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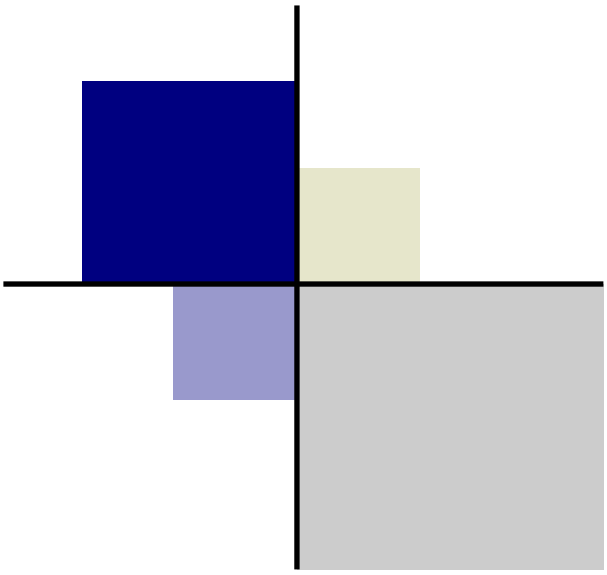

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Documenting Cooperative Extension's Family Resource Management Impacts: Insights and Outcomes from a National Effort

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Family Resource Management (FRM) professionals of the Cooperative Extension System contribute to the financial security and well-being of individuals and families and are committed to contributing to financial literacy education scholarship and better positioning Cooperative Extension within the field of financial and consumer education. This paper presents a summary of a multi-year initiative by a team of FRM Extension professionals who build the case for creating a reporting system to document FRM impacts nationally. Initiative activities are summarized and include reviewing existing reporting systems, garnering input from FRM Extension professionals about the delivery and evaluation of FRM programs, identifying barriers and solutions to establishing a common reporting system, developing tools, a logic model, and an inventory of common indicators, concept testing a data collection model, and aggregating multi-state data on FRM outputs and incomes. The paper highlights the processes of the initiative, lessons learned, and the next steps. A reporting system that allows FRM program impacts to be shared with a broader audience, whether stakeholders, funders, or the research community, is timely and important for the viability of the FRM program area at a time when FRM content is being subsumed into or replaced by other programs.

Keywords: evaluation, impact, financial education, family resource management, health, financial literacy, health equity model, social determinants of health

Introduction

Family Resource Management (FRM) professionals of the Cooperative Extension System contribute to the financial security and well-being of individuals and families and are committed to contributing to financial literacy education scholarship and better positioning Cooperative Extension within the field of financial and consumer education. Historically, FRM programs

support family decision-making processes within a context of finite resources. In the past and present, FRM knowledge and skill building have been integrated into topics such as food buying, housing, parenting and childcare, healthcare, health insurance, financial and retirement planning, farm succession planning, insurance, taxes, and recordkeeping. FRM programs are needed now more than ever as families and households navigate the financial shock precipitated by the COVID-19 pandemic, face issues of equity and access, and manage fluctuations of prices in our economy that impact household welfare.

This paper presents a summary of a multi-year initiative by a team of FRM Extension professionals who built the case for creating a reporting system to document FRM impacts nationally. Initiative activities are summarized and include reviewing existing reporting systems, garnering input from FRM Extension professionals about the delivery and evaluation of FRM programs, identifying barriers and solutions to establishing a common reporting system, developing tools, a logic model, and an inventory of common indicators, concept testing a data collection model, and aggregating multi-state data on FRM outputs and incomes.

The 2021 Extension Committee on Organization and Policy (ECOP) Health Equity and Wellness Framework (HEWF) illustrates the social determinants of health that Extension personnel impact through our programs (Braun & Rodgers, 2018; Burton et al., 2021). Though FRM constructs are not plainly expressed in the new framework, they are closely connected to and unified with health. The model helps to illustrate the importance of financial, health, mental health, and health insurance literacy as key health and well-being factors for individuals, families, and our communities. ECOP's 2021 HEWF report recommends a greater investment by Extension in "health-related professionals, programs, and initiatives." (Burton et al., 2021, p. 15). Investment in a topical, programmatic area typically necessitates disinvestment in another. Consequently, professionals and programs not valued or recognized as health-related and tied to the HEWF framework, such as FRM, could be at risk of elimination.

A vast body of research documents that individual financial well-being enables and affects a person's health, and, at the same time, their health impacts their financial well-being (for reviews, see Bartholomae & Fox, 2022; Frasquilho et al., 2016; Hoffman et al., 2018). The interconnection of health and financial well-being is manifested in a person's values, attitudes, behaviors, and decision-making, including the ability to assess tradeoffs and outcomes associated with decisions regarding resources (time, energy, money, developmental capability, etc.). The connection between the two is also evident in the management of and/or access to resources, the ability to identify and plan for goals related to well-being, and/or the ability to mitigate events and/or rebound from events that disrupt or negatively impact well-being (Bartholomae & Fox, 2022). One's risk management ability and understanding of and confidence to use technical and legal information is a requisite to facilitate health and financial well-being. In sum, FRM is integral to the framework and highly relevant to Extension's current programmatic work, whether in stand-alone FRM programs or integrated with other program areas.

FRM programming has long supported the health and well-being of individuals and families by increasing knowledge, skills, confidence, and positive behaviors through implementing consumer educational programming, building community partnerships, offering professional development training, and conducting research to understand the well-being of consumers. With the programmatic area of FRM as the focus, this article summarizes an evaluation initiative undertaken to identify common indicators and document the national impact of Extension's FRM educational efforts. Though FRM program efforts include a broad range of topics, this team focused on financial literacy education for this evaluation initiative.

Financial literacy education is an important aspect of FRM, and those programs offered by Cooperative Extension have been shown to have an impact (Battelle, 2015). Extension FRM programs use a variety of evaluation strategies that focus on short-term (knowledge and skills acquisition) and intermediate-term (behavior change) outcomes. However, in the past decade, FRM impact evaluations have been absent from reviews documenting the efficacy of financial education (e.g., Fernandes et al., 2014; Kaiser & Menkhoff, 2017). Like most community-based financial education evaluations (National Endowment for Financial Education, 2016), FRM Extension programs often fail to meet the rigorous empirical standards required to be published in peer-reviewed journals. Consequently, Extension FRM program evaluation results are mostly absent from meta-analytic reviews of financial education program evaluations (e.g., Fernandes et al., 2014; Kaiser & Menkhoff, 2017; Kaiser et al., 2020). Meeting the stringent inclusion criteria, such as long-term follow-up and randomized control or quasi-experimental evaluation designs, is expensive and often not suitable for financial education programs (Consumer Financial Protection Bureau [CFPB], 2015).

An evaluation of FRM programs in the North Central Region found FRM programs to be effective on many levels, but evaluation efforts were noted to be "frustrated by inconsistencies across states in reporting methods used and in some cases the lack of useful data" (Battelle, 2015, p. ES13). To address these issues, a team of Cooperative Extension FRM professionals has worked together since 2015 to coordinate efforts and document FRM impacts nationally. In doing so, this group builds the case for creating a reporting system that will facilitate and contribute to the body of scholarship on financial education evaluation in general and Extension financial education initiatives, in particular.

Project Background and Rationale

Like many Extension programs, FRM programs are delivered with scarce resources in a crowded marketplace and an environment of greater accountability to stakeholders, particularly funders (Bartholomae & Pippidis, 2015). The costs, overlap, duplication, coordination, and effectiveness of federal financial literacy activities, including those of the U.S. Department of Agriculture (USDA), have been examined by the U.S. Government Accountability Office (GAO; e.g., see reports from 2004, 2012a, 2012b, 2014). One report recommended that Congress require federal

agencies to evaluate financial literacy efforts (GAO, 2012a). Regionally, an external evaluation of the efficacy of family and consumer sciences (FCS) programs concluded that program efforts have an opportunity to "strengthen its knowledge-sharing process to reduce parallel efforts and combine efforts in evaluation work in order to better document program successes" (Battelle, 2015, p. ES13).

These are among the many compelling reasons that emerge from the current environment to support a national, coordinated evaluation effort. Since 2010, some federally funded financial literacy programs have been defunded (GAO, 2012a). The efficient use of funds and resources used for financial literacy activities by federal agencies, such as the USDA, was recently recommended (Mnuchin & Carranza, 2019). By obtaining collective impact data, the Cooperative Extension System's FRM programs provide administrators and decision-makers with evidence of efficacy to safeguard and expand the future of this program area. Over time, there has been a drop in the number of Extension professionals working in FRM.

FRM is not alone in this aspiration; other Extension program areas recognize the imperative to report common measures systemwide to hold up their work. In 2012, the 4-H Common Measures framework standardized the reporting of youth outcomes nationwide with the goal of aggregating measures to improve program quality and accountability (National 4-H Council, n.d.). This collaboration between USDA National Institute of Food and Agriculture (NIFA), land-grant universities, and faculty and county 4-H staff integrates 4-H Common Measures into NIFA's Plan of Work system and provides resources and training for reporting. Currently, reporting from 48 land-grant universities to the 4-H Common Measures framework occurs (National 4-H Council, n.d.).

Community Resource and Economic Development (CRED) has a national indicators team driven to support an effort that aggregates and documents common indicators so stakeholders at all levels understand the difference Extension is making (Morse et al., 2014). Since 2010, CRED has reported and collected data from 12 states using the "but for" rule to show evidence of their contribution. This rule relies on follow-up with stakeholders who provide a statement about a significant change that was realized because of working with a CRED program. Unlike the current FRM effort, these efforts are explicitly supported by USDA NIFA and from USDA NIFA funding.

Extension systems recognize the importance of evaluation as demonstrated by the investment made in maintaining centralized evaluation teams charged with supporting evaluation efforts across their system. In our experience, these teams are comprised of talented evaluation professionals. However, many lack the capacity to fully support all of their system's evaluation activities, and it is likely unreasonable to expect this. Consequently, evaluation falls to the content expert, who must have evaluation skills. The aspiration of a common indicator system across the larger Extension system is ambitious but worthwhile. This feature paper describes the

project goals and process, program impacts, as well as limitations, and lessons learned from a national initiative to systematically aggregate FRM program outcomes between 2017 and 2019.

Project Goals and Process

A range of activities supported two primary goals of the project: 1) discovering and strengthening links between local programming, state initiatives, and national priorities, and 2) bringing leadership to national reporting efforts.

Goal I. Discover and Strengthen Links Between Local Programming, State Initiatives, and National Priorities

Given the need identified to document national impact, a prerequisite was to investigate current or previous common reporting. To this end, the authors spoke with several key representatives in Extension and at USDA NIFA, considered current reporting systems, and reviewed current and past FRM initiatives that aggregated data for reporting purposes.

USDA NIFA collects information from states based on the Annual Reports of Accomplishment and Results and the Plans of Work (POW) templates (USDA, 2021). Annually, states use a web-based reporting system to submit that information. The POW includes information about the proposed programming and research initiatives by identified Knowledge Areas and outcome indicators. At reporting time, information related to the POW is submitted. The USDA NIFA Business Reporting Office makes this information available.

Knowledge Areas were developed several decades ago to articulate the areas in which Extension works. Those supporting FCS FRM include KA 801 Individual and Family Resource Management; KA 607 Consumer Economics; and KA 807 Disaster Preparedness, Mitigation, Response, and Recovery (USDA NIFA, 2019). Each of these knowledge areas is broad, inclusive, and suggests specific indicators. The KA801indicators are most relevant to FRM programs and are as follows: 1) number of individuals who learn about financial capability including a) earning/ income, b) spending, c) saving and investing, d) borrowing, and e) protecting; 2) number of individuals who learn about consumer decision-making; 3) number of individuals who improved or adopted financial capability and/or consumer behavior skills; or 4) number of reported changes in financial capability and/or consumer behavior. For Federal reporting, some states include impact statements and success stories, which are available by contacting USDA NIFA. Additionally, the landgrantimpacts.org website houses information for decision-makers and the media.

Our findings revealed that USDA NIFA is not able to aggregate data nationally to tell a cohesive story of the impact of FRM programming. Data can be accessed by state and/or by keyword search. The authors were aware of multi-state initiatives based on curriculum and/or program

initiatives that then aggregated information and provided impact reports. Previous FRM initiatives have included:

High School Financial Planning Program

Working with the National Endowment for Financial Education (NEFE), Extension FRM educators provided professional development training for teachers and youth workers and used the resources to support youth education (Danes et al., 1999; Danes & Brewton, 2012). Students who completed the High School Financial Planning Program (HSFPP) were found to increase their confidence in making decisions (Danes & Brewton, 2012). Among teachers delivering NEFE's HSFPP, just over half (51% to 54%) reported confidence in teaching the personal finance topics covered in the curriculum. Among teachers delivering NEFE's HSFPP, 52% to 62% found the curriculum relevant to their students, and 47% to 69% were satisfied with the content of the curriculum (Danes & Brewton, 2012).

Money 2000™

This initiative focused on building the financial capability of adult audiences through several programs and topics. Participants reported changes in behavior and savings data that were aggregated and reported nationally (O'Neill et al., 1999, 2000).

Financial Security in Later Life

During the early 2000s, this national Extension initiative focused on developing a reporting system for any FRM educator conducting financial management and retirement education programs for adults later in life. Information was collected and aggregated from participating states, allowing reported outcomes (Porter et al., 2005). By the sixth year of the initiative, this system-wide program delivery and evaluation effort accounted for educating 38,132 individuals in 24 states (Porter et al., 2005).

More current FRM initiatives include:

Small Steps for Health and Wealth

This program focused on increasing knowledge about health and financial topics and strategies for making change. Multiple states used and/or adopted the materials to conduct programming. Outcomes were reported at the state level through conferences and briefing papers (O'Neill & Ensle, 2014), with the possibility of national impact yet to be shown.

Your Money, Your Goals

In partnership with the CFPB, multiple states offered professional development for helping professionals featuring Your Money, Your Goals (YMYG), a financial empowerment toolkit.

The training focused on increasing confidence and knowledge in financial literacy concepts and increased access to tools to use with their clientele. Data from 12 participating states were collected and aggregated for reporting (Bartholomae et al., 2016). Approximately 460 participants completed pre- and post-test surveys, and 89 participants completed a 3-month follow-up survey. Data from a subsample (n = 58 matched pre-posttests; n = 22 completed 3-month follow-up data) showed that 94.8% agreed and/or strongly agreed the training prepared them to use the YMYG toolkit and 55.5% felt well-prepared to use the financial empowerment tools after the training. Since being trained in the use of YMYG, approximately 95% of frontline workers discussed financial information with six clients, on average (number of clients ranged from 0 to 25), 76.1% used YMYG tools and resources with three clients, on average (range of 0 to 10), and 60% referred four clients, on average, to other financial resources (number of clients ranged from 0 to 25). Over three-quarters of the professionals trained (76.2%) said their interactions with clients have been affected (Bartholomae et al., 2016).

Smart Choice™ Health Insurance

Rolled out during the implementation of the Affordable Care Act, this timely health insurance literacy program provided curriculum resources and training to Extension educators to show program validity. Data were collected nationally during the pilot stages, and the impact was reported in briefing papers, on the website, and through conference presentations. States reported their data locally (Bartholomae et al., 2016; Brown et al., 2016). Based on aggregated data from seven states piloting Smart Choice™, multivariate analysis showed consumers made significant gains on a standardized health insurance literacy measure. Participants who made greater gains in their health insurance literacy tended to be female, had higher incomes, and were consumers residing in states that supported the ACA.

The findings suggested additional work was needed to gather information from Extension professionals and identify strategies to work together to advance the common impact initiative. In November 2015, at the Extension preconference of the Association for Financial Counseling, Planning and Education (AFCPE), the authors led a round table session to introduce the common indicator initiative. Emerging from the round table discussions was an interest in working together, developing a summary of information about curriculum and evaluation strategies currently being used, and making a commitment to future engagement to advance the common indicator initiative.

Monthly work group meetings and agendas helped set working principles. The organizing principles recognized by the project leads were to

- maintain inclusion,
- make sure the process continues and make it happen,
- recognize people who are participating and contributing,

- support opportunities for scholarship,
- navigate differences between authorship and acknowledgment,
- keep processes simple but effective while working toward the overall goal, and
- recognize and accommodate differences among states as best as possible.

The goal was to collect data from as many FRM professionals willing to participate in states nationwide; however, differences in state reporting and evaluation systems offered several challenges that prevented participation (Pippidis et al., 2017). Many FRM colleagues had a limited role in reporting outcomes and were unable to participate. Some states have state specialists who lead evaluation; others do not. Not all Extension staff have input in what is reported, just what they report. We learned there are differences in what gets reported and what counts as a program. For example, Michigan and Iowa only report programs that deliver more than one session. One FRM colleague could not contribute to the project because in any given year, FRM data is only collected if it is selected as a focus of evaluation efforts, otherwise, data are not available.

The goals for the working group meetings were successfully met. The inclusivity goal of collaborating with as many FRM Extension personnel who wished to participate as possible resulted in a committed group of 24 Extension educators from 19 states. The goal of identifying curriculums and indicators resulted in an inventory of indicators and the development of a crosswalk of indicators that were organized and aligned with NIFA indicators, umbrella indicators, and the actual indicators. These indicators include participation data (output data) and changes in knowledge, attitude, confidence, aspiration, and behavior, as well as actual measurements of change (how much was saved). The group developed three logic models that supported the programming efforts for this group's typical target audiences: consumers, professionals and volunteers, and decision-makers. Lastly, strategies were identified to inform FRM professionals and engage them in reporting their data (Pippidis et al., 2017). The workgroup documents are available from the Financial Security for All Community of Practice (FSA CoP) webpage at https://personal-finance.extension.org/getting-extension-on-the-map-common-indicators-common-reporting/

Goal II. From Information Gathering and Organization to Action

Communication and dissemination of information were necessary to advance the initiative and get buy-in from FRM colleagues who were not present at the AFCPE roundtable discussion. Outlets included quarterly FSA CoP meetings, formerly housed under eXtension, which was recently renamed the Extension Foundation (Weibe, 2021). The February 2016 FSA CoP webinar resulted in support among FRM Extension network members to develop a national reporting system and inform the workgroup agendas. In 2017, a Briefing Paper was developed to describe the scholarship supporting the project, project rationale, history, logic models, indicators, and crosswalk (Pippidis et al., 2017). The document was distributed to network

members and used to inform the FRM community, decision-makers, and program leaders within states and at USDA NIFA. The progress of this initiative was presented at the subsequent presymposia at the AFCPE Annual Symposium (2016 through 2019).

Develop a System to Aggregate Data

Steps were taken to create a reporting structure. Through conversations, it emerged that a system of state contacts should be employed. Each state contact would then be charged with collecting and reporting output and outcome/impact data from their state annually. Reporting tools for local Extension educators and the state contact were also developed. Twenty-seven states identified state contacts and committed to participating in regular meetings to develop the reporting system.

Because of the progress made, 14 states committed to pilot-testing the reporting tools using FY2017 data. In early 2018, as state contacts summarized FY2017 data for their state, data were submitted via an online survey platform to allow aggregating. The year 2018 also began what was dubbed the year of concept testing. All contacts were invited to work with their state's local unit educators to engage in the data collection process to test the system that had been developed. Quarterly meetings were held with state contacts to keep them up to date, identify emerging needs, and address any concerns.

In early 2019, data from the 2018 concept test were submitted. Soon after the data were submitted, state contacts met to discuss what did and did not work. Adjustments were made to the data collection tools, and preparations for collecting 2019 impact data were made. The official launch year was 2019. Annual data collection continued through 2022, and though interest in data collection continues, annual data collection paused as states adapted programming and responded to COVID-19.

Provide Training and Awareness about the Importance of Evaluation and Reporting

Though the Cooperative Extension FRM network was accustomed to participating in and supporting national programming efforts (e.g., NEFE's High School Financial Planning Program, Money 2000, Financial Security in Later Life), there had not been an effort to aggregate data from the variety of programs delivered and evaluated at the state and local level. Tools were developed to provide a shared framework, build evaluation capacity, and promote consistent reporting by states.

In addition to developing a system to aggregate data, another goal was to provide training and awareness about the importance of evaluation and reporting. This goal was accomplished through periodic webinars and regular updates through eXtension (now Extension Foundation) and the FSA CoP and presentations at professional meetings, such as the annual AFCPE preconferences between 2015 through 2019, National Extension Association of Family and Consumer Sciences (NEAFCS) in 2019 and Epsilon Sigma Phi (ESP) in 2020.

Program Impacts

Report Program Outputs and Outcomes

Working through multiple years and process iterations, FRM professionals developed and reached a consensus about common indicators to collect. These indicators were integrated into a State Contact reporting template and an Educator reporting template. The state reporting template, completed by the state contact, included questions about the number of educators and counties reporting, outputs, and outcomes. An FRM output measure might include the number of workshops delivered (activities) and the number of people reached through workshops (participation). Outcomes related to FRM learning objectives would be evidence of individuals and/or professionals gaining knowledge, confidence, and/or skills related to financial management concepts such as savings, investing, insurance or credit management, consumer rights and protections, or process skills such as record keeping.

The Educator reporting tool, completed by local and regional educators, asked questions about program format and length, outputs, and outcomes. Educators were also asked to conduct follow-up evaluations to collect medium-term changes (3–6 months). Starting in 2017, an online data collection tool was available to all state contacts for them to record their annual data based on the state reporting template. The number of states reporting across years (2017 to 2021) has averaged 14, ranging from 9 to 21.

Fluctuations in participation can be attributed to changes in programming and reporting priorities at the state level as well as changes in staffing, including retirements. While it is important to note the number of states submitting data each year, FRM Extension programming reaches a significant number of consumers across the country. Extension personnel also train thousands of professionals each year, who then reach consumers, multiplying the impact of their efforts. Since project inception through FY21—in aggregate, FRM has reached 2,200,750 consumers among the states reporting. This number includes the number of consumers reached by both Extension professionals and by volunteers. The total numbers reported annually throughout the project were impacted by the number of states reporting, clarifications and refinements in the data collection tools, and how states responded and adapted their programming and reporting efforts in response to COVID-19. Thus, while impressive, this figure understates the total reach of subject matter programming and activities.

While the data collection tool documented increases in knowledge, intention, and behavior change, post-program follow-up evaluations are not appropriate for all Extension educational efforts. States were given the opportunity to share data from the program evaluations they administered related to the number of participants who increased their knowledge, skills, confidence, attitudes, and behavior change related to important financial management and consumer economics practices. For example, practices documented included reducing debt and/or household spending or initiating or increasing contributions to a savings plan.

With aggregated data to share, data placements were identified as a reporting tool (Pankaj & Emery, 2016). Program impacts have been reported to a variety of audiences. They have been used to share programming outputs and outcomes during state contact and FSA CoP meetings, at professional conferences (Bartholomae & Pippidis, 2015; Pippidis et al., 2019), and through national professional development webinars (Kiss et al., 2020).

In sum, these findings highlight the challenges in aggregating information and providing evaluation data that could be used to showcase the effectiveness of FRM program efforts, thereby recognizing the impact of Cooperative Extension FRM program efforts.

Limitations and Lessons Learned

Several lessons emerged from the effort to aggregate common indicators nationally across FRM Extension programs. Many considerations went into the design of a reporting system. As with any system, there are imperfections. For example, states use different annual reporting years depending on the practice in their state: calendar year, federal fiscal year, or state fiscal year. The State contacts had to be flexible, collaborate with colleagues, and utilize or extract existing state data to fit this new system. Most state contacts are not able to document efforts such as the number of FTEs being spent on programming. In meeting the educational needs of clientele at the local level, there is no single, standard curriculum delivered and evaluated, a limitation to be considered. FRM professionals often engage in policy, systems, and environmental change activities in the community and provide training for professionals, but these types of activities are not captured in this project's reporting. Also, cross-disciplinary work, for example, with community vitality, community development, farm succession or financial planning, and/or health equity, is not explicitly recognized as FRM work. Some of the lessons learned include:

Be Inclusive

Early on, it was recognized that Extension professionals varied in their reporting and evaluation experience. The process honored FRM professionals by intentionally creating a process and reporting system that was not overly strict or exclusionary. Not all FRM professionals are involved in the state's plan of work or reporting; some educators submit evaluation information to their program director, and the administration decides what is ultimately reported. State differences in reporting were recognized and accommodated.

Keep It Simple and Build in Complexity

The process of collecting and aggregating data is complex. Issues continually emerged that required consensus. As a result, efforts were simplified. Currently, the team is considering reporting on a national curriculum, like other federal agencies such as the FDIC's Money Smart (Lyons & Scherpf, 2003) or the CFPB's YMYG. This is more challenging because Extension's approach is driven by local needs.

Set Goals

Evaluation research pushes programs to go beyond just counting the number of programs and participants (Braverman & Engle, 2009). This initiative set a simple goal to collect "some data from every participant for every program that we do so we can tell a national story of outreach and impact" (State Contact, Personal Communication, 2016). The evaluation initiative succeeded in the data collection goal, but limitations of the process remain.

Understand Differences in Personnel Capacities Related to Program Evaluation

Some educators are more attuned to the evaluation and reporting that occurs in their state than others. In some states, there is no specialist or county/regional educator with data collection and reporting responsibility. Early on, a work group member requested a glossary to help interpret the data requested to ensure consistency across states when submitting data to the national reporting system. Quarterly meetings with rich discussions helped to increase evaluation competency.

Recognize Colleagues May Have a Limited Role in Reporting

Many FRM professionals who contributed to this collective dialogue indicated that they do not have input into what is collected and/or submitted for their Federal Report. Instead, administrators may be responsible for determining evaluation priorities and submitting information to USDA NIFA.

Conduct a Concept Test

A concept test helped the State contacts and the FRM educators to be clear in what they were being asked to report. After the concept test, we provided a glossary of terms for the data collection, such as what qualified as a program and what counted as a follow-up.

Convene and Communicate Regularly

The project involved many complexities and unknowns. As part of the process, the FRM team met regularly and worked through questions until a consensus was reached. The shared purpose and dialogue of the meetings contributed to a greater understanding of the array of work being implemented across states and the challenge of common reporting.

Disseminate and Celebrate Accomplishments

To keep the energy going and bring recognition to FRM work, it was critical to create products to disseminate the commitment, efforts, and findings demonstrated by the FRM Extension professionals. It was important for the team to keep the project's goals in mind and to be patient.

Conclusion and Next Steps

Extension programs try to provide rigorous research evidence documenting effective implementation and impact. At the same time, programming is driven by local needs, which makes programs relevant to program participants but also makes national reporting difficult. The evidence provided through data aggregation is impressive, and the lessons learned from this common reporting initiative underscore the need for an investment in a system that provides an organized way to document Cooperative Extension's FRM/Financial Literacy impacts. At the same time, the initiative underscores the challenge of being able to achieve data integrity in a common reporting system. One solution may be to create a national curriculum to address specific issue areas. A single curriculum could create a multi-state delivery with combined reporting efforts. Just documenting the output—the number of consumers and professionals reached—across participating states is an accomplishment.

Partnerships with other state and federal organizations that could provide opportunities to develop additional educational resources, support the training of educators, assist with evaluation of materials/program efforts and potentially offer funding to support all these initiatives are worth investigating. As federal agencies such as Federal Deposit Insurance Corporation (FDIC), CFPB, and Health and Human Services realign their efforts, partnerships with Extension may provide avenues for reaching additional citizens and small businesses at the local level.

The sustained effort of the common indicator initiative is not without challenges. There are a limited number of FRM professionals across the country. Additionally, as noted earlier, the financial literacy and family resource management content area is not always comprised of just stand-alone FRM programs. Rather, the content is integrated into other content areas within FCS as well as other Extension program areas such as 4-H youth development, agriculture, natural resources, and community development. Consequently, financial literacy efforts implemented by other Extension program areas may not be reported or captured. The lack of confidence or knowledge of non-FRM-trained educators to elevate the content area may diminish potential outcomes for program participants. For example, educators may provide information about the importance of accessing health care without addressing the cost and tradeoffs. Training may be needed for educators.

The new ECOP Health Equity and Wellness model provides an opportunity to identify the importance of FRM concepts, skills, and tools and elevate them across programmatic issues related to health, equity, and well-being. Identification and use of key FRM indicators could help support the health equity model currently being espoused and provide a basis for unified data collection and impact reporting across the Extension systems.

The 2021 ECOP HEWF highlights several grand challenges of our time, including COVID-19, mental health, food insecurity, health insurance, the opioid crisis, and climate change. FRM professionals are well-positioned to respond to the needs of their communities on these issues

and others. Future efforts need to address a sustainable way to document impact given the embedded nature of family resource management and financial literacy knowledge and skills in most aspects of individual and family well-being.

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Examining the Experiences of College Students Simulating the Community Worker Role in the Community Action Poverty Simulation

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Poverty is a pervasive issue impacting many areas of human sciences and Extension. Individuals living in the United States may have varying attitudes toward poverty. Research has shown that poverty simulations are effective in modifying attitudes toward poverty. The Community Action Poverty Simulation (CAPS) program is one such example that exposes its participants to the lived realities of poverty in the United States. While research on CAPS is plentiful, little research has examined the experiences of those who simulated the community worker role. This research explored the experiences of students who simulated community worker roles during a CAPS simulation. This research used the Reflexive Thematic Analysis approach to analyze 50 sampled student reflection papers. The students were enrolled in a large, public land-grant institution in the Southeast. All students completed a family resource management course in either Fall 2015, 2016, 2017, 2018, or 2019. Students shared that they learned about poverty by observing other students. They also expressed their intentions of donating, volunteering, and avoiding judgment of those living in poverty. This research contributes to the literature on CAPS outcomes, specifically for supporting community worker roles.

Keywords: teaching about poverty, poverty simulations, Community Action Poverty Simulation, experiential learning, Extension, poverty

Introduction

Poverty in the United States of America is a pervasive issue that spans all Extension and human services areas. For instance, those living in poverty have lower levels of nutrition, lower levels of school achievement, negative health issues, a lack of access to affordable health insurance, and a lack of affordable housing (Collinson & Reed, 2018; Dreyer, 2019; Keisler-Starkey & Bunch, 2020; Larrimore & Schuetz, 2017; Williams & Latkin, 2007). In 2019, 10.5% of American families lived in poverty (Semega et al., 2020), and the official poverty rate increased to 11.4% in 2020 because of the COVID-19 pandemic (Shrider et al., 2021). The U.S. Department of Health and Human Services sets the annual poverty guidelines, which identify the minimum income needed to cover basic needs such as food, clothing, and shelter. According to the guidelines, a single person in 2022 earning at or below $13,590 is deemed to be living in poverty (U.S. Department of Health and Human Services, 2022).

Research has shown that Americans have different attitudes toward poverty (Ekins, 2019; Feagin, 1972, 1975). For instance, lower-income, politically liberal, and minoritized households are more likely to believe that poverty is the result of systematic/structural barriers (Bradshaw, 2007). Examples of systematic/structural barriers include, but are not limited to, the rise of low-wage jobs, discrimination, and the high cost of living (Brady, 2019). On the other hand, affluent, politically conservative, and White households may believe that poverty results from individual attributions (Hunt, 1996, 2002, 2004). Examples of individual attributions include personal laziness, lack of education, lack of motivation to work, or substance abuse (Bradshaw, 2007). Although research shows that both individual and structural factors contribute to poverty, Americans and college students, especially from affluent communities, are more likely to believe individual attributions are the sole cause of poverty (Zosky & Thompson, 2012). As such, educational efforts to align college students' views with the lived reality of those in poverty are worthy of undertaking (Parks, 2023; Parks & Worthy, 2023).

One such effort, the Community Action Poverty Simulation (CAPS), was created by Missouri Community Action Network (MCAN) in 2003 to expose individuals to the realities of poverty in the United States. Over 2,000 organizations, including Extension programs at land-grant institutions, have used the CAPS program through a licensing agreement (Missouri Community Action Network [MCAN], n.d.). Examples include North Dakota State University Extension (Pankow, 2006), University of Georgia Extension (Chapman & Gibson, 2006; Nickols & Nielsen, 2011; Parks et al., 2023), and University of Tennessee Extension (Franck et al., 2016). This live-action role-play program enables policymakers, teachers, business owners, and students to experience the realities that those living in poverty may encounter. The objectives of the simulation are to (1) promote poverty awareness, (2) increase understanding of poverty, (3) inspire local change, and (4) transform perspectives about poverty (MCAN, n.d.). CAPS features several family types, including single parents, grandparents raising grandchildren, and homeless adults.

CAPS participants may simulate one of three roles (1) adult, (2) child, or (3) community worker (MCAN, n.d.). Usually, CAPS student-participants simulate only the adult role (Arnett-Hartwick & Davis, 2019; Arnett-Hartwick & Harpel, 2020; Nickols & Nielsen, 2011; Nnakwe, 2020). The CAPS facilitators might ask external volunteers (e.g., other professors or community members) to simulate community worker roles (Hartman et al., 2020; Mann, 2017; Smith-Carrier et al., 2019). Often, the child roles are left unclaimed or are simulated by dolls if there aren't enough student participants. Thus, little research examined the experiences of those who simulated the role of the community worker or child roles (Hartman et al., 2020; Mann, 2017; Parks et al., 2024).

The purpose of this research was to examine students' experiences simulating the community worker roles during CAPS. The students were enrolled in a family resource management course at a large, public land-grant institution in the Southeast. The program was offered by a local Extension agent for University of Georgia Extension, making it both a Family and Consumer Sciences (FCS) and Extension program. This sample drew on 50 reflection papers from students who simulated the community worker role during a CAPS simulation from 2015 through 2019. The students were enrolled across five different years in the same family resource management course at a large, public university in the Southeast. Additionally, this research relied on Kolb's (1984) Experiential Learning Model to frame the student reflection questions. Braun and Clarke's (2006) Reflexive Thematic Analysis approach was used to analyze the student reflection papers.

This research makes a twofold contribution to the literature. First, it adds to the body of Extension studies that have used CAPS by specifically exploring community worker data (Arnett-Hartwick & Davis, 2019; Arnett-Hartwick & Harpel, 2020; Kihm & Knapp, 2015; Nickols & Nielsen, 2011; Nnakwe, 2020). Most of the studies about CAPS emanate from nursing and public health (Noone et al., 2012; Northrup et al., 2020; Phillips et al., 2020), with very few from Extension and Family and Consumer Sciences (FCS). Second, to the authors' knowledge, few studies have addressed the experiences of college students who simulated community worker roles (Hartman et al., 2020; Mann, 2017; Smith-Carrier et al., 2019), with even fewer studies examining the community worker roles in general. This lack of inclusion suggests that only the participants who simulate adult roles could have a meaningful experience with CAPS. However, there is merit in exploring whether the community worker role was likewise meaningful to student-participants. Exploring whether the community worker role is a useful learning activity for FCS college students could improve their empathy toward those living in poverty (Parks & Worthy, 2023).

Literature Review

Research suggested that poverty simulation education in Extension and Family and Consumer Sciences (FCS) programming is beneficial (Chapman & Gibson, 2006; Nickols & Nielsen, 2011;

Parks & Worthy, 2023; Parks et al., 2024). Since Extension and FCS professionals are designed to serve their communities, it is imperative that their programs are sensitive to those of low socioeconomic status (Pankow, 2006). Therefore, teaching college students about the lived and complex realities of poverty may contribute to better Extension programming, helping them to better serve their communities (Parks & Worthy, 2023). The CAPS program is one of the many experiential learning tools used to teach about poverty (Nickols & Nielsen, 2011).

Use of CAPS in Extension

CAPS has been used among University Cooperative Extension programs (Chapman & Gibson, 2006; Franck et al., 2016; Pankow, 2006). These studies demonstrated the effectiveness of CAPS on attitude change (Arnett-Hartwick & Davis, 2019; Arnett-Hartwick & Harpel, 2020), increased empathy (Nickols & Nielsen, 2011), and general increase in the understanding of poverty (Kihm & Knapp, 2015). These studies underscore the utility and effectiveness of CAPS for both FCS college students and Extension professionals (Parks et al., 2023).

Chapman and Gibson (2006) showed that CAPS is effective in changing participants' attitudes and in increasing participants' level of confidence in helping the poor. According to Pankow (2006), North Dakota State University Extension has offered a CAPS program since 1996, with the first simulation featuring 50 Extension educators. Pankow's (2006) study conducted various simulations with 420 participants. Post-simulation surveys issued between 2001 and 2003 revealed that 80% of the participants indicated that their perceptions of those living in poverty had changed. Open-ended responses from follow-up phone interviews (n = 14) revealed that participants completed some form of action (e.g., donated or volunteered their time at a homeless shelter) and gained a better understanding of poverty.

Franck et al. (2016) partnered with a local school in Tennessee to increase awareness of student homelessness and childhood poverty among schoolteachers and community members. Fifty-six out of 102 participants completed the 16-item CAPS questionnaire. Results showed that participating in CAPS had effectively increased participants' awareness of poverty and elicited empathy for impoverished children and families. Results from the survey's two open-ended questions revealed three themes: concrete actions, increased awareness, and increased empathy. Participants shared that they were going to donate money, volunteer their time, and be less judgmental toward those living in poverty.

Although few CAPS studies emanate from FCS, those that do discuss a wide range of outcomes. Some discuss attitude change (Arnett-Hartwick & Davis, 2019; Arnett-Hartwick & Harpel, 2020; Nickols & Nielsen, 2011), empathy (Nickols & Nielsen, 2011), or increased understanding of poverty (Kihm & Knapp, 2015). The research spans several FCS programs, including Human Development and Family Studies (HDFS), FCS education (Arnett-Hartwick & Davis, 2019), family resource management (FRM), and nutrition programs (Nnakwe, 2020). FCS research also extends to non-college audiences, including 47 FCS teachers from the Midwest (Arnett-Hartwick

& Harpel, 2020). Studies by both Arnett-Hartwick and Davis (2019) and Arnett-Hartwick and Harpel (2020) used Yun and Weaver's (2010) scale and determined there were marginal changes in attitudes towards poverty among their sampled participants. Yun and Weaver's (2010) 21-item Attitude Toward Poverty (ATP) scale is widely used in CAPS literature and assesses undergraduate ATP pre- and post-CAPS. Kihm and Knapp (2015) used the scale embedded with the CAPS simulation and saw general changes in participants' understanding of poverty. Themes included the difficulty of living in poverty, poverty has many implications, and access to resources (Arnett-Hartwick & Davis, 2019). With the exception of one study (Nnakwe, 2020), research generally showed significant changes in ATP when FCS students participated in CAPS. Lastly, as noted in the literature, few studies have addressed the experiences of college students who simulated community worker roles (Hartman et al., 2020; Mann, 2017; Smith-Carrier et al., 2019).

Despite the many contributions that CAPS brings as an experiential learning opportunity, it has limitations. Scholars addressed some of the challenges of using CAPS, primarily related to how it can perpetuate negative stereotypes (Gaines, 2018). They noted that some of their Illinois teacher-participants drew stereotypical conclusions about all low-income persons as being criminals. Research also discussed the negative and possibly triggering impact that CAPS could have on low-income participants (Reid & Evanson, 2016; Smith-Carrier et al., 2019). Smith-Carrier et al. (2019) and Hartman et al. (2020) warned that facilitators and community workers must be properly trained so that CAPS is not too emotionally damaging for its participants. Franck et al. (2016), in their Extension work with teachers in Tennessee, stressed the importance of having well-trained volunteers involved in the debriefing phase. Pankow (2006), in their Extension work, warned that simulations could be counter-productive if learners do not have the chance to process their experience and discuss it.

Theoretical Framework: Kolb's (1984) Experiential Learning Model

This study relied on data from student reflection papers, which asked students to reflect on their experiences with CAPS. This research relied on Kolb's (1984) Experiential Learning Model (ELM) to frame the student reflection paper questions. The prompts were designed to help the student-participants process their feelings and share their experiences during the simulations. The ELM model contains four phases: (1) concrete experiences, (2) reflective observation, (3) abstract conceptualization, and (4) active experimentation. Concrete experience involves learners engaging in new experiences (Hughes et al., 2012). Concrete experiences (e.g., CAPS) require learners to become involved in hands-on learning activities. The reflective observation stage requires describing what happened during their CAPS experience (Browne & Roll, 2016). Reflective observation is relevant during both the debriefing period and when the students write their reflection papers. The abstract conceptualization, or the generalization stage, asks learners to integrate their experiences into logically sound theories and new perspectives (Kolb, 1984). This phase also includes comparing what one just observed in CAPS to what is already known

about poverty. In the case of the CAPS program, students entered the simulation with previously established attitudes toward poverty. Lastly, during the active experimentation phase, learners tested the theories formed in the abstract conceptualization phase. They then used these theories to guide future decisions and behavior (Sugarman, 1985). After completing CAPS, students were asked to write a two- to four-page personal reflection paper addressing several prompts:

1. Concrete Experience and Reflective Observation: Please provide a thorough description of your experience. (What role were you in during the simulation? What challenges did you face?)
2. Reflective Observation: Please describe how you felt about your experience during the CAPS.
3. Abstract Conceptualization: What did you learn from CAPS?
4. Active Experimentation: What were some of your takeaways (highlights/key points) from this experience?

Methodology

This research used Braun and Clarke's (2006) Reflexive Thematic Analysis (RTA) approach to examine a purposive sample of 50 student reflection papers. These college students simulated community workers as a part of their enrollment in either a Fall 2015, 2016, 2017, 2018, or 2019 family resource management class at a large, public institution in the Southeast. These CAPS simulations were hosted by the University of Georgia Extension Program by a local FCS Extension agent, thus rendering it both a collegiate FCS and Extension program.

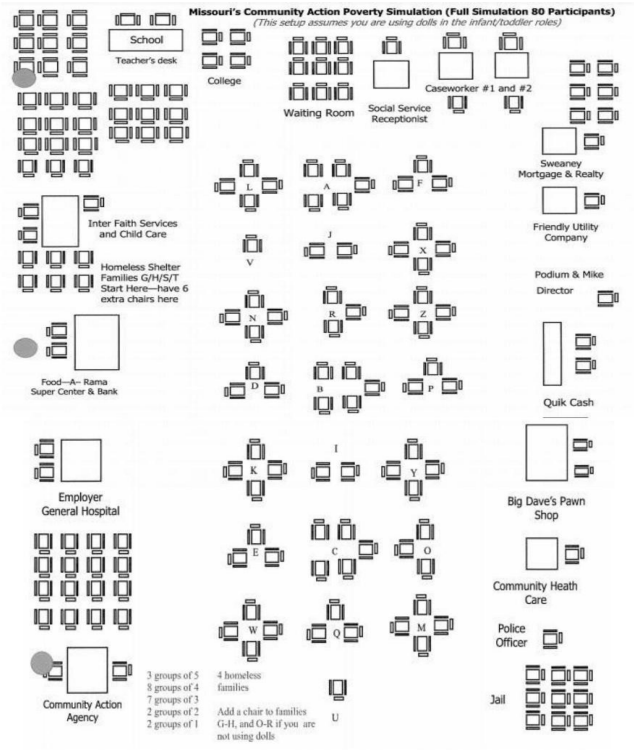
The CAPS Community Worker Roles

CAPS, as a simulation, is set in the fictitious "Realville, USA," where 26 low-income families neighbor each other (See Figure 1). In total, 88 people can simulate a family role (i.e., an adult or child), and between 15 and 20 persons can simulate a community worker role. Participants arrange themselves in family units. Each family is given a "Family Profile," which is a printed handout explaining their household structure, income level, and assets. Household structures can vary from recently unemployed breadwinners to single mothers and even grandparents raising grandchildren. For instance, the Aber family features a 42-year-old recently unemployed husband, a 39-year-old stay-at-home wife, two minor sons, and a 16-year-old pregnant daughter. Those simulating an adult role are responsible for going to work or seeking employment, paying bills, and managing their day-to-day responsibilities. Those simulating the child roles attend school receiving "school opportunity cards" (e.g., needing money for a school field trip) and engaging in efforts to raise money (e.g., babysitting) for their families. Those simulating children must remain in character. The child roles, especially the toddlers, are forbidden to pay bills, purchase groceries, obtain full employment, or provide advice to their "parents."

The community workers maintain table stations located around the periphery of the room. See Figure 1 for a diagram of the room layout. The community workers serve the family members

and represent the institutions that consumers encounter in everyday life. They include a banker, a doctor, a school teacher, and staff representing social assistance programs. For instance, the supercenter clerk accepts Electronic Benefits Transfer (EBT) cards to process the adult characters' Supplemental Nutrition Assistance Program (SNAP) benefits. The social service office caseworker connects student-participants with benefits such as Temporary Assistance to Needy Families (TANF) and SNAP. The students who simulated the community workers typically met thirty minutes prior to the simulation to receive additional training on their roles.

Figure 1. Layout of the CAPS Room



The CAPS simulations in this particular study were different from the literature since some undergraduate students simulated the community worker role. At least 15 people can serve as community workers. During semesters with low enrollment, the facilitators relied on faculty volunteers to simulate the community worker roles. Thus, it was common to have semesters (e.g., 2018) where both students and external volunteers simulated community workers.

Table 1 shows the number of student reflection papers by semester. This research analyzed a total of 50 student reflection papers.

Table 1. Community Worker Participants by Semester

	Fall 2015	**Fall 2016**	**Fall 2017**	**Fall 2018**	**Fall 2019**	**Total**
Student Enrollment	98	66	97	100	99	460
Community Workers	9	3	12	14	12	50

Reflexive Thematic Analysis (RTA)

As a means of data analysis, this research used Braun and Clarke's (2006) Reflexive Thematic Analysis (RTA) approach to explore the experiences of students who simulated a community worker role. Reflexive Thematic Analysis (RTA) contains the following 6 phases:

- Phase 1: Reading and Re-reading the Data
- Phase 2: Generating Initial Codes
- Phase 3: Constructing Themes
- Phase 4: Reviewing Themes
- Phase 5: Defining and Naming Themes
- Phase 6: Producing the Report

During the first phase, the researcher read all 50 student reflection papers twice. During each reading, the first author highlighted phrases and maintained a list of potential codes. Codes are concepts or phrases that are used to categorize and make meaning of data (Benaquisto, 2008). This study relies on inductive coding, which refers to allowing the codes to derive from the data instead of pre-selecting the codes (Benaquisto, 2008). In phase two, a list of potential codes and a working definition of each were compiled. The researcher expected to identify new codes that were not mentioned during the first phase. These secondary codes were considered in a later phase. At the end of every coding session, the inquirer maintained detailed notes justifying why themes and codes were suggested and changed from the previous sessions. Newly formed codes were later defined. The researcher organized each code category into potential themes, memo-ing along the way.

During the third phase, the researcher used ATLAS.ti to organize codes into meaningful themes. The researcher grouped the codes according to categories. For instance, codes related to feelings about the adult role were categorized as Perceptions of Adult Role." After identifying a list of candidate themes during the fourth phase, the researcher refined the themes and recoded them as necessary. The researcher knew when all the candidate themes reflected the data when a specific name and brief description of the theme were generated. During the penultimate phase, the researcher carefully chose which words were used to name the themes. The results section aligns with the final step.

Reliability and Validity

Many qualitative researchers are of the opinion that reliability and validity should be considered differently from quantitative research (Lincoln & Guba, 1986) and should be consistent with the research's theoretical framework and method. Reliability refers to the extent that research is consistent, stable, and could report similar results using the same procedure (Miller, 2008). This research followed standard reliability reflexivity practices such as memo-ing and reflecting on one's views or biases and how they emerge over time (Russel, 2008). Coding drift is a significant

threat to reliability, resulting in a shift in the meaning of codes (Creswell & Creswell, 2017). This problem would lead to generating themes that do not accurately reflect the data or are too broad. Memo-ing is a reliability practice that mitigates coding drift. The researcher was careful to list and define the codes that were used. Additionally, the coder documented the reasons for renaming or redefining codes (Braun & Clarke, 2006). Inter-rater reliability (also known as between-coder agreement) was not employed, since only one researcher analyzed the data (Braun & Clarke, 2006).

Validity, in qualitative studies, can be defined as whether the finding accurately represents the researcher's standpoint and the experiences of the data (Creswell & Miller, 2000). Subjectivity statements are a standard validity practice; they are autobiographical summaries of the researcher's relationship with the research (Creswell & Miller, 2000; Preissle, 2008). These autobiographical summaries might include gender, race, socioeconomic status, age, and education status. These subjectivity statements are intended to encourage reflexivity and to ensure coding validity (Peshkin, 1988).

Results

This research aimed to examine the experiences of students who simulated the community worker role during a CAPS simulation. The sample drew on 50 student reflection papers. The students were enrolled across five different years in the same family resource management course at a large, public university in the Southeast. The first author identified two themes after coding the data using Braun and Clarke's (2006) Reflexive Thematic Analysis: the importance of the community worker role and CAPS participation prompted future actions of the students. The two themes are outlined below.

Theme 1: The Importance of the Community Worker Role

> Theme 1 explored the pedagogical importance of the community worker role for the student-participants. Students gained a unique perspective by serving in the community worker role because they were able to observe the other students' behaviors during the simulation. The statement below from a 2015 student who simulated a Quik Cash worker illustrates this. The Quik Cash worker issues transportation passes, cashes checks, and authorizes title loans. Being able to work behind the tables instead of being in a family was a takeaway because we got to see what it was really like for poverty families with the hustle and grind they have to do each week to survive. The poverty simulation was a great experience to be a part of.

The student who simulated the Pawnbroker in 2016 echoed a similar sentiment. The Pawnbroker offers cash to families for their personal items, appliances, and furniture and cashes checks for the families. In their reflection papers, the students who simulated the Pawnbroker in 2016 mentioned short-changing customers and threatened to avoid doing business with those who

claimed they had been cheated. The student-participants were given the autonomy to conduct business as they wished. The student who simulated the Pawnbroker in 2016 remorsefully stated:

> This kind of corruption is upsetting, especially in a poor neighborhood. People in poverty are the ones who need the honest businessman the most. They are completely powerless against the companies. It became very clear that these families were trying their best, but even then it was not enough… Poverty is not always a choice and getting out of poverty could be near impossible if you are living your life with corrupt businesses. Even when poor people put their best foot forward in hopes to provide just the simple bare necessities for their families, they cannot always obtain that goal.

By serving in this community worker role, the student saw the impact of unscrupulous financial practices on low-income communities. This student's experiences illustrated the importance of the community worker role.

Another student, who simulated the Social Service Office Caseworker in 2019, also shared the impact that the poverty simulation had on them. The caseworker offers a variety of services, including medical, housing, nutrition, and employment assistance to the families in the simulation. The student who simulated this role in 2019 shared:

> Next, my personal view of poverty dramatically changed. … I thought to myself that in this century, it was very easy to find any kind of job and sustain a family. However, that is not the case. Through the families that came to my office, I started talking to them and learned that many of them were born into struggling families. Also, how [can] applying to a job can be so hard now since most applications now are being sent through online. So, what happens if those families do not have internet available? These are just some of the things that I did not think about, maybe because I view having internet as such a normal thing and honestly take it for granted. I now understand how hard it can be for those families if they live in rough areas of town and the difficulty of finding jobs.

By engaging with the families directly as a social service officer, this student began to see the impact of poverty on their clients.

Theme 2: CAPS Participation Prompted Future Actions of the Students

As captured by theme 2, some students simulating the community worker roles expressed specific poverty-reduction intentions after completing the CAPS. These actions ranged from donating and volunteering their time to reserving judgment of those living in poverty. The social service office caseworker works with clients with various medical, housing, and nutrition needs. They also process social assistance and welfare benefits. A student who simulated the social service office caseworker in 2017 shared their intention to avoid now making assumptions about those living in poverty.

> One of the biggest things that I took from this experience is to always remember that you never know what the person next to you is going through, or how they got there. There are many people in poverty who try without success to get away from poverty.

The student simulating the Quik Cash Worker in 2016 is another example. The Quik Cash Worker is responsible for cashing checks and offering title loans. This station is also the place where family members can buy their transportation passes. The student who simulated the Quik Cash Worker in 2016 stated,

> For those that are in poverty I would say that you aren't alone and there are resources out there that will help you get on your feet. Some include soup kitchens, food pantry, free GED classes, on the job training, and resume assistance. For others not in poverty, realize that one person is not better than the other due to their financial status; we are all a country that needs each other's help and unity to fight poverty each and every day.

This student's quotation illustrates the importance of everyone being unified. Additionally, the student suggested that they, too, should empathize with those living in poverty and stand in solidarity with those living in poverty. The student who simulated the Banker in 2015 specifically mentioned being more empathetic to those living in poverty. The Banker cashes checks and tracks savings account withdrawals and loan payments.

> I believe that yes, some people are born into way better or way worse circumstances as their neighbor, but most everyone has the capability of taking steps in the right direction. … Even though I say this, I don't want to take away from the importance of the issue. Some active, motivated, and talented people are just very situationally unlucky. These are the impoverished I really empathize with; the ones who bust their cans trying to improve their family's quality of life by all ethical means possible.

As a result of their experience with CAPS, students expressed various actions, including empathizing, no longer making assumptions about one's economic status, and working with others to end poverty.

Conclusion

The purpose of this research was to examine the experiences of students who simulated a CAPS community worker role. These students were enrolled in the same family resource management course at a large, public university in the Southeast. The sample drew on 50 student-authored reflection papers across five different years. This research's methodology includes inductive coding using Braun and Clarke's (2006) RTA. Additionally, this research relied on Kolb's (1984) Experiential Learning Model to frame the questions for student reflection papers. This research identified two themes: (1) the importance of the community worker role and (2) CAPS participation prompted future actions of students.

Discussion of the Theme 1

Theme 1 demonstrated that the students who simulated a CAPS community worker role could learn about poverty by observing other students' behaviors. To the researchers' knowledge, few studies have explored participants' experiences simulating the community worker roles or child role (Mann, 2017; Parks et al., 2024). Typically, past researchers relied on professors, graduate students, or external volunteers to simulate the community workers (Nnakwe, 2020; Smith-Carrier et al., 2019; Yang et al., 2014). Therefore, this study is novel in that it is one of the first to demonstrate the pedagogical benefits of the community worker role.

Students simulating community workers encounter all four stages of Kolb's (1984) Experiential Learning Model. The community worker role is a concrete experience in which learners involve themselves in a meaningful poverty simulation role (Browne & Roll, 2016). Additionally, observing other students (Theme 1) teaches them more about poverty. By reflecting on their experiences through the reflective observation stage, they begin to examine their previously held beliefs about poverty and make connections to what they learned (i.e., the active conceptualization phase). Theme 2 explains how active experimentation plays out among learners.

Discussion of the Theme 2

As shared in theme 2, the students who simulated the community workers' roles cited specific future actions they intended to take. These ranged from donating, to volunteering, to not passing judgment on those living in poverty. This finding related to the active experimentation phase of Kolb's (1984) four-phase Experiential Learning Model. Active experimentation (AE) suggests that learners test the theories formed in the abstract conceptualization phase and use them to guide future decisions (Sugarman, 1985). In this phase, students articulated potential attitude changes and future behaviors that they might adopt to assist those living in poverty. While behavioral change was not the focus of this project, this topic should be explored further in future research.

Limitations

While this research addressed several gaps in the literature, it is not without limitations. Although these findings cannot be generalized to all FCS post-secondary or Extension programs, they reflect this particular group of FCS student-participants. As with any reflection paper data, there is the chance for a social desirability bias to influence the findings. Students might feel tempted to provide overly optimistic responses if they perceive their grade is contingent on their reflection paper responses. The author contends that social desirability bias was not a major threat to validity since standard procedures were used to reduce it. First, students were given their grades before this research's inception. Additionally, many students willingly volunteered opinions that could be viewed as being less socially acceptable, such as disdain or apathy for

those living in poverty. Since students freely reported these beliefs, the researcher assumes a certain level of verisimilitude that students have in sharing their experiences with CAPS.

Implications and Future Research

This research offers implications for future academic research for Extension and FCS professionals. First, future research might examine the experiences of those who simulate the child roles. To date, little research (Mann, 2017; Parks et al., 2024) has examined the pedagogical benefit of this role. Next, little research addressed whether CAPS participation translates into actual and sustained behavioral and attitude change. Few studies used longitudinal data that followed up with students, post-simulation or even into future semesters (Browne & Roll, 2016; Noone et al., 2012). Behavioral change was little addressed in the literature (Hernandez et al., 2016). There is merit in following up with participants to see if they actually donated money or volunteered their time post-simulation. Third, the Spent poverty simulation has been used with family resource management students (Parks & Worthy, 2023), and future research might continue to explore its success among FCS students.

This research joined other studies (Arnett-Hartwick & Davis, 2019; Arnett-Hartwick & Harpel, 2020; Kihm & Knapp, 2015; Nickols & Nielsen, 2011; Nnakwe, 2020) that support the use of the CAPS program in FCS classrooms and Extension programs. Additionally, this research demonstrated that the community worker role is a useful learning activity to teach FCS college students about poverty. Historically, professors, graduate students, or external volunteers have simulated the role of community workers (Nnakwe, 2020; Noone et al., 2012; Smith-Carrier et al., 2019; Yang et al., 2014). Post-secondary FCS educators, FCS agents, and Extension program specialists could benefit from including the community worker role in their programs. This research added to the body of Extension and FCS studies by addressing the experiences of college students who simulated CAPS community worker roles. This research demonstrated that students who simulated the community worker role found it to be a meaningful experience. Many shared that they were motivated to donate, volunteer time, or work towards eliminating their biases toward poverty.

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Emotional Experiences of Mental Health First Aid Trainees: A Qualitative Study

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Mental Health First Aid (MHFA) is a program that helps participants identify, understand, and respond to mental health and substance use disorders. Research studies focusing on the emotional experiences of MHFA participants are lacking. Studying these experiences can help improve the training process for MHFA learners. This paper aims to identify participants' motivations for signing up for MHFA and investigate their emotional experiences when applying MHFA knowledge in real-world settings. This qualitative study used semi-structured interviews. Participants (n = 20) completed 30-minute interviews. Thematic analysis was used to identify themes related to the motivators and feelings of participants when applying MHFA. More than half of the participants reported positive feelings, such as increased confidence and gratification. Participants discussed the process of regulating and responding to their own emotions in a crisis situation. Others described negative experiences, including feelings of nervousness, anxiety, and frustration. Personal and professional experiences with mental health or substance use disorders were identified as motivators for taking the training. Participants' lived experiences when applying MHFA knowledge are key elements to consider. Practitioners may benefit from attending to the prior experiences of trainees and providing more support for participants post-training.

Keywords: mental health, qualitative interviews, motivators, emotion regulation, community education, program evaluation, social cognitive theory

Introduction

Mental health disorders are one of the most common health conditions experienced by Americans. According to the Centers for Disease Control and Prevention (CDC), more than 1 in 5 adults are living with a mental illness in the United States (CDC, 2023). In 2021, this amounted to 57.8 million adults, or 22.8% of the U.S. population (U.S. Department of Health and Human Services, n.d.). Furthermore, suicide is currently the 11th leading cause of death in the United States, and an estimated 1.7 million suicides were attempted in 2021 (American Foundation for

Suicide Prevention, 2023). Mental illnesses also impact adolescents, as 1 in 5 currently or at some point in their lives have had a debilitating mental illness (CDC, 2023). Additionally, 40.3 million Americans aged 12 or older experienced a substance use disorder in 2020 (CDC, 2022). Unfortunately, the high prevalence of mental health and substance use disorders has resulted in an unmet need for treatment. More than half of American adults with mental illnesses and the majority with substance use disorders have not received adequate treatment (Mental Health America, n.d.).

In an effort to address the unmet need for mental health and substance use treatment, Betty Kitchener and Anthony Jorm developed Mental Health First Aid (MHFA) in Australia in 2001. Their goal was to teach the public how to identify, understand, and respond to mental health and substance use challenges. MHFA has since been adopted in the United States, resulting in over 2.5 million Americans being trained (National Council for Mental Wellbeing, 2023). The evidence-based program provides participants with an action plan for encountering someone in a mental health or substance use crisis, just as CPR is taught for encountering a physical crisis (National Council for Mental Wellbeing, 2023). Mental Health First Aiders are meant to be the link between an individual with a mental health or substance use challenge and appropriate resources (National Council for Mental Wellbeing, 2023). People who experience mental health challenges will frequently turn to their social networks for support (Jorm & Ross, 2018), and individuals experiencing challenges are more likely to seek professional help when it is suggested by those in their social networks (Kitchener & Jorm, 2008). Therefore, MHFA utilizes an early intervention approach, where initial guidance is provided by family, friends, and members of the general public prior to contact with healthcare resources (Kitchener & Jorm, 2008). Using members of the public to act as liaisons can help empower individuals with mental health or substance use challenges to seek professional help.

The standard 8-hour MHFA course revolves around the five-step ALGEE action plan, which includes (a) assessing the risk of suicide or harm, (b) listening non-judgmentally, (c) giving reassurance and information, (d) encouraging the person to get appropriate professional help, and (e) encouraging self-help strategies (Kitchener & Jorm, 2008). The course also touches on the symptoms and risk factors of mental health challenges, including depression, anxiety disorders, and substance use disorders (Kitchener & Jorm, 2008). Aspects of crisis situations are also discussed, including suicidal ideation, panic attacks, and drug overdoses (Kitchener & Jorm, 2008). Various versions of MHFA are offered, including Adult MHFA for those who interact with adults and Youth MHFA for those who interact with adolescents aged 12 to 18 (Morgan et al., 2018). MHFA has also been culturally adapted for specific audiences and professions, such as rural communities (Morgan et al., 2018). Instruction is offered either in-person or virtually. The course content is regularly evaluated and updated to include new research findings (Morgan et al., 2018).

Previous research studies have shown MHFA to be widely effective. The National Council for Mental Wellbeing recently noted 45 peer-reviewed articles published in the United States in the past 10 years regarding MHFA efficacy (National Council for Mental Wellbeing, 2023). Major findings consistently suggested across the studies included participants' increased ability to recognize signs and symptoms of someone in a crisis, increased confidence and self-efficacy, increased likelihood of helping an individual in distress, and increased empathy towards individuals experiencing challenges (National Council for Mental Wellbeing, 2023). Additional studies support these findings and have shown the effectiveness of MHFA across various geographic settings and audiences. For example, a study performed in Sweden explored the experiences of public sector employees, including social workers and health care professionals, among others, who attended MHFA and found that their confidence and inclination to intervene in a mental health challenge had increased. The study also found that participants described the program as a toolbox with a practical and applicable focus (Svensson et al., 2015). An additional study focused on undergraduate nursing students in China found that the students experienced a heightened sense of achievement and satisfaction after taking MHFA (Hung et al., 2019). A study performed by Rose et al. (2017) focused on social work students in the United States also found that participants felt improved confidence and increased knowledge attributable to the training. Further studies have found an increase in confidence and knowledge attributed to the training across diverse audiences, including family members of Australian military veterans (Evans et al., 2021), pharmacists (Witry et al., 2020), and social work students (Rose et al., 2017). Although many studies have shown that MHFA improves mental health knowledge and confidence, less research has focused on the motivations to sign up for MHFA and the emotional experiences of applying the knowledge to real-world scenarios. Existing research on motivations for signing up has focused largely on medical or medical student populations outside of the United States (e.g., Crawford & Burns, 2020; Davies et al., 2018; Sibeoni et al., 2023) with some studies including more general health services professionals (e.g., health and social services departments; Kitchener & Jorm, 2004). These studies highlight both professional and personal reasons (e.g., to help a family member) for signing up for MHFA. Given the popularity of the MHFA course in the United States, understanding U.S. participant characteristics and experiences is relevant.

From a social-cognitive perspective (Bandura, 1997, 2000), the well-documented changes in confidence and self-efficacy brought about by MHFA training should also be related to how trainees experience the provision of help to others. However, few studies have examined trainees' accounts of emotions while intervening in real-world crisis scenarios. Understanding motivations and emotions can inform MHFA instruction strategies to better prepare future MHFA trainees. The more accurately instructors can forecast the experience of applying MHFA, the better prepared future trainees will be. Understanding the reasons for seeking training and prior trainees' experiences of applying the knowledge will help future instructors make such forecasts. Thus, the present study aimed to identify motivations and emotions felt by participants.

This study aimed to (a) identify participants' motivations for signing up for MHFA and (b) investigate participants' emotions felt when using MHFA knowledge in real-world settings.

Methods

Data Collection

The present study used a qualitative design, including semi-structured interviews. Two of the authors developed an interview guide based on a literature review of the gaps regarding motivations for signing up for MHFA and emotional experiences related to the training. We tested this guide on colleagues and sought the expert opinion of an experienced MHFA instructor for feedback and further refinement. The experienced instructor participated in a mock interview in order to provide feedback to the research team. The research team, composed of the principal investigator and two research assistants, conducted 30-minute interviews from February to April 2023, using Zoom as a videoconferencing platform for data collection and audio recording. All research team members met weekly to discuss impressions from the interviews and maintain fidelity to the research methods. Participants were contacted via email 24-48 hours pre-interview to share the study's consent form. Their verbal consent was obtained at the beginning of each interview. They received a $30 electronic gift card and were sent a debriefing letter post-interview. This letter served as a thank-you note, a reminder of the participation incentive, and a step-by-step guide on how to use their gift card. The University of Maryland Institutional Review Board granted ethical approval to all research protocols and documents.

Participants

Maryland Reinforcing Overdose Prevention through Training and Advocacy (MD ROPTA) was initially developed by the University of Maryland Extension. This initiative supports communities in developing overdose prevention strategies, raising awareness about substance use prevention and mental health promotion, and developing support networks within communities. MD ROPTA partners with local and state organizations to provide educational training, such as the MHFA training course.

Using the MD ROPTA [i] database, recruitment emails were sent to participants who took the MHFA 2.0 course between March 2020 and January 2023. The research team retained the first 20 respondents and placed the additional respondents on a waiting list in case of dropouts and no-shows. The team then contacted interested participants and scheduled their interview dates according to their convenience and availability. Following interviews with 10 participants, the research team convened to evaluate emerging themes. They determined that theme saturation had not been achieved. By the twentieth interview, recurring and similar theme patterns became apparent, leading to the decision to cease recruiting additional participants. Additionally, funding constraints for participant incentives imposed limitations on the team. Thus, the final sample included 20 participants. Most were female (90%), and approximately half identified as White

(55%). Our study population was similar in gender to the overall population of participants in Maryland ROPTA programming (86% Female, 54% White). The participants were also from diverse occupational and educational backgrounds, such as social workers, nurses, and certified peer recovery specialists. 70% of participants had previous training and education in mental health topics, while 30% described having no knowledge and training in mental health before attending the MHFA course. Table 1 offers a detailed description of the characteristics of the study sample.

Table 1. Participant Characteristics (n = 20)

	% (*f*)
Race	
White	55% (11)
Black	25% (5)
Asian	10% (2)
Multiracial	5% (1)
Prefer not say	5% (1)
Gender	
Female	90% (18)
Male	10% (2)
Highest level of education	
Beyond bachelor's degree	50% (10)
Bachelor's degree	35% (7)
Associate's degree	5% (1)
High School Diploma	5% (1)
Some college	5% (1)
Professional Background	
Non-clinical human services	25% (5)
Certified peer recovery specialist	15% (3)
Social worker	15% (3)
Administrative professions	15% (3)
Nurse	10% (2)
Academic occupation	10% (2)
Other	5% (1)
Missing	5% (1)
Previous training or education in mental health topics	
Yes	70% (14)
No	30% (6)

Data Analysis

Data were analyzed using thematic analysis (Braun & Clarke, 2006). The research team followed the 6-step guide described in Braun & Clarke, 2006, to identify, analyze, and report themes

within the data. First, the team members used an artificial-intelligence-based computer software (Otter.ai) to transcribe the recorded interviews. Then they proceeded to verify the transcripts to check for accuracy. The team members read the transcribed interviews multiple times to familiarize themselves with the data. Then, they generated initial codes and organized them into overarching themes. The interview transcriptions were uploaded and coded using the web application Dedoose, Version 9.0.90. Themes were reviewed, refined, and better defined throughout the analysis process. They were also discussed among the researchers during weekly meetings to see whether the emerging themes caught the content's essential meaning without leaving out important information related to the research aims: (a) identify participants' motivations for signing up for MHFA and (b) investigate participants' emotions felt when using MHFA knowledge in real-world settings. The analysis resulted in 6 themes, illustrated with quotes, describing the original data. Table 2 describes the themes identified regarding motivations to sign up for MHFA (1 theme divided into 3 sub-themes) and the feelings and emotional experiences of participants (5 themes) when applying the skills and knowledge gained from the training.

Table 2. Themes and Sub-themes Illustrating Participants' Motivation and Emotional Experiences Throughout Applying MHFA

	% (*f*)
Motivations to sign up for MHFA	
Personal experiences	40% (8)
Professional experiences	45% (9)
Non-emotion driven experiences	25% (5)
Confidence	50% (10)
Gratification	50% (10)
Negative emotional experiences	40% (8)
Regulating negative emotions	35% (7)
Relief	15% (3)

Note. Some participants mentioned personal and professional motivations to sign up for MHFA. This overlap causes this section's *n* to be greater than the total sample size (20).

Results

Motivations to Sign Up

Many participants shared emotional personal experiences when asked their motivation for signing up for MHFA. These participants spoke about individuals in their social networks who were struggling with a mental health or substance use disorder and their desire to learn how to help them. Two participants even spoke about their own mental health experiences and their desire to learn how to apply MHFA to themselves:

> *I have a lot of friends and family members who experience, you know, recurring mental health challenges. And I wanted to make sure I was as quick as possible to help them when they were in a period of crisis.*

> *I actually come from a family that is riddled with depression. … And my family specifically, we've lost a few members to suicide ideation and things of that nature. I myself have struggled with it, my mother, my friends, my family. So, I thought it'd be really beneficial to kind of know what to do in those situations.*

Several participants spoke about professional experiences that motivated them to take MHFA. Participants described a desire to be better equipped for interacting with clients experiencing mental health challenges. One participant noted their desire to help their students who have been impacted by the COVID-19 pandemic:

> *Even three years after the onset of COVID-19, our students are really struggling mentally and I am in no place to be able to offer them professional help. I know it's not what I do. I'm a biology professor, but yet I have academic advisees lining up outside of my office…*

Other participants noted non-emotion-driven experiences as their motivation for signing up for MHFA. For example, some participants shared that it was a requirement for their jobs. Others described that they wanted to add the certification to their resume while searching for employment:

> *I actually, as part of my job, it's actually something that they have everyone do. I wasn't really even sure what it was. I was just kind of like, you know, sure, you know, I'll do it. So I really didn't have any motivation necessarily. I was kind of told, Hey, you're going to do this. But I really enjoyed it. And I'm glad that I did it.*

Emotions Experienced When Applying MHFA

When asked to describe their feelings and emotional experiences when applying MHFA skills and knowledge in the real-world settings of their lives, more than half of the participants (n = 13)

linked the training with positive feelings, such as increased confidence and gratification, while eight reported negative emotional experiences. These emotional experiences included feelings of nervousness, anxiety, and sometimes frustration and were closely related to the seriousness of the mental health scenario experienced by the participant.

Confidence

Ten participants mentioned an increase in confidence after taking the MHFA training. Per their response, the course offered them tools and resources that they could confidently apply to help people experiencing mental health challenges. One participant also shared how the training allowed them to intervene without hesitation, regardless of the type or gravity of the mental health crisis:

> *I feel, like, well prepared, I would say. So definitely, I'm not, like, anxious. I just feel like I now have the tools and… I guess it just more gives me confidence.*

> *I never felt equipped or competent enough to be like, 'well, I'm the person who should help,' …but now… I feel confident that I could step in, apply the skills as necessary, and be a support, because I have the tools in my pocket.*

> *Every situation I encountered after [taking the training] I felt I could well handle.*

Participants also focused on the robustness and scientific evidence behind the knowledge and information delivered in the MHFA course. They shared how gaining scientifically backed knowledge increased their confidence in managing mental health scenarios:

> *I have more confidence. I have the resources and the background to say 'yes, this is where I'm getting the information.' Not just 'oh, I think I remember this from nursing school way back,' or 'I read this online somewhere.' It's actual backed information that can actually help de-escalate things before it gets to that level, or get people help before something happens.*

Two participants expressed how the course contributed to their acting faster in a mental health crisis and confidently assisting more people experiencing mental health challenges:

> *I've been able to help a lot more people, and be able to react to situations a lot faster and more helpful.*

Gratification

Five participants shared how de-escalating a complex situation provides a sense of pride and accomplishment. They also mentioned how they are proud of their ability to adequately apply the

knowledge and skills gained from the MHFA training. Participants used a variety of language to describe feelings of gratification including pride, happiness, and helpfulness:

> *I'm feeling accomplishment, because you were able to do the de-escalation, you've been able to assist the person. So that feeling of calm, that feeling of I was able to do it, the feeling of I did do it, that I was able to do all of those things.*

> *But it's really nice to know that I'm able to apply this knowledge and apply the steps and really kind of intervene with things that could have been a lot worse and have the tools available to help somebody.*

However, two participants talked about dismissing feelings of pride to focus exclusively on the person experiencing a mental health crisis. One commented:

> *You know, sometimes you can't help but feel pride in being able to help somebody. But I try to avoid those feelings. Because it's not about me. It's about everyone, and it's about the people you're working with and talking to.*

Helpfulness was also a recurring theme during the interview process. Two participants shared how helping others is a natural behavior, while two others reported how they find happiness in helping people in crisis and making a difference around them:

> *And I think it's my responsibility not only professionally but as a human to help individuals. So it's just a natural feeling. No, I [don't] need to be proud because I did something today. No, it's just natural for me.*

> *I was going to say it makes me happy when I can help people. I love to help people; I love to make a difference.*

Negative Emotional Experiences

Two participants reported being nervous and anxious at the onset of assisting someone experiencing a mental health crisis. However, both participants mentioned that remembering the tools and knowledge from the MHFA training helped them remain calm and intervene adequately. Other participants (n = 3) expressed anxiety related to the seriousness of the situation and the reaction a person in crisis might exhibit when a Mental Health First Aider starts applying the skills and tools from the training. For example:

> *I'm definitely nervous going into it, because it is like a serious scenario that you're going through.*

> *Well, I get, at first, I get a little anxious. I'm like, Oh, my God, oh, my God, oh, my God. And then I have to remember again for myself to breathe. I have to do it for myself before*

you can do it for other people. It's kind of like the oxygen mask in the plane. But, yeah, I tried to stay as calm as possible.

Two participants mentioned being anxious about not providing enough help to a person in crisis, while one reported being stressed for their patient because mental health scenarios are time-sensitive:

But there is that anxiety of, like, am I doing enough? I guess, like, is this enough?

I think the one main emotion I felt was stress, mostly for the patient. And I felt like it was a time-sensitive thing that I had to do. I had to, like, basically stop everything I was doing and had to stop seeing patients to make sure I went through with it.

Regulating Negative Emotions

Several participants described not just the experience of negative emotions, but the process of regulating and responding to their own emotions. For example, on the front end of a potential interaction, some participants weighed fears for physical safety. Participants' responses to negative emotions determined whether or not they would intervene in a particular situation. One shared:

I am always very conscious that, like, I am a small, not very physically strong woman. And so, like, when a very large man is having, you know, a crisis, I did not feel equipped to help because I feared for my personal safety.

Other participants weighed their present-moment readiness for acting according to the MHFA action plan. For example:

She has said, 'I think about killing myself.' … I didn't see it coming. And I admit I was very thrown off-guard. And I didn't know what to do other than tell her, 'do you want to set aside a time to talk another time?' … So I would say, I was in a situation where this feels particularly intense, like I kind of just blanked out and didn't know what to do.

Given the emotional intensity of assisting someone through a challenge, participants described the need to maintain composure in order to effectively implement the MHFA action plan:

Even though you might be … questioning yourself, you can't let that person see, because then they'll start to question you, also.

I'm not gonna lie, I do get nervous, but I have to not show it. I'm very aware that, initially, people may not be open to it. So I do expect a negative response, and that's something we talked about in the first aid class.

Self-talk was frequently reported as one method of maintaining engagement or composure during attempts to apply Mental Health First Aid. The self-talk took the form of coaching statements focused on what exactly they were going to do or reviewing whether they did everything they should have done after applying MHFA:

> *We have to be calm. We have to go through the steps ... I've always remembered that. Go through the steps. We've practiced this.*

Several participants reported having to manage frustration as a negative feeling they might experience after applying MHFA, because things did not go as planned when attempting to apply the skills and action plan learned in the MHFA course:

> *So with something like that, you feel like you went through all of that knowledge that you have in your head, and you use all of the tools in your toolbox, but it still didn't work. And that's frustration on my part, because I did everything that I had been taught to do. But it didn't get through to the person, didn't get through to the person.*

> *I feel guilty, like, 'oh…maybe I should have waited?' ... But then, when I think about it, I'm like, 'I'm okay. I did what was the most important thing, and safety is always first no matter what, so.'*

Participants also discussed the self-talk that would occur in situations when they decided not to apply Mental Health First Aid. Some of the emotion regulation was in response to feelings of guilt about not intervening. Participants described their internal justifications for not intervening in certain situations. One shared:

> *There's definitely shame. And also frustration, because I think most people have, like, a very human desire to help. And it's like, you feel the guilt of 'I should help.' And then, but if I did help, would I be putting myself in a very bad situation, that I would not be, like, that I would be hurting more than I'd be helping, you know what I mean?*

Relief

Relief and calm were also post-MHFA delivery feelings reported by participants, especially after managing a complex situation using the MHFA skills and knowledge. One participant talked about being relieved because they were present during a mental health crisis and had been able to provide help:

> *So that feeling of calm, that feeling of I was able to do it, the feeling of I did do it, that I was able to do all of those things, and then just a basic calm is the best way I can put it.*

> *But then after [after applying MHFA] you just feel relief when it works.*

Discussion

There are several notable findings of the present study. The participants reported significant gains in confidence to handle others' mental health challenges. This echoes the findings from prior qualitative research in other cultural settings in North America and Europe (Delaney et al., 2021; Svensson et al., 2015). This finding also aligns with quantitative studies documenting the effectiveness of the MHFA curriculum (e.g., Baker et al., 2019; Banh et al., 2019). Our study also uncovered the lived experiences of delivering MHFA, which include an array of emotions and strategies that participants employed to manage these emotions. These findings all carry implications for practice.

Our study's findings echo prior studies that have reported increased confidence in handling others' mental health challenges (Evans et al., 2021; Svensson et al., 2015, Witry et al. 2020). Of particular note is that a majority of our study participants had some background or prior training in mental health topics. This finding supports the findings presented by Rose and colleagues (2017) suggesting that MHFA provides value added to typical courses of training for mental health professionals. Our study extends these findings by highlighting that the course appears to have a similar effect even on professionals with years of experience (participants in the Rose et al. study were social work students as opposed to mid-career participants in the present study). Resilience to mental health challenges, like any other public health challenge, is a product of individual, family, and community factors (Okwori, 2022). The more individuals who report confidence in intervening in mental health challenges, the more a community can theoretically provide support for any individual suffering.

Our study also extends the findings on confidence by adding an additional layer of positive emotion: gratification. A significant number of our participants reported feeling a sense of accomplishment or gratification upon successful application of the MHFA action plan. This sense of gratification is a significant finding. Gratification represents an internal reward mechanism that may contribute to a higher likelihood of future altruistic actions, such as applying MHFA (Benabou & Tirole, 2006; Feigin et al., 2014). Future studies may examine whether individuals who report gratification when applying MHFA apply MHFA more frequently in their lives compared to those who do not identify with that experience.

Our analysis extends the literature by providing more detailed accounts of participants' emotions during the process of signing up for, implementing, and reflecting on their use of MHFA. The present study's finding that lived experiences with mental health challenges are part of participants' motivations to sign up for MHFA is noteworthy. Although participants did list professional or non-personal reasons for signing up, personal reasons for taking MHFA have bearing on instruction. Lived experiences with mental health challenges could help or hinder an individual's performance in delivering MHFA. Lived experience may boost the potential for empathic listening and responses. Conversely, First Aiders may also be vulnerable to experiences

similar to what is described as countertransference in clinical literature (Cavanagh et al., 2015). For example, a First Aider with a history of trauma may experience heightened emotional and physiological responses when listening to someone else describe a traumatic event bearing similarity to the First Aider's own experience. On one hand, if sufficient coping resources are available, the First Aider could use these feelings to empathize with the person they are assisting. However, without sufficient coping resources, the First Aider may become anxious, dissociate, or otherwise be less emotionally responsive to the person they are helping. Traumatic experiences, which tend to include the feeling of helplessness, may interfere with an individual's sense of self efficacy in responding to a challenge (Bandura, 2000). This suggests a trauma-informed approach would be useful, especially when it comes to preparing the First Aiders for their own experiences in assisting others. The current curriculum emphasizes self-care, but does not explicitly discuss the potential for personal histories to influence the emotional intensity of a given MHFA scenario.

Our findings related to negative emotion and emotion regulation also carry implications for training. Social cognitive theory (Bandura, 1997, 2000) suggests that the confidence boost from MHFA should help trainees experience the demands of applying MHFA less intensely. The example quote related to self-talk reflects the cognitive control aspect of self-efficacy in taxing situations. However, despite the presence of useful coping strategies, participants still reported some anxiety regarding whether or not they implemented the MHFA action plan sufficiently. Although a part of the training curriculum focuses on debriefing with others after applying MHFA, the section may not contain enough detail to sufficiently help participants assess their performance in a way that reduces the post-application anxiety. This is a notable gap, because managing negative emotions is important in predicting the actual occurrence of prosocial behavior (Caprara & Steca, 2007).

It may be necessary to make a more explicit prediction that participants may worry about their own performance, and make a clear link to helpful coping strategies such as positive self-talk, physical coping strategies (e.g., breath work), and the use of holistic self-care action plans (developed during training) as a method of coping with this anxiety. Participants may also find it helpful to hear the reports of prior participants, such as those in this study and other cited studies, to normalize the experience of anxiety. Being able to predict a challenging experience may help participants cope with it. Furthermore, several participants mentioned that having near-term support groups might be beneficial, for example, in the months following a training, hosting semi-official debriefing sessions where participants can meet with their original instructor and review any scenarios where they applied MHFA in the recent past. Reaching out periodically to recent trainees with the opportunity to debrief may be another way of offering this sort of support.

Limitations

Our study has some notable limitations. First, we used a non-random convenience sample of past MHFA participants from MD ROPTA's database. Also, participants had a fair amount of prior experience with mental health issues. It is possible that these First Aiders differ from the general population who have less experience and prior training with mental health issues before taking MHFA. Furthermore, other participant characteristics, such as gender and education distribution, may be non-representative of the general population and therefore limit generalizability of study findings.

Conclusion and Future Perspectives

Despite limitations, the present study offers significant takeaways. Emotional experiences, in both personal and professional aspects of life, are motivators for participants to partake in the MHFA training. It is important that instructors consider participants' lived experiences and how they may impact a First Aider when applying their knowledge. Additionally, participants noted increased confidence after taking the MHFA course, regardless of prior experience in mental health topics. Some participants also noted feeling gratification after successfully applying MHFA. However, others noted negative emotions when thinking about their performance. Our findings present important implications and future research perspectives. Future research should aim to gather participants' opinions on the most effective strategies for coping with negative emotions, explore the role of MHFA instructors in preparing trainees to manage their emotions, and conduct a detailed examination of the MHFA curriculum to optimize the overall emotional impact of the training. Future research may also ask more specific questions regarding the willingness of individuals to tolerate negative emotions in order to apply MHFA.

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Increasing Access to Acceptable and Affordable Gluten-Free Baked Goods

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Transitioning to a gluten-free (GF) diet can be difficult due to limited reliable recipes to produce baked goods at home and poor quality of commercially available baked goods. This study tested basic recipes capable of creating acceptable GF baked products at home using commercially available GF flour blends. Recipes for a drop cookie, rolled cookie, bread, and pizza crust were tested and altered during this research to produce reliable recipes for GF baked goods. To assess the acceptability of these GF baked goods, products were tested for springiness, moisture content, hardness, height, spread, taste, appearance, and texture during in-lab testing and consumer in-home testing. Results suggest that the specific GF flour blend used changed the quality and acceptability of the products tested. Flour blends that contain higher amounts of starch by ingredient weight tend to produce more acceptable bread and pizza crust, while flour blends with less starch produced more acceptable drop and rolled cookies.

Keywords: gluten-free, baked goods, acceptable recipes, gluten-free flour blends

Introduction

The demand for acceptable gluten-free (GF) food products has been steadily increasing since the early 2000s (Bael, 2015). In the past few years, the demand for commercial GF products has increased by 41%, which suggests that this interest may not be a simple food trend, but rather a life-long commitment to GF eating (Bael, 2015). One of the reasons some consumers choose to limit their intake of gluten is that GF eating is thought to provide health benefits and enhance weight loss (Arslain et al., 2021; Bascuñán et al., 2017). Other individuals are encouraged to completely avoid gluten because of a diagnosis of celiac disease (Bael, 2015; Naqash et al., 2017). Celiac disease is an autoimmune disorder of the gastrointestinal tract (Gandini et al., 2021; Levinson-Castiel et al., 2019; Naqash et al., 2017). Ingestion of gluten by individuals with this disease can result in damage to the intestinal mucosa, which reduces the ability of the intestines to absorb nutrients. Total avoidance of the gluten protein is necessary to reduce

immediate symptoms of malabsorption and to reduce long-term damage to intestinal tissue (Anton & Artfield, 2008; Gandini et al., 2021; Naqash et al., 2017). The increase in demand for GF products has spurred an interest in research focused on wheat-flour substitutes capable of producing acceptable baked goods without gluten.

The U.S. Food and Drug Administration (FDA) states that food acceptability is based on safety, nutrition, quality, and value as perceived by the consumer (Gardner, 1992). Often, commercially available GF products are considered unacceptable by consumers because of reduced food quality, such as undesirable flavor and texture. The value of the product is also lacking, as the cost for commercially produced GF products is much higher than for gluten-containing products (Capacci et al., 2018). The protein gluten is responsible for the texture, volume, and taste of bread, cake, and cookie products (Anton & Artfield, 2008; Bender & Schönlechner, 2020; Naqash et al., 2017). There are no other grains that contain a protein that acts similarly to the gluten protein found in wheat. This creates challenges when attempting to produce baked goods that are acceptable to consumers. Several common grains have been ground and studied as potential flour substitutes, namely rice, oats, and corn (Gómez & Martínez, 2016; Susman et al., 2020). While these grains can produce a variety of baked goods, the consumer acceptability of these goods is often poor. However, research has shown that the use of flour blends combining one or more of these flours, with other additives, can produce acceptable baked products (Anton & Artfield, 2008; Bender & Schönlechner, 2020; Naqash et al., 2017; Susman et al., 2020). A few additives and ingredients that help mimic the effect of gluten in baked goods include hydrocolloids (commonly known as gums), dry milk solids, evaporated milk, gelatin, an additional egg, oil, or honey. These additives increase water-holding capacity in starch, which helps improve texture and tenderness. These additives also improve the structure and mouthfeel of baked goods (Anton & Artfield, 2008; Salehi, 2019).

Because demand for GF baked products has increased, prices of commercial GF baked goods have also risen (Capacci et al., 2018). Often, the price for GF products is 2 to 2½ times higher than for non-GF products. This often results in a 29% increase in food costs for those regularly consuming GF products (Capacci et al., 2018). Because of the combination of cost, limited availability, and poor quality of GF products, many individuals who cannot eat gluten have poor diet quality (Capacci et al., 2018). This can increase their risk of nutrient deficiencies, as individuals with celiac disease tend to eat 23% less food than those without the disease because limited food products are acceptable to them (Capacci et al., 2018; Gorgitano & Sodano, 2019).

The objectives of this research study were to determine 1) the feasibility of using commercially available flour blends to bake GF products at home, 2) the effect that GF commercial flour blends would have on overall consumer acceptability of GF home-baked goods (i.e., taste, texture, flavor, appearance, and aroma), 3) recipes that could be used by the average consumer to make affordable GF baked goods at home instead of purchasing commercially baked products.

Methods

Preliminary Testing

Preliminary testing began with basic recipes for bread, pizza crust, drop cookies, and rolled cookies (see *Appendix 1*) obtained from an introductory food science course (Utah State University, Introduction to Food Science Course). These products were chosen for testing because of the demand for GF versions of these products. Demand was determined based on personal experience of the investigators, inquiries from consumers in their counties, and the availability of similar commercially baked products. Extension faculty in four Utah counties used the same standard recipe to bake GF products using commercial GF flour blends available in their local grocery stores. These flours were selected because they claimed to have multi-purpose use and were readily available for purchase, enabling Extension faculty to make recommendations that would be beneficial to home consumers across the state. Each Extension faculty member purchased two or three flour blends available in their area and did preliminary testing in their home or Extension office kitchen. Researchers recorded processes and outcomes during the preliminary testing and shared these data in a collective discussion. Conclusions from this discussion were used to decide necessary recipe modifications and preferred flour blends and to develop procedures for the in-lab testing that was conducted at Utah State University in Logan, Utah. Products to be tested were chosen from two different gluten-function categories, yeast breads (white bread and pizza dough) and cookies (drop cookies and rolled/refrigerated cookies).

Four flour blends were chosen for further testing. The product specifications can be found below:

- Cup4Cup Multipurpose Flour (Cup4Cup, LLC, Yountville, CA) claims a 1:1 substitution of wheat flour for GF flour in recipes for baked goods including cakes, cookies, quick breads, pie crust, sauces, scones, muffins, etc. The descending order of ingredient predominance by weight is cornstarch, white rice flour, brown rice flour, milk powder, tapioca flour, potato starch, and xanthan gum. The product is certified GF and comes in a 3-lb bag.
- King Arthur Measure for Measure Flour (King Arthur Baking Company, Inc., Norwich, Vermont) claims a 1:1 substitution of wheat flour for GF flour in recipes for baked goods including bread, muffins, cookies, cakes, brownies, pancakes, and other non-yeast recipes. The descending order of ingredient predominance by weight is rice flour, whole grain brown rice flour, whole sorghum flour, tapioca starch, cellulose, xanthan gum, and vitamin and mineral blend. The product is allergy-free and certified GF and comes in 1-lb and 3-lb bags.
- Extra White Gold (Better Foods Jeyer, LLC, Alpharetta, GA) is an all-purpose flour that claims to replace wheat flour in a 1:1 cup ratio in baking pastries, cupcakes, cakes, and pancakes. The descending order of ingredient predominance by weight is

rice flour, potato starch, modified tapioca starch, tapioca starch, corn starch, pea protein, cellulose fibers, xanthan gum, sodium acid pyrophosphate, sodium bicarbonate, mono diglyceride (emulsifier), and salt. The product is certified GF and is sold in 15.9-oz packages.

- Grandpa's Kitchen Flour Blend (Grandpa's Kitchen, Spanish Fork, UT) is certified GF and claims a 1:1 substitution of wheat flour for GF flour in making baked goods. The descending order of ingredient predominance by weight is white rice flour, potato starch, corn starch, tapioca flour, xanthan gum, brown rice flour, and sorghum flour. The product is sold in 2-lb bags.

In-Lab Testing

Product Preparation and Method Standardization

Using the optimized recipes from the preliminary testing, standard operating procedures (SOPs) were established to minimize errors by the researchers. The typical process for SOPs was used to develop the specific procedures for this experiment (Stup, 2023). All researchers (n = 4) testing food products were trained on the SOPs before testing began. The SOPs and training included information on measuring ingredients accurately, using volume-to-volume substitutions for the flour blends, proper use of the stand mixers (KitchenAid Professional 600, Whirlpool Co., Benton Harbor, MI), and oven settings. The SOPs included step-by-step instructions on when to add each specific ingredient, mixing ingredients for exact time increments, scraping mixing bowls at exact times in the process, and portioning completed product using scoops or weight. Instructions for how long to bake the product and actions after baking (e.g., remove cookies to cooling rack) were given. Each step in the procedure was documented by the researcher and observations were recorded to ensure quality control.

Three complete replicates (n = 3) (where replicate represents a single, distinct batch) for each flour blend were completed for each product type. In total, there were twelve batches each of drop cookies, rolled cookies, bread, and pizza crust completed over a two-day period. The finished products were labeled and analyzed immediately or packaged in consumer-grade low-density polyethylene cling film (Glad Products Company, Oakland, CA) or zip-top bags (SC Johnson & Son, Inc., Racine, WI) designed for freezer storage. Products were held under frozen storage (-10 °C (14 °F)) or room temperature (20 °C (68 °F)).

Bread. Each bread replicate was prepared following the established SOP. Dry yeast (12 g) (ACH Food Companies, Chicago, Il) and granulated sugar (38 g) (Walmart, Inc., Bentonville, AR) were added to 300 ml warm water (33°C (91°F)) to activate yeast. Flour blend (700 g), Canola oil (75 g) (Walmart, Inc., Bentonville, AR), eggs (150 g) (Walmart, Inc., Bentonville, AR), and salt (9 (Morton Salt. Chicago IL) were combined with the yeast mixture. Ingredients were mixed in a mixer (KitchenAid, Benton Harbor, MI) for 2 min at speed 5 using the paddle attachment to form a stiff batter. The batter was spooned into a 9- x 5-in loaf pan sprayed with

cooking spray (Walmart Inc., Bentonville, AR) and placed in a proof box (Avantco Equipment, Meridian, ID) (80 °C (175 °F)) until doubled in size (20-25 min). Bread was baked in a preheated 190 °C (375 °F) oven to an internal temperature of 74 °C (165 °F). The bread was allowed to cool 5 min in the pan before being removed from the pan.

Bread was cooled on a cooling rack at room temperature (20 °C (68 °F)) for 1-2 hr before it was sliced into ½-in slices and analyzed or labeled and prepared for storage in zip-top freezer bags. Three slices from the center of each loaf were randomly assigned to one storage treatment: no storage (analyzed 2 hr after removing from oven); room temperature storage (20 °C (68 °F)) for 2 days before analysis; or frozen storage (-10 °C (14 °F)) for 1 month, then thawed at room temperature for 24 hr before analysis.

Pizza Crust. Each pizza crust replicate was prepared following the established SOP. Dry yeast (8 g) (ACH Food Companies. Chicago, IL) and granulated sugar (3 g) (Walmart, Inc., Bentonville, AR) were added to 60 ml warm water (33 °C (91 °F)) to activate yeast. Flour blend (360 g) and salt (5 g) (Morton Salt. Chicago, IL) were combined with the yeast mixture and mixed in a mixer (KitchenAid, Benton Harbor, MI) for 2 min at speed 5 using the paddle attachment. Olive oil (40 g) (Walmart, Inc., Bentonville, AR) and remaining water (15 ml) were added and mixed for 2 min at speed 10 to form a stiff batter. Batter was placed in a proof box (80 °C (176 °F)) until doubled in size (20-25 min). Raised dough was divided into two portions of equal weight to prepare two crusts from each batch. Each portion was placed between two pieces of parchment paper (Walmart, Inc., Bentonville, AR) and rolled to a ¼-in thickness. Rolling guides were used to ensure a uniform thickness across the entire crust. The top piece of parchment paper was removed, and the crust was transferred to a baking sheet that had been preheated in the oven for 5 min. The pizza crusts were baked in a preheated 205 °C (400 °F) oven. One crust per batch was parbaked for 7 min and removed from the oven. The second crust was baked for 15 min and removed from the oven.

Pizza crusts were cooled for 30-40 min at room temperature (20 °C (68 °F)) until completely cool to the touch. Fully baked crusts were analyzed immediately after cooling. Parbaked crusts were labeled and prepared for storage in consumer-grade, low-density polyethylene cling film and stored at freezer temperatures (-10 °C (14 °F)) for 6 weeks. After storage, the crusts were thawed at room temperature (20 °C (68 °F)) for 4 hr, cooked for an additional 7-8 min in a preheated 205 °C (400 °F) oven, and cooled as described above before analysis.

Drop Cookies. Each drop cookie replicate was prepared following the established SOP. Room-temperature salted butter (60 g) (Walmart, Inc., Bentonville, AR) and shortening (50 g) (The J.M. Smucker Company, Orrville, OH) were mixed using a mixer (KitchenAid, Benton Harbor, MI) at speed 5 using the paddle attachment to completely combine ingredients. Next, granulated sugar (100 g) (Walmart, Inc., Bentonville, AR) and brown sugar (110 g) (Walmart Stores, Inc., Bentonville, AR) were added and creamed for 1 min at speed 10. One egg (50 g)

(Walmart, Inc., Bentonville, AR) was added and mixed at speed 5 just to incorporate. Most of the flour blend (240 g) (Walmart, Inc., Bentonville, AR), baking soda (3 g), (Walmart, Inc., Bentonville, AR), and salt (1.5 g) (Morton Salt, Chicago, IL) were whisked together in a separate bowl to combine, added to mixer, and mixed at speed 2 for 1 min. The remaining flour blend (120 g) and chocolate chips (200 g) were stirred in by hand to combine. The dough was scooped onto a parchment-lined (Walmart, Inc., Bentonville, AR), rimmed baking sheet using a #30 commercial scoop (1.22 oz). Cookies were baked in a preheated 177 °C (350 °F) oven for 10-11 min until cookies spread and had a slight amount of brown color on top.

Cookies were removed from the oven, and the pan was lightly tapped on the counter to deflate cookies. The cookies were allowed to cool on the pan for 5 min and were then removed to a cooling rack. They were left to cool on the cooling rack until they were cool to the touch. Four cookies from each replicate were reserved for immediate analysis or were labeled and prepared for room-temperature storage (20 °C (6 8°F)) in zip-top freezer bags.

Rolled Cookies. Each rolled cookie replicate was prepared following the established SOP. Butter (114 g) (Walmart, Inc., Bentonville, AR) and granulated sugar (100 g) (Walmart, Inc., Bentonville, AR) were creamed together using a mixer (KitchenAid, Benton Harbor, MI) for 1 min at speed 10 using the paddle attachment. One egg (50 g) (Walmart, Inc., Bentonville, AR) and vanilla (2 g) (Walmart, Inc., Bentonville, AR) were added and mixed at speed 5 just to incorporate. Half of the flour blend (240 g) (Walmart, Inc., Bentonville, AR), powdered sugar (20 g) (Walmart, Inc., Bentonville, AR), and baking powder (4 g) (Walmart, Inc., Bentonville, AR) were whisked together in a separate bowl to combine. This mixture was then incorporated into the creamed mixture at speed 2 for 1 min. The remaining flour blend (240 g) was stirred in by hand to combine, then the dough was gently kneaded by hand for 5 turns. Dough was placed between two sheets of parchment paper (Walmart, Inc., Bentonville, AR) and rolled to a ¼-in thickness using rolling guides. Round cookie cutters (2-in diameter) were used to cut cookies from the initial roll of dough and placed on parchment paper on a rimmed baking sheet. No re-rolled dough was used. Cookies were baked in a preheated 163 °C (325 ° F) oven for 6-7 min.

Cookies were removed from the oven and allowed to cool on the pan for 5 min before being moved to a cooling rack. They were left to cool at room temperature until they were cool to the touch. Four cookies from each replicate were reserved for immediate analysis or were labeled and prepared for room-temperature storage (20 °C (68 °F)) in zip-top freezer bags.

Physicochemical Properties

Physicochemical properties were evaluated for each product as described below. Breads were analyzed for moisture, crust color, interior color, cross-sectional (slice) area, and air cell size. Pizza crusts were analyzed for moisture, color, and height. Drop cookies were analyzed for moisture, color, and spread. Rolled cookies were analyzed for moisture, color, height, and spread.

Moisture. Moisture content was measured using a programmable moisture balance with a ceramic heating element (MA150 Sartorius Mechatronics, Bohemia, NY). The moisture balance heats samples individually in a tared pan until no additional loss in weight is detected during drying, at which point the program ends and results are displayed as the percentage of water in the sample. Measurements were taken the same day as baking after products had cooled completely. A section from the center of the product (bread, pizza crust, rolled cookie, or drop cookie) was cut into rough crumbs using a bread knife immediately before analysis, then a 2-3 g portion was added to the tared pan and heated at 110 °C (230 °F) until a constant weight was reached (Zhong et al., 2014).

Color. Color values were measured using a portable colorimeter (Hunter Lab Miniscan, Reston, VA) with a 5 mm diameter aperture, set to use illuminant D-65. The colorimeter was standardized through a single layer of low-density polyethylene film using both white and black standard tiles. CIELAB values were recorded, L* (lightness; L*=100 indicating white and L*=0 indicating black), a* (red/green; +a* indicating more red and -a* indicating more green), and b* (yellow/blue; +b* indicating more yellow and -b* indicating more blue). Chroma (color intensity) was calculated as [$\sqrt{}$ (a*2 + b*2)]. Hue angle (true color) was calculated as [arctangent (b*/a*)] and transformed into a four-quadrant (360°) system to facilitate statistical analysis (McLellan et al., 1995).

All color measurements were taken the same day that the products were prepared. For bread and pizza crust, measurements were taken at three random locations across the crust. Interior color was also taken for bread, across the face of a slice from the middle of each loaf. For dropped and rolled cookies, single measurements were taken on each of three randomly selected cookies from each batch.

Cross-Sectional Area and Air Cell Size. Cross-sectional area was measured by tracing a slice of bread taken from the center of the loaf onto standard graphing paper and counting the squares inside the tracing. The center slice was also photographed against a reference grid, with squares of exactly 4 square millimeters. The magnetic lasso tool in Photoshop CC 2015 (Adobe, Inc., San Jose, CA) was used to highlight a reference square from the grid and five individual cells from the slice within each individual photograph (Allen et al., 2007). Pixel counts within each of the highlighted cells were recorded and converted to square millimeters, based on the pixel count for the reference square.

Height. Rolled cookies (two per batch) and pizza crust were cut across the diameter for height measurements. Height was taken at the center of the cut surface using a digital caliper (Carrera Precision CP9807-TF, Max Tool LLC, La Verne, CA).

Spread. Three cookies from each batch (drop cookies and rolled cookies) were centered on a standard line spread template with concentric rings every 5 mm (Zhong et al., 2014). Spread

was measured for each cookie as the average of four measurements, one from each of the quadrants of the line spread template.

Textural Properties

Textural properties were evaluated for each product as described below, using a TSM-Pro Texture Analyzer (Food Technology Corporation, Sterling, VA) equipped with a 50-Newton (N) load cell. Breads were analyzed by texture profile analysis (TPA) for hardness (peak force to compress, penetrate, or break a sample) and springiness (sample recovery or "bounce back" after an initial compression). Pizza crusts and cookies were analyzed for hardness (peak force).

Bread. TPA was conducted on three separate slices of bread taken from the center portion of each loaf. One slice was tested the same day as baking, one after 2 days of storage at room temperature (20 °C (68 °F)) in a zip-top freezer bag, and one after freezing for 1 month at -10 °C (14 °F) in a zip-top freezer bag and then thawing for 24 hr at room temperature (20 °C (68 °F)). A 7.5 cm diameter plate was used to compress bread cubes (2 x 2 x 2 cm) at a crosshead speed of 50 mm/min to 50% of the original height of the sample, then withdrawn to a fixed height to allow an approximate resting time of 25 s before a second compression cycle. Hardness was taken as the peak force in N in the first compression cycle (force required to compress the sample to half its original height). Springiness was calculated as the ratio (L2/L1) of the time from zero to max force for the second compression peak (L2) divided by the time from zero to max force for the first compression peak (L1) (the degree to which a sample recovers its original shape after an initial compression) (Armero & Collar, 1997).

Pizza Crust. Hardness was conducted on both crusts made from the same batch of dough. Crust 1 was fully baked, cooled, and tested on the same day. Crust 2 was parbaked, and frozen for 6 weeks at -10 °C (14 °F) and then thawed at room temperature (20 °C (68 °F)) for 2 hr, completed baking at 205 °C (400 °F), cooled, and tested. A ¼-in rounded-end probe was used to compress crusts at a crosshead speed of 50 mm/min until they reached 50% of their original height. Hardness was taken as the amount of force in N required to compress the crust to half its original height.

Cookies. Hardness was conducted for both drop cookies and rolled cookies on two cookies per batch, one on the same day as baking and one after 2 days of room temperature 20°C (68°F) storage in a zip-top freezer bag. A ¼-in rounded-end probe was used to compress cookies at a crosshead speed of 50 mm/min until they fractured or reached 50% of their original height, whichever occurred first. Hardness was taken as the peak force in N recorded for each cookie.

Statistical Analysis

Statistical analysis was performed using SAS version 9.4 (SAS Institute, Inc., Cary, NC). The effect of flour blend was evaluated by analysis of variance using the proc GLM function with the

Tukey adjustment for multiple means comparison. For stored samples, additional statistical analysis was conducted to evaluate the change in texture during storage. Time series analysis was performed using the proc Mixed function with an autoregressive moving average (1,1), with flour blend and storage time as fixed effects. For all analyses, statistical significance was identified at the 95% confidence level ($p < 0.05$). Three complete replicates were performed for each flour blend for each product.

Sensory Evaluation

One additional batch of each product, using each flour blend, was made and reserved for sensory evaluation. Researchers ($n = 6$) completed sensory evaluation in the testing kitchen after baking was completed for each product. Researchers prepared their own samples and were in the same room during sampling but recorded observations on individual data sheets. Each researcher tasted a small portion of a drop cookie made from each flour blend and a rolled cookie made from each flour blend. The bread for each flour blend was evaluated both independently and as part of a meal (i.e., researchers made sandwiches with the bread, either a ham and cheese sandwich or peanut butter and jelly). The pizza crust for each flour blend was evaluated in a similar way, the crust by itself and the crust with standard pizza toppings (pizza sauce, cheese, and pepperoni). Researchers recorded their experience for each flour type and baked product in a chart that gathered information on flavor, texture, and appearance. Each attribute was rated using a 5-point hedonic scale (5 = like extremely, 3 = neither like nor dislike, and 1 = dislike extremely). Researchers provided qualitative feedback on the experience to better understand whether they preferred one specific product over another and, if so, why.

Consumer Testing

Approval for research was given by Utah State University IRB #12631. A consumer recruitment advertisement was posted on a popular Facebook group that focused on GF subjects. Members of this group volunteered ($n = 153$) to be part of the consumer testing by responding to the social media post with their email address. Information for all individuals who volunteered was placed in a spreadsheet and given a number. Funding available for this research allowed for twenty study participants ($n = 20$) to participate in the consumer testing portion of this study. An online random-number-generating program (www.random.org) was used to randomly assign 20 participants (plus 5 alternates) to the study. Participants were provided the informed consent form and other study information through their email address. Participants were asked to respond to the email indicating their agreement to the informed consent and to provide their mailing address in order to receive the food kit, recipes, and product evaluation data sheets.

Food kits were prepared (ingredients were weighed and packaged into individual zip-top bags) in a commercial kitchen lab at Utah State University and included all ingredients needed to complete the recipe except perishable ingredients (e.g., butter, shortening, eggs). Each participant was given ingredients to make all four recipes (bread, pizza crust, drop cookies, and

rolled cookies). One flour blend per product was chosen by researchers based on scientific and preliminary sensory testing results (bread – Cup4Cup, pizza crust – King Arthur, drop cookies – King Arthur, rolled cookies – Extra White Gold). Two weeks after food kits were mailed, participants were emailed a link to a Qualtrics online survey to record the experimental data they collected while baking the products. Participants were also asked to conduct an informal sensory evaluation of products and provide data in answer to specific questions in the Qualtrics online survey. Consumer responses for the quality of baked goods were measured using a hedonic scale. The hedonic scale was defined as follows for a scale of 1-5: 5 = very appealing,4 = appealing, 3 = neither appealing nor unappealing, 2 = unappealing, and 1 = very unappealing.

Participants who completed the survey received a complimentary electronic kitchen scale. See *Appendix 2* for survey information. The survey was designed to gather data similar to the data collected during the in-lab testing. Due to the small number of external participants, surveys were not validated before external consumer testing.

Results

Bread

Though flour blend had a significant effect on the air-cell cross-sectional area (indicating expansion) of the bread slices ($p = 0.02$), no significant differences were seen between the flour blends ($p > 0.05$). Cup4Cup showed higher expansion, with approximately 20% larger surface area than the other flour blends except for White Gold ($p > 0.05$). Overall, the standard deviation shows that air cell size was highly variable within a single slice for all flour blends. See Table 1 for specific values.

Table 1. Effect of Gluten-free Flour Blend on Bread Air Cell Size

Flour Blend	Air Cell Size (mm^2) Mean ± Std Dev	
Cup4Cup	10.84 ± 7.88	a
White Gold	6.20 ± 5.40	a b
Grandpa's Kitchen	5.04 ± 2.20	b
King Arthur	3.14 ± 1.23	b

Note. Values with different letters are significantly different ($p < 0.05$). For measurements not shown in this table, no significant effect of flour type was observed ($p > 0.05$).

Though air cell size is often related to bread hardness and the tendency to stale quickly, no correlation was seen between these parameters in this study. Also, no significant differences ($p > 0.05$) in moisture content were seen between loaves from different flour blends. All loaves were between 40% and 46% moisture. However, moisture content was inversely correlated ($p = 0.04$) with hardness, though the relationship was not linear ($r = -0.59$). Moisture content was positively correlated ($p = 0.01$) with springiness; however, the relationship was weakly linear ($r = 0.69$).

In Table 2, the type of flour blend did not have a significant effect on the hardness of loaves, regardless of when testing occurred (day of baking or after storage). However, Grandpa's Kitchen tested higher for hardness, though not significantly different ($p > 0.05$), than the other flour blends. And as a general trend, hardness decreased for all flour blends after being frozen. The type of flour blend did have a significant effect ($p = 0.02$) on the amount of springiness observed, though the relationship was weakly linear ($r = 0.69$). The Cup4Cup flour blend showed higher springiness than the other flour blends on Day 1 and after freezing. Though springiness was not significantly correlated with the cross-sectional area ($p > 0.05$), this general observation is consistent between these two measurements. Overall, flour blend ($p = 0.003$) and storage time/technique ($p = 0.007$) had a significant effect on springiness, but there was no interaction effect.

Table 2. Effect of Gluten-free Flour Blend and Time/type of Storage on Bread Texture

	Day 1		**Day 3 (Room Temperature)**		**1 month (Frozen)**	
			Hardness (N)			
Grandpa's Kitchen	15.87 ± 4.76	a	15.96 ± 3.43	a	13.04 ± 0.09	a
Cup4Cup	9.29 ± 6.27	a	6.66 ± 3.90	a	5.08 ± 1.45	a
White Gold	9.20 ± 2.94	a	6.65 ± 1.07	a	5.65 ± 1.62	a
King Arthur	9.01 ± 2.37	a	11.16 ± 2.08	a	8.29 ± 0.59	a
			Springiness (%)			
Cup4Cup	89.67 ± 5.01	a	77.79 ± 8.99	a	80.73 ± 11.25	a
White Gold	81.93 ± 1.99	a b	59.36 ± 0.92	a b	63.16 ± 9.02	a b
King Arthur	76.34 ± 6.84	b	55.54 ± 9.70	a b	52.80 ± 17.91	b
Grandpa's Kitchen	74.84 ± 2.63	b	50.61 ± 3.39	b	47.25 ± 0.24	b

Note. Values with different letters are significantly different ($p < 0.05$). For measurements not shown in this table, no significant effect of flour type was observed ($p > 0.05$).

The color of the bread varied significantly between flour blends, as seen in Table 3. However, these variations were difficult to detect with the naked eye. Test results suggest that crust color was most consistent in the Grandpa's Kitchen flour blend and the White Gold flour blend. The interior color of each flour blend varied significantly from the other flour blends with no clear association between any two flour blends.

Table 3. Effect of Gluten-free Flour Blend on Bread Color

	Chroma (Color intensity)		**Hue Angle** (True color)		**Lightness** (L*)	
			Crust Color			
Grandpa's Kitchen	30.17 ± 6.47	a	72.19 ± 2.12	a	57.05 ± 2.03	a
White Gold	29.50 ± 5.64	a	67.22 ± 4.24	a b	55.04 ± 5.00	a
King Arthur	27.29 ± 2.45	a	31.73 ± 1.07	b	47.59 ± 4.84	a b
Cup4Cup	21.41 ± 12.59	a	53.56 ± 11.23	b	41.27 ± 7.55	b

	Chroma (Color intensity)		Hue Angle (True color)		Lightness (L*)	
			Interior Color			
White Gold	17.50 ± 0.96	a	98.6 ± 2.7	c	65.99 ± 2.79	a
King Arthur	14.84 ± 0.46	a b	101.2 ± 1.5	b c	67.89 ± 1.63	a
Grandpa's Kitchen	14.43 ± 1.78	b	103.9 ± 2.0	a b	68.01 ± 2.00	a
Cup4Cup	12.40 ± 0.66	b	106.3 ± 1.0	a	60.95 ± 0.95	b

Note. Values with different letters are significantly different ($p < 0.05$). For measurements not shown in this table, no significant effect of flour type was observed ($p > 0.05$).

Pizza Crust

No significant differences were seen between pizzas from different flour blends for moisture content ($p > 0.05$). All pizza crusts were between 31% and 35% moisture. Also, no significant differences in hardness were seen between flour type or how the crust was processed ($p > 0.05$) (e.g., the crusts fully baked on the same day gave similar texture readings as the crusts that were parbaked and stored frozen before being baked completely). Chroma ($p = 0.01$) and hue angle ($p = 0.002$) varied significantly between flour blends, but no significant effect was seen for lightness ($p > 0.05$). However, from a practical standpoint, this color variation was only slightly perceptible to the naked eye. Hue angle was positively correlated with moisture ($p = 0.03$, $r = 0.43$) and negatively correlated with hardness ($p = 0.0009$, $r = -0.37$).

Drop Cookies

No significant differences were seen for moisture content in cookies from different flour blends ($p > 0.05$). All cookies were between 5% and 7% moisture. Overall, the flour blend had a significant effect on hardness ($p = 0.003$): Grandpa's Kitchen and King Arthur flour blends varied from the other flour blends on Day 1, and Grandpa's Kitchen was significantly harder than all other flour blends at Day 3 ($p < 0.05$). However, no significant effect of storage was observed ($p > 0.05$) for fixed effect of storage time. Flour type also had a significant effect on the extent to which cookies spread, with King Arthur cookies spreading less ($p < 0.05$) (smaller diameter) than other flour blends. See Table 4 for specific measurements.

Table 4. Effect of Gluten-free Flour Blend and Time/type of Storage on Drop Cookie Hardness and Spread

Flour Blend	Mean ± Std Dev			
	Hardness (N)			
	Day 1		**Day 3**	
Grandpa's Kitchen	28.1 ± 14.7	a	36.9 ± 4.3	a
King Arthur	17.5 ± 7.0	a b	25.5 ± 8.0	b
Cup4Cup	10.4 ± 3.7	b	18.0 ± 4.8	b
White Gold	8.6 ± 3.2	b	14.0 ± 5.7	b

Flour Blend	Mean ± Std Dev	
	Spread of Cookie During Baking (mm)	
White Gold	5.49 ± 0.51	a
Grandpa's Kitchen	5.39 ± 0.43	a
Cup4Cup	4.71 ± 1.08	a
King Arthur	3.58 ± 0.46	b

Note. Values with different letters are significantly different ($p < 0.05$). For measurements not shown in this table, no significant effect of flour type was observed ($p > 0.05$).

In Table 5, chroma ($p = 0.006$) varied significantly between Cup4Cup and King Arthur flour blends and between White Gold and Grandpa's Kitchen flour blends, but no significant effect was seen for hue angle and lightness ($p > 0.05$) between flour blends. From a practical standpoint, very little color variation was visible to the naked eye. Also, hue angle was positively correlated with hardness ($p = 0.03$, $r = 0.43$) and moisture content ($p = 0.003$, $r = 0.56$) and negatively correlated with spread ($p = 0.0009$, $r = -0.37$).

Table 5. Effect of Gluten-free Flour Blend on Drop Cookie Color

	Chroma (Color intensity)		Hue Angle (True color)		Lightness (L*)	
Cup4Cup	17.20 ± 4.53	a	80.42 ± 5.88	a	57.31 ± 10.15	a
King Arthur	17.07 ± 2.94	a	84.07 ± 1.43	a	58.90 ± 7.33	a
White Gold	14.78 ± 3.10	b	81.63 ± 2.60	a	56.76 ± 6.29	a
Grandpa's Kitchen	13.92 ± 2.08	b	84.08 ± 2.71	a	61.49 ± 6.71	a

Note. Values with different letters are significantly different ($p < 0.05$). For measurements not shown in this table, no significant effect of flour type was observed ($p > 0.05$).

Rolled Cookies

No significant difference in moisture content was noted between cookies made from the different flour blends ($p > 0.05$). All cookies were between 10% and 11% moisture. However, moisture was negatively correlated with height ($p = 0.01$, $r = -0.50$). Flour blend had a significant effect on hardness between the Cup4Cup and King Arthur flour blends and between the White Gold and Grandpa's Kitchen flour blend at Day 1 ($p < 0.05$). And King Arthur was significantly different at Day 3 ($p = 0.003$) from all other blends, but no fixed effect of storage time was observed ($p > 0.05$). See Table 6.

Table 6. Effect of Gluten-free Flour Blend and Time/type of Storage on Rolled Cookie Hardness and Spread

Flour Blend	Mean ± Std Dev					
	Hardness (N)					
	Day 1			**Day 3**		
King Arthur	6.47 ± 2.42	a		7.16 ± 2.22	a	
Cup4Cup	5.91 ± 2.56	a		6.15 ± 2.35	a	b
White Gold	2.22 ± 1.15		b	2.44 ± 1.23		b
Grandpa's Kitchen	2.06 ± 0.41		b	2.42 ± 0.83		b
	Spread of Cookie During Baking (mm)					
White Gold	11.82 ± 0.66				a	
Grandpa's Kitchen	10.90 ± 0.47				b	
Cup4Cup	10.07 ± 0.14				c	
King Arthur	9.65 ± 0.36				d	

Note. Values with different letters are significantly different ($p < 0.05$). For measurements not shown in this table, no significant effect of flour type was observed ($p > 0.05$).

Flour type also had a significant effect ($p = 0.001$) on the extent to which cookies spread, with King Arthur cookies spreading less (smaller diameter). White Gold cookies had significantly more spread than the other flour blends ($p < 0.05$). See Table 6.

No differences were seen for height ($p > 0.05$). All cookies rose 4-5 times in height (from ¼-in-thick dough to 1- to 1.2-in-thick cookies). Lightness ($p = 0.0002$) varied significantly between White Gold and all other flour blends. Chroma ($p < 0.0001$) varied significantly between White Gold and Grandpa's Kitchen and King Arthur and Cup4Cup ($p < 0.05$). Also, a significant effect ($p < 0.05$) was seen for hue angle between Cup4Cup and Grandpa's Kitchen and King Arthur and White Gold flour blends ($p < 0.05$). Despite these differences, very little color variation was visible to the naked eye. Chroma was positively correlated with moisture content ($p = 0.003$, $r = 0.56$) and height ($p = 0.05$, $r = 0.41$), but negatively correlated with spread ($p = 0.004$, $r = -0.33$). However, as mentioned, this has no practical implications, as very little color variation was visible to the naked eye. See Table 7.

Table 7. Effect of Gluten-free Flour Blend on Rolled Cookie Color

	Chroma (Color intensity)			**Hue Angle** (True color)			**Lightness** (L*)		
King Arthur	15.87 ± 1.16	a		88.29 ± 0.64		c	74.22 ± 5.12	a	
Cup4Cup	14.97 ± 0.74	a	b	91.55 ± 0.43	a		73.20 ± 1.84	a	
White Gold	14.35 ± 1.21		b	89.78 ± 0.55		b	67.36 ± 11.25		b
Grandpa's Kitchen	14.13 ± 0.95		b	91.14 ± 0.65	a		77.19 ± 2.82	a	

Note. Values with different letters are significantly different ($p < 0.05$). For measurements not shown in this table, no significant effect of flour type was observed ($p > 0.05$).

Consumer Testing

Sixteen out of twenty (n = 16, 80%) consumers who were sent a food kit completed the gluten-free baking and survey as part of the consumer testing stage of this study. All consumers were provided a baking kit through the mail. Four participants (n = 4) did not complete the survey within the allotted study time frame: these participants were emailed twice to determine their willingness to participate, with no response.

Survey results showed that participants' total experience of making GF baked products at home ranged from less than 1 year (n = 4) to 2-3 years (n = 2) to 4-6 years (n = 4) to more than 6 years (n = 6) The frequency of making GF baked products at home ranged from daily (n = 2) to 2-3 times per week (n = 4) to 1 time per week (n = 4) to 2-3 times per month (n = 4) to once per month (n = 2). There was no correlation between the amount of experience a participant had and the frequency with which they made GF products.

Bread. The consumer acceptability of the finished bread loaf was highly correlated with flavor (r = 0.93, $p < 0.0001$), suggesting that the flavor of the finished bread was more important to consumers than the texture. No significant correlation ($p > 0.05$) was noted for this variable. The hedonic testing results suggested the bread was acceptable to most of the consumers based on the following mean values: appearance 5, taste 4.4, aroma 4.7, texture 3.8, and overall acceptance 4.7. Also, 10 of 16 (63%) consumers found the bread recipe instructions to be very clear. Overall, 13 of 16 (81%) participants indicated they would make the bread recipe again.

Pizza. The workability of the pizza crust dough (p = 0.01, r = 0.60) was just as important in determining whether participants would reuse the pizza crust recipe as the sensory characteristics of appearance (p = 0.02, r = 0.59), flavor (p = 0.0009, r = 0.75), and texture (p = 0.05, r = 0.50). Overall acceptability of the pizza crust was correlated with appearance (p = 0.04, r = 0.52), flavor (p = 0.0002, r = 0.80), and texture (p = 0.05, r = 0.50), but was not correlated with aroma. It is important to point out here that the aroma was rated lowest on the hedonic scale as 2.2, which is unappealing. The other hedonic values were taste 1.6, texture 1.0, and overall acceptability 1.3.

Of the consumers, 10 of 16 (63%), found the pizza crust recipe to be clear, but 11 of 16 (69%) indicated the baking time was too long. Participants (n = 7) commented that the recipe was unnecessarily complicated. Also, the dough quality was not as described in the recipe, as reported by participants (n = 7). Overall, 11 of 16 (69%) participants indicated they would not be likely to use this recipe in the future.

Drop Cookies. Product acceptability analysis of the drop cookies showed that appearance (p = 0.01, r = 0.60), flavor (p = 0.007, r = 0.64), and overall acceptability (p = 0.04, r = 0.52) of cookies were correlated with intent to reuse the recipe. Texture was highly positively correlated with flavor (p = 0.0008, r = 0.75), and both parameters were highly positively

correlated with overall acceptability (texture: $p = 0.0005$, $r = 0.77$; flavor: $p < 0.0001$, $r = 0.83$), suggesting these characteristics (flavor and texture) were more important to participants than other sensory characteristics (appearance and aroma). Most consumers, 10 of 16 (63%), found the drop cookie recipe to be clear or very clear (instructions for when to add vanilla extract were inadvertently omitted from the recipe, 7 of 16 participants commented on this), though the baking time was too short. All sensory evaluation characteristics were found to have high averages on the hedonic scale: appearance 4.7, taste 5, texture 4.3, aroma 5, and overall acceptability 5. Of the consumers who responded, 14 out of 16 (88%) said they would be likely or very likely to use this recipe in the future.

Rolled Cookies. All sensory characteristics for rolled cookies were correlated with intent to reuse the recipe: appearance ($p = 0.009$, $r = 0.63$), flavor ($p < 0.001$, $r = 0.90$), texture ($p = 0.002$, $r = 0.72$), aroma ($p = 0.003$, $r = 0.70$), and overall acceptability ($p = 0.04$, $r = 0.52$). The appearance was inversely correlated with baking time ($p = 0.04$, $r = -0.52$), suggesting that cookies baked for less time were more appealing. Overall acceptability was highly correlated with all other sensory characteristics: appearance ($p = 0.0006$, $r = 0.76$), flavor ($p < 0.0001$, $r = 0.83$), texture ($p = 0.0004$, $r = 0.78$), and aroma ($p = 0.0008$, $r =- 0.75$). Consumers found the rolled cookie recipe to be very clear, though 12 of the 16 (75%) responses stated the cooking time was not long enough. Overall, 11 of the 16 (68%) participants indicated they would be only slightly likely to use this recipe in the future. The sensory evaluation characteristics were found to have medium averages on the hedonic scale: appearance 4.3, taste 3.2, texture 2.5, aroma 4.1, and overall acceptability 3.2.

Discussion

The results of this study provide valuable information to better inform consumers concerning preferred techniques for making acceptable GF baked goods. We will focus on product tenderness, texture, color, and flavor to provide understanding of overall acceptability for each baked good.

Bread

The Cup4Cup flour blend had significantly different springiness ($p < 0.05$) than the other flour blends (King Arthur, White Gold, and Grandpa's Kitchen). One reason for this could be the higher amount of cornstarch by weight in the Cup4Cup flour blend. In gluten-containing bread, protein networks expand as bread is baked, then gelatinized and partially gelatinized starch molecules "set" the texture (this prevents further expansion as well as the collapse of the protein-based foam network) (Horstmann et al., 2017; Khatkar et al., 1995). In GF bread, the gluten network would be replaced by gums (e.g., xanthan) and other protein substitutes (e.g., non-wheat flours, pea protein). During storage, water is lost as starches begin to stale (retrogradation). Though this may not result in a noticeable increase in hardness (at least during the preliminary stages), retrogradation may be preventing these protein foams from rebounding to their original

size. These research results indicate that cornstarch molecules have the ability to gel, thicken, and stabilize gluten-free bread structures (Horstmann et al., 2017). This type of action produces a product more similar to gluten-containing breads and increases consumer acceptability of the product.

One result of note was the hardness results for bread (Table 2). These suggest that, regardless of the flour blend used, storage in zip-top freezer bags did not increase the hardness of the bread. In fact, this type of storage maintained or reduced the effects of storage, particularly when stored in the freezer. Based on these results, it is recommended that consumers bake the bread, cool it completely, and then slice it into uniform slices. These slices can then be packaged in freezer bags and stored in the freezer to preserve the optimal texture of the bread. Another item to note is that the springiness, or "bounce back," results for the bread suggested that, despite the flour blends and time of storage, springiness decreased when compared to freshly baked bread. This relationship was not significant ($p > 0.05$), but the general trend of results suggests a general trend toward less springiness over time. This is consistent with preliminary starch retrogradation (staling), which may not be sufficient to result in a noticeable change in hardness but prevents the bread from "bouncing back." The amount of starch in the flour blend may be one reason for the change in bounce back and staling over time. Starch also has the ability to prevent increased staling in these types of products, which would contribute to the increased hardness of bread over time (Horstmann et al., 2017).

The color of the bread also varied significantly between several of the flour blends (Table 3). The variations noted in each loaf are due to the ingredients included in the flour blends. Because the grains used in these flour blends tend to be a lighter color than wheat, they produce lighter baked goods than traditional wheat baked goods. Also, flour additives can change the color of the baked goods during baking (Alsaiqali et al., 2023; Gustafson, 2016; Vilmane & Straumite, 2014). Some of these additives include butter, gums, and milk powder. The Cup4Cup flour blend was the only blend studied that contained milk powder and registered a reddish-brown crust, which is consistent with this additive (Gustafson, 2016). This could suggest that milk powder will change the color of baked goods to be more consistent with wheat flour.

Pizza Crust

The results obtained for the pizza crust in this study showed that, regardless of the flour blend used, par-baking and freezing for future use did not change the texture of the pizza crust ($p > 0.05$). There were no differences seen between flour blends for height ($p > 0.05$). All pizza crust replicates rose roughly two times in height (from ½-in-thick dough to 1-in-thick crusts). Unfortunately, the taste of the pizza crust baked with King Arthur flour was ranked not acceptable, with a score of 2, by consumers in the sensory testing. And for all flour blends, consumers suggested an increase in the water content to improve crust texture and chew. One other suggestion recommended using a fairly wet dough and patting it into a pan vs. rolling it out

like a traditional wheat pizza crust. More research is needed to determine a preferred way to bake GF pizza crust that meets consumer expectations.

Drop Cookies

One characteristic of particular interest regarding dropped cookies refers to the hardness of the cookies (Table 4), or the amount of force it takes to break or fracture the cookie. Low hardness values do not necessarily indicate desirable cookie texture, depending on the type of cookie being tested. Drop cookies, such as chocolate chip cookies, tend to be harder if they are crispy and less hard if they are chewy and soft. The hardness of the drop cookies tested was variable depending on the flour blend used; no significant differences were noted in the scientific testing. However, the flour blend that was rated the highest during the sensory testing done by researchers was the King Arthur blend, which consumers received to make these cookies. In the consumer testing, the cookies received a 5 on the hedonic scale (very appealing) from every consumer. The addition of tapioca starch and xanthan gum to this flour blend likely created a higher moisture content, which was more preferred by consumers (Xu et al., 2020). The most noted characteristic of acceptability for the cookies made with the King Arthur flour was the crispy outside and chewy center, which is directly influenced by moisture content in the cookie. Scientific testing results (Table 4) also suggest that, regardless of the flour blend used, storage in air-tight packaging for up to 2 days did not significantly change the texture of the cookies ($p > 0.05$). Based on these results, it is recommended that consumers store cookies in plastic zip-top bags or other airtight containers for up to 2 days or freeze them to preserve freshness and texture.

Rolled Cookies

One major conclusion noted from the testing results of the rolled cookies was that consumers who baked the cookies for less time (2 min less than indicated in original recipe) found the cookie more appealing. Consumers altered the time based on the degree of browning the cookies were acquiring, as sugar cookies are expected to be very light in color. These results could suggest that consumers prefer a more tender rolled cookie, which would be accomplished with less cooking time. And, depending on the variability of ovens used to bake the cookie, a time range with instructions on the state of browning would be useful in the recipe. Also, rolled cookies with a taller height had a lower moisture content. Because steam helps baked goods rise, it follows that, in cookies where more water was converted to steam (adding to the rise and eventually escaping), a taller cookie was the result.

Another notable conclusion is related to the texture, or hardness, of rolled cookies. Typically, these types of cookies need to be stable enough to handle frosting and still have a tender texture (less hardness, $N = 2.22 \pm 1.15$) when eaten. Because hardness varied (Table 6) significantly in the GF rolled cookies depending on the flour blend used, the flour that created a taller cookie would produce a more preferred cookie, as seen with the White Gold flour. Again, the addition of starch and xanthan gum in all of the flour blends created the appropriate structure for the

rolled cookies, while the White Gold flour also contained pea flour protein, which has been shown to help with tenderness in a cookie (Xu et al., 2020). Like dropped cookies, storage in air-tight packaging did not significantly change the texture of the cookies ($p > 0.05$) across storage times, regardless of the flour blend used. The recommendations for storage of this type of cookie are the same as for rolled cookies.

Study Limitations

One major limitation of this study was our inability to test all the gluten-free flour blends available commercially. This limits the general recommendations that can be made from this study. Also, all the consumers who participated in the study lived in a similar geographic area, with high elevation and low humidity. Without conducting a study in areas with varied climates and other conditions, it is difficult to know if these recipes and flour blends would perform in a similar way in other geographic areas. Lastly, the recipe for the pizza crust was highly variable among participants of the consumer study. The in-lab testing showed very different results from the consumer testing. More study is needed on the pizza crust recipe instructions to produce more consistent results.

Extension Application

One focus of Extension work is to educate consumers in areas that will improve their life situations. This research was conducted to improve consumer understanding of the difficulties and costs associated with gluten-free eating. A consumer cost/benefit analysis was conducted in connection to this research to determine whether baking gluten-free products at home would be more economical than purchasing commercial products. Table 8 details the results of this analysis. Products available in Utah stores were used to inform the analysis. Results suggest that, on average, the consumer saves between $0.41 to $3.77 when making and consuming GF baked goods in the home as opposed to buying them pre-made from stores.

Extension faculty across Utah were provided with study results, recipes, consumer analysis, and recommendations for decreasing the difficulties and costs related to gluten-free eating. Classes and presentations were also conducted in several counties that included baking demonstrations, to further educate participants on preferred baking techniques learned through this research. Lastly, this information was shared through social media posts, news spots, and website articles. Participants in the above-mentioned classes reported high satisfaction with the information provided: 76% said they were very satisfied with the classes, and 82% of participants indicated that they learned many new concepts from the information provided. Lastly, 82% of participants said they were likely to use the information from the classes to bake gluten-free products at home.

Table 8. Cost/Benefit Analysis of Home Baked vs Commercially Purchased

Baked Good Item	Recommended Flour Blend	Amount of Flour Per Bag	Price Per Ounce	Flour Cost for Home-Prepared Baked Goods	Commercially Prepared Cost for Baked Goods
Rolled Cookies	Extra White Gold all-purpose flour blend	1.1 lb	$.33	$5.28 per recipe made	$4.59-$5.69 per package
Drop Cookies	King Arthur measure-for-measure flour blend	3 lb	$.19	$2.32 per recipe made	$5.89-$6.09 per package
Pizza Crust	King Arthur measure-for-measure flour blend	3 lb	$.19	$2.32 per pizza crust	$3.49-$4.19 per pizza crust
Loaf Bread	Cup4Cup multipurpose flour blend	2.9 lb	$.42	$5.26-$7.46 per loaf	$6.29-$8.69 per loaf

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Appendix 1. Recipes

Bread

Ingredients

3 cups gluten free flour (we use Cup4Cup GF flour blend)
1 tablespoon active dry yeast
3 Tbsp sugar
1 ¼ cup warm water (about 95°F)
⅓ cup oil
3 eggs
1 ½ tsp salt

Steps

Combine flour and salt in an electric mixer bowl, set aside. In a separate bowl, dissolve sugar and yeast in warm water and let stand until the yeast becomes foamy. Add yeast mixture, eggs, and oil to dry ingredients.

Mix ingredients on medium speed using the paddle attachment until fully incorporated (about 1 minute). Turn mixer to high and mix for 1-2 minutes until dough is smooth and stretchy. Scrape bowl as necessary to thoroughly blend all ingredients.

Grease a 9x5” loaf pan. Spoon dough into the pan and smooth the top with the back of a wet spoon. Using a butter knife cut a shallow line down the middle of the dough.

- Note: If you are using an 8.5x4.5” loaf pan, only add about ¾ of the dough.

Cover dough with greased plastic wrap and place dough in a warm room to rise for 20 minutes.

- Note: Do not let dough rise longer than 20-25 minutes, it will form large holes in the dough if it raises too long.

Bake in preheated 375F oven until golden brown. Check the bread after 30 minutes for doneness (you can use a toothpick, skewer, or thermometer to at least 165 degrees). If the top looks too brown, but the interior is not done, turn the oven down to 350F. Let the bread continue cooking, checking for doneness as appropriate.

- Note: You might want to put a cookie sheet or cake pan on the bottom rack of your oven in case the bread overflows the pan.

Pizza Crust

Ingredients

1 ½ cups gluten free flour blend (we use King Arthur Cup for Cup GF Blend)
1 ½ tsp instant yeast (or 2 tsp active dry)
¾ tsp sugar
¾ tsp salt
½ cup plus 1 TBS water
3 Tbsp olive oil

Steps

In the bowl of your stand mixer fitted with the paddle attachment place the flour, yeast, and sugar, and mix slowly to combine. Add the salt and mix slowly again to combine. Add the water and olive oil and mix on medium speed until the dough begins to come together. Turn the mixer on high-speed mix until dough begins to appear whipped.

Transfer the dough to an oiled container with a tight-fitting lid or a greased bowl, spray lightly with cooking oil spray, and cover tightly. Place in a warm, draft-free area to rise until it's about 150% of its original volume (about an hour).

When you're ready to make the pizza, place a pizza stone or overturned rimmed baking sheet in the oven and preheat it to 400°F. Place the tightly sealed dough in the refrigerator to chill for at least 15 minutes before working with it, as it's easiest to work with when it's chilled.

To make pizza, place the dough on a lightly floured surface and sprinkle the top lightly with a bit more flour. Knead the dough a bit until it's smoother and roll out on the floured surface with a rolling pin, moving the dough frequently to prevent sticking. Sprinkle very lightly with additional flour as necessary. Create a smooth edge around the perimeter of the dough by pressing the edges with one hand toward the palm of your other.

Transfer the dough to a large piece of unbleached parchment paper and brush the top of the dough generously with olive oil. Using a pizza peel or other flat surface like a cutting board, transfer the dough to the pizza peel or baking sheet in the preheated oven and bake it plain for 5 to 7 minutes, or until the crust has begun to crisp on the underside.

Remove the crust from the oven. At this point, the parbaked crust can be cooled completely, wrapped tightly, and frozen for at least one month.

To use the crust, simply defrost at room temperature, and then continue with the recipe as written. To continue preparing the dough, add your favorite toppings to the parbaked crust, and

return the pizza to the hot oven until any cheese is melted and the edges have browned and puffed (another 5 to 7 minutes). Allow to sit for 5 min.

Drop Cookies

Ingredients

¼ cup butter
¼ cup shortening
½ cup granulated sugar
½ cup brown sugar
1½ cups flour (we use King Arthur Cup for Cup GF blend)
1 cup chocolate chips
1 egg
½ tsp baking soda
½ tsp vanilla
pinch of salt

Steps

Combine room temperature butter, shortening, and sugars (white and brown) in the bowl of an electric mixer. Beat on high until mixture is smooth. Add egg and beat on high until mixture lightens and becomes fluffy. Scrape bowl and add soda, vanilla, and salt. Mix well.

Add flour to mixture and mix on low speed to combine. Mix on high for 1-2 minutes until dough starts to form together, if it is still really sticky add more flour in ¼ cup measurements. Dough should form a ball and not stick to the sides of the mixing bowl. Stir in chocolate chips.

Scoop cookie dough (use #50 scoop, which is about 1 ½ Tbsp of dough) into hand and gently form into a ball. Place on parchment lined baking sheet.

Bake at 350F for 10-12 minutes until barely golden brown. Smack pan against countertop to flatten cookies. Let sit 1-2 minutes on pan then transfer to a cooling rack to cool completely.

Rolled Cookies

Ingredients

½ cup butter
½ cup granulated sugar
¾ tsp baking powder
2 cups GF flour blend (we use White Gold GF baking blend)
1 egg
½ tsp vanilla
3 Tbsp powdered sugar

Steps

Add room temperature butter and sugar to electric mixer bowl, mix well using paddle attachment. Add egg and then beat until butter mixture starts to lighten and become fluffy. Scrape bowl and add baking powder, salt, and vanilla. Add flour and powdered sugar all at once. Pulse mixer to incorporate flour/sugar slowly into other ingredients. Once flour is mostly mixed in, scrape bowl and turn mixer to high and beat for 1-2 minutes until it becomes smooth and elastic.

Test dough, it should not be sticky when touched, it should also be thick and hold its shape when pinched. Add more flour in ¼ cup increments until it is a thick, rollable dough.

Place dough onto a sheet of parchment paper and gently form into a ball.

Place another piece of parchment on top of dough and roll out to ¼" thickness. Cut cookies into circles or shapes. Carefully transfer to parchment lined baking sheet. Combine scraps and re-roll, cut as before.

Bake at 325F for 8-9 minutes until set, but not browned. Let sit 1-2 min on pan then transfer to a cooling rack to cool completely.

Appendix 2. Survey

Gluten Free Baked Goods Consumer Survey (this same pattern was repeated for each of the four baked products)

Please rate your experience for each recipe and baked good you completed using the scales below. Please respond according to your best description of the baked products.

1. Rolled cookies recipe instructions
    a. Very clear
    b. Clear
    c. Okay
    d. Confusing
    e. Very confusing

2. Rolled cookies batter/dough
    a. As described in recipe
    b. Somewhat as stated in recipe
    c. Not sure
    d. Not as described in recipe
    e. Totally different than expected

3. Rolled cookies baking time
    a. Just right
    b. Too much time
    c. Not enough time

4. Would you make the rolled cookies recipe again?
    a. Yes
    b. Not sure
    c. No
    d. Definitely not

5. Please evaluate the quality of the rolled cookies you made.

Appearance	Very appealing	Appealing	Neither appealing nor unappealing	Very unappealing
Taste/flavor				
Texture				
Aroma/smell				
Overall acceptance				

6. What other comments do you have about the rolled cookies?

Additional questions:

How long have you been baking gluten free products?

a. Less than a year
b. 1-3 years
c. 4-6 years
d. Longer than 6 years

How often do you bake gluten free products at home?

a. 1 time a week
b. 2-3 times a week
c. Everyday
d. 1 time a month
e. 2-3 times a month

Why do you choose to bake gluten free?

A Midwest Perspective on Biochar Integration in Extension Services

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Biochar can be considered a climate-smart, agricultural soil amendment due to its ability to provide long-term storage of carbon. Research examining the impacts of biochar-enriched soils reported improved soil characteristics often leading to agricultural benefits, especially in nutrient-poor soils. Despite the potential use of biochar in the Midwest, United States, few studies have examined biochar in Extension. This study, guided by the Theory of Reasoned Action, used survey methodology to collect information on Midwest Extension agents' (n = 125) knowledge, attitudes, and subjective normative beliefs toward biochar. These factors, along with agents' demographics and perceptions toward sustainable soil amendments, were used to predict agents' future intent to incorporate biochar in their work-related activity. On average, respondents correctly answered approximately half of 12 true-false statements on biochar. Respondents' attitudes toward biochar, as well as their perceptions of other agents' attitudes, were, on average, neutral. Agents held moderate importance in promoting sustainable soil amendments. On average, respondents indicated being neither likely nor unlikely to incorporate biochar in their work-related activity, but high variability was found. A significant model was produced that indicates agents who are more knowledgeable about biochar and view biochar more favorably are more likely to incorporate biochar in future work.

Keywords: attitudes, climate-smart agriculture, knowledge, soil, sustainability, theory of reasoned action

Introduction

Climate change, water scarcity, and environmental degradation are critical and complex issues affecting the global society. The production of food, forage, and fiber through unsustainable methods has contributed to harmful environmental impacts. Concurrently, environmental issues

such as climate change are leading threats to sufficient agricultural production (Praveen & Sharma, 2019). Sustainable approaches to agricultural development, including new technologies, will play an important role in providing a sufficient food supply to a growing global population while limiting pollution and even restoring the environment (National Research Council, 2010). Climate-Smart agricultural practices are being promoted in this regard (U.S. Department of Agriculture [USDA], n.d.). These practices are guided by reducing carbon dioxide emissions and sequestering atmospheric carbon.

Land-grant universities in the United States are drivers for agricultural research and development, and Cooperative Extension serves as a mechanism to diffuse agricultural innovations and best practices to producers and consumers. As strategies to combat climate change are being infused into Extension programming (Tobin et al., n.d.), emerging climate-smart agricultural practices should be considered. One emerging technology to address climate change is the production and use of biochar.

The application of biochar as an agricultural soil amendment can improve soil quality and help sequester carbon. Biochar is a charcoal-like and carbon-rich product created through the pyrolysis of biomass, or the heating of biomass at low temperatures with limited oxygen in a closed environment (Lehmann & Joseph, 2009). Biochar can be produced in a wide range of quantities, from small-scale, farmer-owned stoves (Mahmoud et al., 2021) to large-scale, industrialized manufacturing facilities (Wang et al., 2013). The type of biomass used for biochar production can vary significantly and can include organic matter such as wood, manure, leaves, and other agricultural wastes. Thus, the biomass used for biochar production is often dependent upon regional organic material and agricultural byproducts, which leverage local waste and support a circular economy. Although biochar is primarily created to be used as an agricultural soil amendment and to sequester carbon, its creation also produces heat, synthesis gas (syngas), and bio-oil and, when captured, can have useful applications (Ziberman et al., 2022).

As research and use of biochar continues to grow in the United States, it will be critical for Extension agents to be informed on the science behind the technology to develop education programming and to answer farmers' questions related to the topic. Researchers have found that Extension can inform stakeholders' decisions through their outreach and education programs (Haider et al., 2015). However, farmers have started to turn to other sources for information, which has led to recommendations for Extension to better tailor their programs and provide unique information to stakeholders that would be difficult to find otherwise (Edge et al., 2017). Given the novelty of biochar use in agricultural practices, growers are likely to be highly interested in receiving information about this emerging technology, and Extension can help increase adoption of biochar through strategic programmatic activities, thus increasing positive environmental impacts as well. Therefore, the purpose of this research was to examine Extension agents' intent to incorporate biochar into their work-related activities.

Importance of Biochar

The ability of biochar to provide long-term storage of carbon is of particular interest as a strategy to combat climate change. Biochar stabilizes carbon in a solid form and resists decomposition, thereby sequestering carbon for thousands of years (Sun et al., 2018). Natural soil carbon storage, including the use of biochar technologies, is broadly supported by the U.S. public as a mechanism to reduce atmospheric carbon dioxide (Sweet et al., 2021; Wolske, 2019). There has been a rapid progression of carbon credit and carbon trading programs in the United States that incentivize farmers to adopt climate-smart agricultural practices. Biochar applications could be incorporated into such carbon credit programs in the future, catalyzing its adoption and economic contributions (Zilberman et al., 2022).

In addition to carbon sequestration, a wide array of benefits of using biochar to improve agricultural productivity have been reported in prior literature. However, several major issues in biochar impact studies must be considered. The characteristics and quality of biochar vary considerably and are dependent upon pyrolysis conditions, raw materials, and the size of particles (Barrow, 2012). Biochar can also be enriched with other amendments (Sutradhar et al., 2021). Therefore, it is suggested that standards for biochar be established (Barrow, 2012), and researchers should be explicit in describing biochar characteristics when reporting impact studies. Biochar experts even agree to the uncertainty of most biochar knowledge claims (Shackley et al., 2011). Furthermore, most research on biochar has been conducted in international settings, where climate and soil quality vary significantly. In a comparison of regional impacts of biochar, Jeffery et al. (2017) posited that biochar applications have the most potential to increase crop yields in tropical climates. The researchers reported that biochar applications may have little to no impact on crop yields in temperate regions, but other benefits, such as reducing liming and fertilizer costs, providing carbon credits, and yielding environmental benefits, are likely (Jeffery et al., 2017). Zilberman et al. (2022) reported that biochar has the most potential to improve soil in marginal farmlands, and Barrow (2012) concluded that biochar is particularly useful for enhancing crop yields grown in nutrient-poor soils. Crane-Droesch et al. (2013) also reported that biochar applications offer the greatest benefits for soils that are coarse-textured and have low pH and cation exchange capacity values.

Prior research has broadly reported that biochar-amended soils improve crop yields (Barrow, 2012; Jin et al., 2019; Kätterer et al., 2019; Kizito et al., 2019), probably due to biochar applications improving soil health characteristics. For instance, biochar has been shown to increase the cation exchange capacity and organic matter content of soils (Barrow, 2012; Bera et al., 2016; Chen et al., 2019), while also increasing nutrient retention and microbial activity (Gul et al., 2015). Biochar has also been shown to increase soil moisture retention (Chen et al., 2019; Dokoohaki et al., 2017; Jin et al., 2019; Major et al., 2010) and to raise soil pH levels (Barrow, 2012; Bera et al., 2016: Jin et al., 2019). These improvements to soil health can reduce the

dependence on synthetic fertilizers and irrigation and can be particularly valuable to improve the resilience of small-scale agricultural systems in international regions (Müller et al., 2019).

The two primary crops grown in the midwestern United States are corn and soybeans. Few studies have reported the impact of biochar on these crops. In a study on biochar applications on soil used for corn-soybean rotations, Kätterer et al. (2019) reported that biochar increased soil fertility and enhanced crop yields. Aller et al. (2018) used computer modeling on biochar application in soils used for corn-on-corn and corn-soybean rotations in the Midwest. Findings indicated biochar application had a minimal impact on corn yields, but it led to reduced nitrogen leaching and increased carbon soil levels, thus providing a net economic benefit to Midwest applications. Filiberto and Gaunt (2013) reported similar conclusions, arguing that biochar application could save U.S. corn farmers an estimated 25% in fertilizer costs, when accounting for a reduction in nitrogen loss.

Despite the potential benefits of biochar, its research is novel and predominantly international, thus leaving gaps in biochar production and use in the United States. However, according to Thengane et al. (2021), North America is the largest market for biochar and a growing number of larger U.S. companies are entering the biochar manufacturing industry. The use of biochar as a soil amendment can also expand beyond commercial growers. Choi et al. (2020) found that home gardening enthusiasts in Tennessee found biochar to be appealing. Economic, social, and cultural structures are regionally unique, and biochar adoption research should be considered on such geographical scales (Müller et al. 2019).

The Role of Extension Agents

Examining biochar from a sociological perspective will be important to overcome barriers that restrict biochar use as an agricultural product (Kamali et al., 2022; Nicholas et al., 2022). One way to increase agricultural producer and consumer awareness and knowledge of biochar is through Extension programming. Farmer adoption of new technologies has been shown to increase when exposed to education and training from Extension agencies (Mariano et al., 2012; Rahman, 2003). Recommendations for farmer workshops and on-farm training to increase the diffusion potential of biochar have been reported in Cameroon (Fru et al., 2018), Kenya (Magnusson, 2015), and China (Lee et al., 2022). In Belize, Aldana and Cob (2022) reported that Extension services will be critical for the implementation of biochar in the country. Similar sentiment is true in the United States. Hunter et al. (2017) described the role of Extension as invaluable to provide guidance to biochar researchers and in educating the public and producers on the uncertainties surrounding biochar use in the United States. Prior research on Extension's involvement with biochar is limited. Dettenmaier et al. (2020) evaluated behavioral changes of participants after completing a state-wide biochar workshop provided by Utah State University Extension. Findings indicate that, after the workshop, 33% of participants attempted to make

biochar, 51% added biochar to soil or land they manage, and 73% indicated being likely or extremely likely to attend another biochar workshop (Dettenmaier et al., 2020).

Hunter et al. (2017) reported that additional biochar research is needed to inform Extension agents on efforts to provide locally relevant information pertaining to biochar use. Kibue (2018) added that Extension training on biochar production, application, and potential benefits can empower Extension services to have the capacity to develop biochar-based workshops and training sessions for farmers. To inform the creation and facilitation of professional development on biochar for Extension practitioners, it is important to determine agents' existing knowledge of biochar, perceptions toward biochar, and current work-related efforts to incorporate biochar. This novel study explores these factors in the midwestern region of the United States.

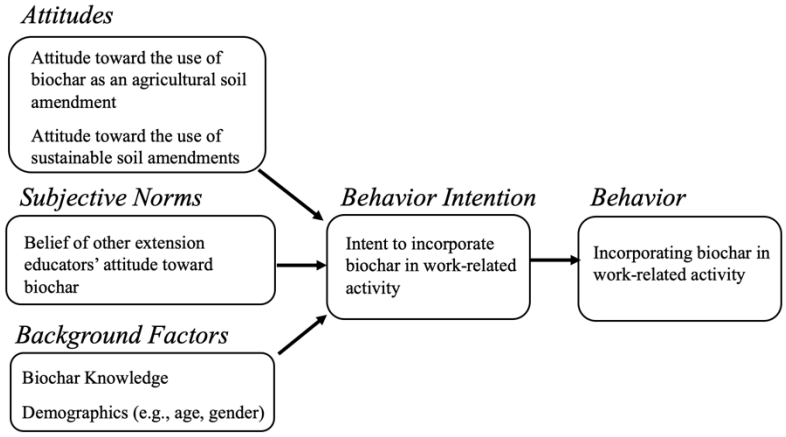
Theoretical Framework

Fishbein and Ajzen's (1975) Theory of Reasoned Action (TRA) was adapted to guide this research. TRA is a commonly accepted theory for Extension-based research (Harder et al., 2021), and, according to the TRA, an individual's intention to perform a behavior is a function of their attitude and normative beliefs toward the behavior. Additionally, background factors, such as knowledge and personal demographics, influence behavioral intention. As behavioral intention increases, the likelihood of behavior increases. TRA is also a special case of the Theory of Planned Behavior (TPB), which built on the foundations of TRA to also consider perceived and actual control to perform a behavior (Ajzen, 1987). Fishbein and Ajzen (1975) had initially assumed that people had the capability to perform a behavior of interest for their research and could easily decide whether they wanted to perform that action. However, the researchers realized that additional control factors, like time, money, and resources, along with people's belief that they had control over a behavior were also determinants of intention. So perceived behavioral control and actual behavioral control were added to TRA to create TPB.

While TPB is the more recent and updated model of the two, Ajzen (2020) stated that, "when [people] strongly believe that they are capable of performing the behavior if they so desire, behavioral control is irrelevant, and the TPB reduces to the theory of reasoned action" (p. 316). Extension agents are expected to develop outreach materials and programs relevant to their stakeholders and are provided the training to engage in these activities. Therefore, we assume that behavioral control would be high for this audience when considering skillset and job alignment, which is why TRA was selected as the theoretical foundation for this study.

When applying the TRA to this study, we classified behavior as Extension agents' involvement in biochar research, education, and outreach. The TRA can be used to presume that attitudes toward the behavior, subjective normative beliefs, and individual background factors will influence behavioral intention. Figure 1 illustrates the application of TRA to Extension agents' incorporation of biochar in work-related activity.

Figure 1. Application of Fishbein and Ajzen's (1975) TRA to Extension Agents' Incorporation of Biochar in Work-Related Activity



Sociological biochar research is limited; and no studies to our knowledge have reported on Extension agents' knowledge and perceptions toward biochar. However, several studies have reported on attributes described in TRA in relation to farmer adoption. Kibue (2018) examined the potential adoption of biochar by farmers in China and concluded that farmers' education level, biochar perception, and contact-level with Extension influenced their likelihood to adopt biochar. In a Polish study, Latawiec et al. (2017) found that only 27% of farmers were familiar with biochar, and attributed education level and knowledge of sustainable agriculture with farmers' familiarity. In a Thailand study, Niemmanee et al. (2019) found that farmers rarely applied biochar and had low knowledge of biochar production and application. However, farmers held a positive attitude toward biochar and desired more government communications about biochar and agricultural sustainability. In Kenya, Magnusson (2015) reported a lack of farmer knowledge as a leading barrier identified by farmers to incorporate biochar in small-scale agricultural settings. Therefore, more research is needed to understand what influences Extension agents' intent to develop biochar programs for local farmers and stakeholders to help overcome barriers related to knowledge and adoption.

Purpose and Research Objectives

The practicality of biochar as a widely used soil amendment in the United States is still largely progressing. Nevertheless, it has promising characteristics that promote climate-smart agriculture. Farmers' adoption of biochar will likely be influenced by the work of scientists and Extension services who research and discuss biochar with their constituents. This study establishes a baseline of midwestern Extension agents' knowledge and perceptions of biochar. Understanding the elements that influence Extension agents' incorporation of biochar in their work will provide valuable information for policymakers, administration, and stakeholders who identify the need for sustainable agri-technologies. The following objectives guided this study:

(1) Determine Extension agents' knowledge of biochar; (2) Determine Extension agents' attitudes and perceptions of other agents' attitudes toward the use of biochar as an agricultural soil amendment; (3) Determine Extension agents' perceived importance of promoting sustainable soil amendments; (4) Identify the factors that predict Extension agents' likelihood to incorporate biochar in their work; and (5) Explore Extension agents' perceived barriers to incorporating biochar into work.

Methods

Extension agents located in twelve states in the U.S. Midwest who specialized in soil, agronomy, horticulture, and/or sustainable agriculture were identified as the population for this study. An exhaustive web-search was used to identify extension Extension agents who fit these parameters. A sampling frame of 771 agents was developed that contained each agent's name, position, specialization, and email address. Each member of the sampling frame was sent a request to participate in this research. The email contained brief information on the purpose of the study, a unique link to participate in a survey, and a brief bio of the researchers involved in this study. The requests for participation and survey links were sent in April of 2022 and followed the tailored design method (Dillman et al., 2014), which included personalized emails and two scheduled email reminders to non-respondents.

Survey Design

The instrument was reviewed by an external panel of four experts for content validity (Kerlinger, 1986). The panel included an Extension agent with familiarity with survey design, a department chair and professor of agribusiness, a professor of biology with expertise in biochar, and an expert in biochar from USDA. The instrument was pilot-tested using Extension agents in the state of Missouri. Slight revisions were made to the survey based on feedback from the expert panel and results from the pilot study. This study was reviewed and approved by the Doane University Institutional Review Board (S22 006 DC IRB HS).

The full survey included 5 scales and 53 questions. Constructs measured included biochar knowledge, biochar attitudes, subjective normative attitudes toward biochar, and attitudes toward promoting sustainable soil amendments. Participant characteristics and demographic information were also collected. At the start of the survey, respondents provided their informed consent, and a screening question ensured respondents met participation criteria (e.g., current Extension agent in the states and specializations identified *a priori*).

Knowledge Instrument

Respondents' knowledge of biochar was assessed through a researcher-developed knowledge instrument containing 12 true-false statements. The true-false format has been shown to improve internal test reliability over multiple-choice formats (Couch et al., 2018; Kreiter & Frisbie,

1989). The option to select *don't know* was used to discourage random guessing and therefore improve reliability (Burton, 2002). Statements were categorized in the areas of biochar properties (4 statements), biochar applications (4 statements), and biochar terminology/classification (4 statements). Each participant's knowledge level related to biochar was measured by the number of statements they correctly answered, with the highest possible score of 12. Post-hoc scale reliability was calculated using the KR20 index score (Kuder & Richardson, 1937), as the KR20 can be used to determine reliability of dichotomous data (Huck, 2008), including true-false tests (Burton, 2004). The knowledge instrument was found to be reliable (α = .869; Field, 2013).

Biochar Attitude Scales

Perceptions toward biochar were measured using a modified 8-item, 5-point bipolar semantic differential scale used to measure attitudes toward genetic engineering in science (Ruth et al., 2019). For each item on the scale, respondents selected a point between two adjectives (good/bad; acceptable/unacceptable; beneficial/not beneficial; positive/negative; necessary/unnecessary; crucial/trivial; important/unimportant; essential/not essential) to represent their perceptions toward biochar. Two reverse-framed adjective pairs were used to improve reliability. Post-hoc analysis indicated scale reliability (α = .856; Field, 2013). A similar 8-item, 5-point bipolar semantic differential scale containing the same set of adjectives was used to measure respondents' subjective normative beliefs. The scale was also found to be reliable at α=.891 (Field, 2013).

Importance of Promoting Sustainable Soil Amendments

Extension agents' perceived level of the importance of promoting sustainable soil amendments was measured using a modified scale from Choi et al. (2020). Respondents indicated their level of importance for 5 items on a 5-point, Likert-type scale (*1 = not important* to *5 = very important*). The stem of the question asked, "how important is it for the soil amendments you promote…," and items included "to provide a decreased need for irrigation," "to provide a decreased need for fertilizer use," and "to provide a decreased need for pesticide use," among similar items. Post-hoc scale reliability analysis showed the scale to be reliable (α = .842).

Intent to Incorporate Biochar in Work-Related Activity

Intention to incorporate biochar in work-related activity was measured using a researcher-developed 4-item, 6-point Likert-type scale (*1 = unlikely* to *6 = very likely*). The stem of the items was "Please indicate the likelihood that you will complete each of the following statements in the future." Statements included: promote the use of biochar; educate others about biochar; conduct research on biochar; and discuss biochar with others. Post-hoc analysis indicated the scale to be reliable (α = .843).

Open-Ended Question and Demographic Variables

One open-ended question was used in the survey. The open-ended question asked respondents to identify barriers that discourage or prevent them from promoting, educating about, or researching biochar. Gender and race/ethnicity were collected by select-all-that-apply and multiple-choice options. Lastly, age was collected by a text-entry response.

Data Analysis

All data were exported from Qualtrics to IBM SPSS Statistics version 26. Means, standard deviations, and frequencies were used to address Objectives 1 through 3 exploring Extension agents' knowledge, attitudes, and perceptions related to biochar and promoting sustainable soil amendments. Multiple linear regression was used to address Objective 4 and identify factors influencing Extension agents' intent to incorporate biochar into work-related activities. Assumptions for a multiple linear regression were met and all variables were continuous with a skewness and kurtosis between +/- 2. Acceptable ranges for variance inflation factors (VIF; 1.09 to 1.24) and tolerance (0.80 to 0.84) were found for variables of interest, thus limiting the concerns of multicollinearity (Bowerman & O'Connell, 1990; Field, 2013; Menard, 1995).

Because of the qualitative nature of the data collected to measure barriers related to promoting, educating about, or researching biochar for objective 5, responses were thematically coded using Glaser's (1965) constant comparative method of analysis. The identified themes were then transformed into quantitative data, and count frequencies were used to report the identified barriers for Objective 5.

Survey Responses

Of the 771 contacts, 200 responded to the survey. Of responses received, 39 were incomplete and 36 respondents did not meet study parameters or did not provide consent. A total of 125 usable responses remained, indicating a 17.0% response rate. The typical respondent was male (n = 62, 49.6%) and identified as White (n = 119, 95.2%). The mean age of respondents was 49 years (SD = 13.6).

Study Limitations

This research is not without its limitations. The population of interest for this study was Midwest Extension agents; however, an existing list of these individuals and their contact information did not exist at the time of data collection. Therefore, the research team had to create their own sampling frame based on an extensive web search. This can lead to coverage errors where the sample frame does not perfectly reflect the population (Dillman et al., 2014). We did have some respondents indicate they were not currently Extension agents, which supports the possibility of this limitation. Additionally, the 17.0% response rate could also indicate concerns for non-

response error, because respondents who participated in the research were different from those who did not participate (Dillman et al., 2014). Follow-up emails were sent to the pool of potential respondents to help increase the response rate and decrease concerns of non-response bias, but additional reminders, alternative modes for data collection (i.e. mailed surveys), and incentives could have increased the response rate (Dillman et al., 2014). However, budget and time limitations prohibited these additional steps. While these limitations will decrease the generalizability of the study and should be considered when interpreting the findings, these data also provide the first steps into gaining deeper insights for Extension agents' professional development needs related to novel technology, like biochar.

Results

Objective 1: Determine Extension Agents' Knowledge of Biochar

On average, respondents correctly answered approximately half of the 12 true-false questions (M = 6.44, SD = 3.67), indicating somewhat low knowledge of biochar. The statement receiving the highest percentage of correct responses was *biochar can be used as a potential soil amendment and carbon sequestration medium* (True; 82.4%). The statement receiving the lowest percent of correct responses was that *biochar lasts less than two-to-three years in the soil after application* (False; 28.0%). Table 1 illustrates responses for knowledge items.

Table 1. Knowledge Item Responses (n = 125)

Statement	A[a]	Response					
		Correct		Incorrect		Don't Know	
		f	%	*f*	%	*f*	%
Biochar Properties							
The properties of biochar are the same regardless of the process of pyrolysis used to manufacture it.	F	52	41.6	4	3.2	69	55.2
All biochar has the same adsorption capacity, pH, nutrient concentration, and chemical composition.	F	68	54.4	4	3.2	53	42.4
Biochar lasts less than two-to-three years in the soil after application.	F	35	28.0	13	10.4	77	61.6
Biochar can be purged from the soil after application.	F	56	44.8	1	0.8	68	54.4
Biochar Applications							
Biochar applications have been shown to improve the physical condition of poor-quality soils.	T	82	65.6	1	0.8	42	33.6
Biochar has the ability to store carbon in a stable form, preventing the carbon dioxide of organic matter leaking into the atmosphere.	T	69	55.2	4	3.2	52	41.6
Biochar can increase the water retention and holding capacity of the soil.	T	79	63.2	1	0.8	45	36.0

Statement	A[a]	Response					
		Correct		Incorrect		Don't Know	
		f	%	*f*	%	*f*	%
Biochar can be used as a potential soil amendment and carbon sequestration medium.	T	103	82.4	0	0.0	22	17.6
Biochar Terminology/Classification							
Biochar can be defined as the solid material obtained from the carbonization of biomass through pyrolysis.	T	87	69.6	0	0.0	38	30.4
Biochar is classified as an inorganic fertilizer.	F	53	42.4	16	12.8	56	44.8
Biochar can be created from agricultural and municipal waste byproducts.	T	74	59.2	3	2.4	48	38.4
The term 'biochar' is still relatively new and has only recently been used in the last decade …	F	47	37.6	35	28.0	43	34.4

Note. [a] Answer, T = statement is true, F = statement is false

Objective 2: Determine Extension Agents' Attitudes and Perceptions of Other Agents' Attitudes toward the Use of Biochar as an Agricultural Soil Amendment

Respondents were found to have an averaged, neutral attitude toward the use of biochar (M = 3.38, SD = 0.51). The overall perceptions of other Extension agents' attitudes toward biochar were also neutral (M = 3.32, SD = 0.49). Item responses for attitude scales are shown in Table 2 and visualized in Figure 2.

Table 2. Attitude Item Responses (n = 125)

	Extension Agents' Attitudes toward Biochar		Perceptions of Other Agents' Attitudes toward Biochar	
	M	*SD*	*M*	*SD*
Good/Bad	3.78	0.80	3.46	0.74
Positive/Negative	3.76	0.75	3.52	0.70
Acceptable/Not Acceptable	3.76	0.73	3.50	0.63
Beneficial/Not Beneficial	3.66	0.79	3.34	0.73
Important/Unimportant	3.22	0.67	3.06	0.64
Essential/Not Essential	2.96	0.71	2.98	0.65
Crucial/Trivial	2.95	0.57	2.97	0.49
Necessary/Unnecessary	2.93	0.69	2.93	0.62
Scale Average	3.38	0.51	3.22	0.49

Objective 3: Determine Extension Agents' Perceived Importance to Promote Sustainable Soil Amendments

Perceived Importance of Promoting Sustainable Soil Amendments

On average, respondents indicated that promoting sustainable soil amendments was of moderate importance (M = 3.22, SD = 0.96). Over half of respondents believed the characteristics "to provide decreased need for fertilizer use" and "to provide a decreased need for pesticide use" to be important or very important. The characteristic "to be organic" received the lowest perceived importance rating, with overall half of respondents indicating it to be not important or slightly important. Table 3 illustrates respondent frequencies for scale items.

Table 3. Item Responses for the Promotion of Sustainable Soil Amendments (n = 125)

Item	Not Important		Slightly Important		Moderately Important		Important		Very Important	
	f	%	*f*	%	*f*	%	*f*	%	*f*	%
To provide decreased need for irrigation	20	16.0	17	13.6	31	24.8	37	29.6	20	16.0
To provide decreased need for fertilizer use	6	4.8	7	5.6	26	20.8	51	40.8	35	28.0
To provide decreased need for pesticide use	8	6.4	10	8.0	26	20.8	48	38.4	33	26.4
To come in recycled packaging/containers	28	22.4	24	19.2	24	19.2	29	23.2	20	16.0
To be organic	35	28.0	28	22.4	36	28.8	18	14.4	8	6.4

Objective 4: Identify the Factors that Predict Extension Agents' Likelihood to Incorporate Biochar in Their Work

Overall, respondents indicated being *neither likely nor unlikely* to incorporate biochar in work-related activity (M = 3.11, SD = 1.03). Over half of respondents indicated being somewhat likely or very likely to "discuss biochar with others" and to "educate others about biochar." More than half of respondents indicated being neither likely nor unlikely to "promote the use of biochar," while respondents tended to be more unlikely than likely to "conduct research on biochar." Table 4 illustrates frequencies for item responses.

Table 4. Item Responses for Likelihood to Incorporate Biochar in Work-Related Activity (n = 125)

Item	Unlikely		Somewhat Unlikely		Neither Likely nor Unlikely		Somewhat Likely		Very Likely	
	f	%	*f*	%	*f*	%	*f*	%	*f*	%
Discuss biochar with others	9	7.2	11	8.8	32	25.6	53	42.4	20	16.0
Educate others about biochar	13	10.4	14	11.2	33	26.4	57	45.6	8	6.4
Promote the use of biochar	17	13.6	8	6.4	66	52.8	29	23.2	5	4.0
Conduct research on biochar	42	33.6	24	19.2	35	28.0	18	14.4	6	4.8

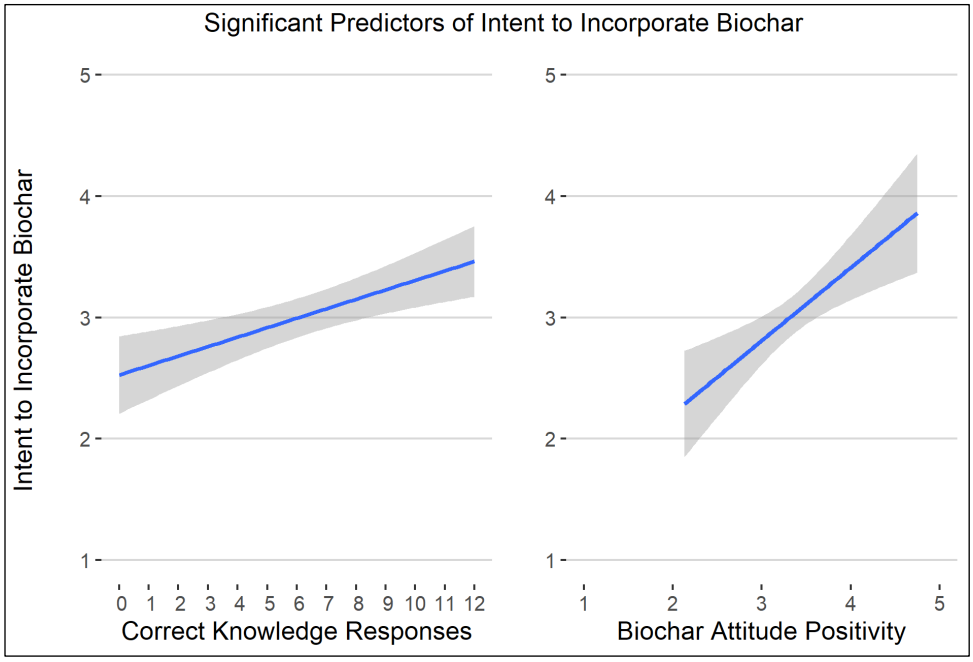
Multiple linear regression was used to predict respondents' likelihood to incorporate biochar in work-related activity based on the variables of knowledge, biochar attitude, perception of others' biochar attitude, attitude toward sustainable soil amendments, age, and gender. The overall regression was statistically significant (R^2 = .184, F(6, 109) = [4.10], p = .001) with a medium effect size (Cohen, 1988). It was found that knowledge (β = .242, p = .012) and attitude (β = .236, p = .048) significantly predicted Extension agents' likelihood to incorporate biochar in work-related activity. Extension agents' attitude toward sustainable soil amendments, age, gender, and belief of other agents' attitudes toward biochar were not significant predictors in the model. Table 5 reports the results of the model and Figure 2 illustrates the relationships between significant predictors and the outcome variable. Tables 6 and 7 in the Appendix provide descriptive statistics and correlation coefficients for the variables of interest.

Table 5. Model Predicting Extension Agents' Likelihood to Incorporate Biochar in Work-Related Activity (n = 125)

Predictor Variable	*B (coefficient)*	SE_B	*β*	*t*	*p*
(Constant)	.630	.766		.823	.413
Knowledge	.068	.026	.242	2.567	.012*
Biochar Attitude	.492	.246	.236	2.000	.048*
Others' Biochar Attitude	-.115	.228	-.055	-.502	.616
Importance of Sustainable Soil Amendments	.171	.098	.158	1.745	.084
Age	.004	.007	.049	.519	.605
Gender	-.011	.194	-.005	-.056	.955

Note. *$p < .05$

Figure 2. Relationship Between the Significant Predictors and the Outcome Variable from the Multiple Regression Model Run for Objective 4



Note. Lines represent fitted values and shaded regions represent standard error.

Objective 5. Explore Extension Agents' Perceived Barriers to Incorporating Biochar into Work

An open-ended question was used to elicit specific barriers to Extension agents' incorporation of biochar in their work-related activity. A total of 92 of 125 respondents answered this question. A majority of respondents (n = 44) described their own lack of knowledge or training on biochar to be a significant barrier. The second most described barrier was a lack of existing research and resources on the topic, including regional studies, peer-reviewed literature, and resources for Extension to use (n = 25). Other identified barriers related to perceived regional factors were found, such as low availability of biochar and high costs (n = 15), biochar not being of high urgency for the area (n = 12), and lack of farmer or client interest on biochar (n = 12). A lack of funding *(*n = 7) and lack of time (n = 8) were also identified as barriers.

Discussion, Conclusions, and Implications

The purpose of this research was to explore Midwest Extension agents' intent to incorporate biochar into their work-related activities. Overall, the respondents in our study did not indicate a strong intent to incorporate biochar content into future programmatic efforts; however, the additional analyses from our study indicate opportunities to positively influence that behavior. Our findings indicated many respondents lacked knowledge of biochar altogether. The lack of knowledge on biochar was similar to that found in other studies that focused on farmer knowledge of biochar (Latawiec et al., 2017; Magnusson, 2015; Niemmanee et al., 2019).

However, there was a large degree of variability in Extension agents' knowledge. On average, respondents were somewhat familiar with biochar based on answering approximately half of true-false questions correctly, but the large standard deviation (*SD* = 3.67) indicated a wide distribution of knowledge. We assume that, if Extension agents possess limited knowledge toward this topic of biochar, they would find it challenging to incorporate this content into future Extension programs.

Extension agents' overall attitudes toward the use of biochar as a soil amendment were fairly neutral, as well as Extension agents' belief of other agents' attitudes toward biochar. These neutral attitudes are likely to also reflect the limited knowledge of biochar. While the respondents may not be familiar enough with biochar to make a positive or negative assessment toward the product, we can at least conclude that biochar does not have negative connotation across this audience of Midwest Extension agents. Additionally, according to the TRA, these neutral attitudes toward biochar would not be expected to have a strong influence on intent to incorporate biochar into work related activities in the future (Fishbein & Ajzen, 1975).

Despite indicating neutral attitudes toward biochar specifically, the respondents' perceived moderate importance toward promoting sustainable soil amendments generally indicates that there could be additional support for biochar programming if they had more knowledge and/or awareness of the topic. Despite averages indicating Extension agents' being neither likely nor unlikely to incorporate biochar in their future work, a high degree of variability was reported. The multiple linear regression model may have been statistically significant, but only knowledge of biochar and attitudes toward biochar were predictors of behavioral intent. Both of these variables were positive predictors of intent to incorporate biochar into work-related activities and supported the prior conclusion that lack of knowledge would inhibit behavioral intent. However, this model did not fully support the TRA (Fishbein & Ajzen, 1975), as perceptions of others' attitudes toward biochar was not a significant predictor. Additionally, the variables of interest could account for only 18.4% of the variance in intent to incorporate biochar into work-related activities. Additional variables influencing behavioral intent not captured in this model should be explored in the future.

The final objective in this study explored barriers to including biochar in programmatic activities, and most respondents did list some type of barrier. A lack of knowledge was the most-identified barrier, which supported the findings that biochar knowledge was low and, as knowledge decreased, behavioral intent would decrease as well. The second most common barrier was lack of peer-reviewed research, regional studies, or Extension publications related to biochar. While there has been research on this topic (for example Aller et al., 2018; Filiberto & Gaunt, 2013; Kätterer et al., 2019), there is a clear need to better connect the existing literature to the regional context of the Extension agents to help inform future programming.

Recommendations

While this study does provide a valuable baseline to understand Midwest Extension agents' intent to incorporate biochar into work-related activities, there are some limitations that should be considered. The previously outlined limitations related to coverage error and non-response error will limit the generalizability of the findings, as will the limited context of Midwest Extension agents. However, this study still reports data from 125 Extension agents across the Midwest and can help inform future professional development to support Extension agents in developing programming around biochar. Because the respondents did perceive promoting sustainable soil amendments to be moderately important, they would be interested in learning more about biochar for this purpose.

In order to further support the development of a biochar industry in the United States, train-the-trainer programs aimed at increasing Extension agents' knowledge and attitudes toward biochar are needed. These findings are important to guide future efforts to improve the adoption of climate-smart agricultural technologies. Although biochar may have a limited capacity to improve soil conditions and crop yields in Midwestern agricultural production (Aller et al., 2018; Filiberto & Gaunt, 2013), it may hold more promise as an agricultural technology to sequester carbon (Sun et al., 2018; Zilberman et al., 2022). As prior Extension efforts to educate stakeholders on biochar have been successful (Dettenmaier et al., 2020), and, as we identified a gap in Extension agents' knowledge of biochar, we concur with Kibue (2018) and Hunter et al. (2017) that Extension training on biochar is needed.

Knowledge was one of the strongest predictors of behavioral intent, and lack of knowledge related to biochar was one of the biggest barriers for incorporating this product into work-related activities. Professional development opportunities for Extension agents should focus on topics they were least familiar with, like shelf life and properties. Additionally, resources should be curated to provide Extension agents with information about the research around biochar and highlighting any regional studies. Farmers who have successfully used biochar can also serve as guest speakers and discuss their experience with the soil amendment as a way to both increase knowledge and positively influence attitudes toward biochar. Providing these resources and trainings to Extension agents is expected to increase their own likelihood of providing training and resources to farmers about the use, applications, and benefits of biochar in the future.

There are additional opportunities for future research to build on this study as well. Due to the limited scope of Midwest Extension agents, we recommend similar research focused on other regions of the United States. Regional comparisons of data can also reveal the unique needs of Extension agents across the country. Another opportunity for future research would be to test alternative theoretical models to understand behavioral intent, like TPB or the Expectancy-Value Theory of Achievement Motivation (Atkinson, 1957), to develop a more holistic understanding of the influences on intent in this context. While TRA is appropriate for Extension-related

research (Harder et al., 2021), TPB variables might be able to account for a greater amount of variance when predicting behavioral intent, especially with the inclusion of perceived behavioral control and/or self-efficacy (Ajzen, 1987). The qualitative data from this study related to perceived barriers can also be used for the development of a future scale, which could then be integrated into a model predicting behavioral intent. Additionally, structural equation modeling should be used to determine if variables of interest serve as moderating or mediating variables for intent to incorporate biochar into future programmatic efforts. This nuanced information would provide important guidance for how to structure and focus train-the-train programs about biochar.

This study measured only behavioral intent, in lieu of actual behavior. If biochar professional development is provided to Extension agents in the future, it would be beneficial to conduct a longitudinal study to measure actual behavior related to integrating this topic into their work-related activities. Evaluation of such programs and on farmers' perceptions and knowledge of biochar is also recommended. Another line of research would be to explore biochar adoption among other actors in the biochar value chain, such as processors, retailers, and farmers. As sociological biochar research is in its exploratory phase, qualitative research in the form of interviews and focus groups may aid in our understanding of biochar perceptions.

The adoption of sustainable agri-technologies and climate-smart agricultural practices is important to confront resource depletion, degradation, and climate change. Extension will play an important role in this endeavor. Improving Extension agents' knowledge and favorable attitudes about sustainable agricultural soil amendments can increase their visibility and use in Extension programming, as was found in this study in the context of biochar.

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Appendix

Table 6. Descriptive Statistics for Variables of Interest

Variable	Range	Minimum	Maximum	Mean	SD
Biochar Knowledge[a]	12.00	0.00	12.00	6.44	3.67
Biochar Attitude[b]	2.88	2.13	5.00	3.38	0.51
Perception of Others' Biochar Attitude[b]	3.00	2.00	5.00	3.22	0.49
Importance of Sustainable Soil Amendments[c]	4.00	1.00	5.00	3.22	0.96
Age	51.00	23.00	74.00	48.96	13.56
Likelihood to Incorporate Biochar in Work-Related Activity[d]	5.00	1.00	6.00	3.11	1.03

Note. [a] 12-item scale measuring the number of correct answers out of 12 true-false statements on biochar; [b] 8-item, 5-point bipolar-semantic differential scale measured from 1 to 5, with 5 indicating more positive attitudes; [c] 5-item, 5-point Likert scale measured from 1 – not important to 5 – very important, with higher values demonstrating more perceived importance toward sustainable characteristics of soil amendments; [d] 4-item, 6-point Likert scale measured from 1 – unlikely to 6 – very likely, with higher values demonstrating higher likelihood to incorporate the topic of biochar in future work.

Table 7. Correlation Coefficients for Variables of Interest

	Variable	1	2	3	4	5	6	7
1	Biochar Knowledge	1						
2	Biochar Attitude	.350**	1					
3	Perception of Others' Biochar Attitude	.193*	.519**	1				
4	Importance of Sustainable Soil Amendments	.067	.315**	.104	1			
5	Age	.105	-.035	.039	.042	1		
6	Gender	.196*	.095	.073	-.040	.375**	1	
7	Likelihood to Incorporate Biochar in Work-Related Activity	.328**	.381**	.124	.251**	.069	.069	1

Note. * $p < .05$; ** $p < .001$

The Positive Behavioral Management Strategies Program (PBMS) for Parents, Teachers, and Caregivers: Impacts and Outcomes

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This study examined the impact of the Positive Behavioral Management Strategies (PBMS) online educational program on 624 participants in the southeastern region of the United States. The PBMS program incorporates established behavioral management principles with new research-based practices to promote healthy, positive relationships between adults and children while constructively managing and preventing problematic behavior. Additionally, the PBMS program helps parents and teachers to recognize the motivations behind misbehaviors and to avoid some common mistakes in child behavioral management. It also describes how to recognize and capitalize on "teachable moments," which are indispensable in the developmental process. A retrospective-pre-test-then-post-test design was used to reduce response shift bias when assessing knowledge and skill intervention outcomes for twenty-two behavioral management variables. The PBMS program was shown to be effective for increasing knowledge and skills related to managing misbehavior while reinforcing interpersonal relationships and fostering a sense of responsibility and capability within the child. Large changes in standardized mean effect size from before to after the intervention were documented for all twenty-two variables studied. The PBMS program showed positive outcomes to assist participants to increase their knowledge and skills in managing child behavior successfully. Implications for educators and practitioners are discussed.

Keywords: behavior management, discipline, parenting, parent education, teaching

Introduction

Consider the statements below as examples of some all-too-familiar strategies employed by parents, teachers, and caregivers while attempting to effectively manage challenging child behaviors.

- *"I thought I told you to go to bed!"*
- *"I want these toys picked up or I'm taking them all away!"*

- *"If you talk back to me one more time, you're going in time-out!"*
- *"Won't you please just listen to me?"*
- *"Because I said so, that's why!"*
- *"If you will just clean your room, we can go get some ice cream."*
- *"I want quiet now, or there will be no recess today!"*
- *"I will turn this car right around if you don't stop horsing around!*

As children develop cognitively, they discern that they are capable of decision-making. As this sense of agency strengthens, a series of power struggles, confrontations, and misbehaviors are normative. All too often, no specific, intentional strategy is put in place to manage behavior until misbehavior occurs, at which point adult intervention is often reactive, emotion-based, and/or punitive. Exasperated caregivers may find themselves attempting to cajole, compel, bribe, persuade, command, or coerce children into compliance. Despite having the best intentions for the child's well-being in mind, caregivers who respond reactively in these power struggles may be unintentionally initiating conflict trends, missing valuable opportunities to foster growth in a child's senses of both self-esteem and agency, and even inadvertently reinforcing undesirable and inappropriate behaviors.

Research has consistently validated behavioral intervention methods that allow adult caregivers to monitor and modify child behavior in ways that foster emotional, cognitive, and social development (Klevens & Hall, 2014; Roggman et al., 2008). In keeping with the goals of a positive child and youth development framework (Benson, 2006; Benson et al., 2012; Ciocanel et al., 2017; Lerner & Hillyard, 2019), the positive behavioral management strategies (PBMS) described herein have been found to be effective for decreasing unwanted behaviors while strengthening positive bonds (Bowlby, 1979; Buehler, 2020), promoting prosocial values (Smetana et al., 2019; Spinrad et al., 2019) and competence (Artschul et al., 2016; Jabagchourian et al., 2014; Weiss & Schwarz, 1996), and fostering personal agency by encouraging decision-making that builds confidence (Montano et al., 2018; Sorkhabi & Middaugh, 2014), character (Shubert et al., 2019), and well-being (Brassell et al., 2016; Buehler, 2020) while reducing risk (Payton et al., 2000; Wang et al., 2019). This paper aims to examine the impact of a behavioral management educational program (PBMS) on participants located in the southeastern United States. The goal of the program was to teach participants strategies to effectively manage child behavior while creating and maintaining a healthy relationship bond.

Review of the Literature

Behavioral Management Strategies

The PBMS programmatic model includes Roggman et al.'s (2008) three general sociocultural parenting strategies: (1) warmth, (2) connectedness, and (3) monitoring. The authors found these strategies to be essential for raising healthy children in American society (see also Rodriguez et

al., 2009; Sue & Sue, 2003). Each of these three general strategies is designed to help children feel safe, capable, and supported. Parental warmth allows children to feel that they are heard and understood, at which point they are in a better position to hear and understand. Adults' attentiveness at the individual level is important for building the trust necessary for developing a healthy, bidirectional relationship between adult and child (Turner & Welch, 2012; Werner, 2000). Parental connectedness allows caregivers to demonstrate their responsiveness and engagement with a child, affirming their authentic concern about the child's well-being through their behaviors and words (Welch & Harris, 2023). Monitoring and behavioral management allow "effective parents and teachers to set clear boundaries, offer limits with latitude, and develop accountable and responsible children through being consistent." (Harris et al., 2015a, p. 3) These strategies are valid and effective for managing behaviors in typically developing children as well as those with behavioral disorders or other clinical diagnoses (De Graaf et al., 2008; Dyches et al., 2012).

Rationale for the PBMS programmatic model is founded on principles of healthy relationships, such as Moore et al.'s (2004) description of the basic components of a healthy or unhealthy couple relationship. These same principles are often mirrored in healthy or unhealthy parent-child practices and relationships (Carlson & McLanahan, 2006; Krishnakumar & Buehler, 2008). The parent-child relationship lays the foundation for the child's developmental context in the home, classroom, community, and all other subsequent social contexts (Bush & Peterson, 2013). According to Moore et al. (2004), healthy marriages meet seven important needs. Specifically, they provide (1) physical support for growth and development; (2) a safe, secure, and nurturing environment; (3) social and emotional support; (4) positive communication; (5) positive conflict resolution; (6) positive and enjoyable time spent together; and (7) [partners] mutually committing to each other.

Four Types of Misbehaviors

In the current study, four general types of misbehaviors are foundational to understanding the potential motivations and causes behind a child's actions. They include (1) goal-getting, (2) reaction-seeking, (3) indolence, and (4) fears (Cline & Fay, 2006; Eyberg, 1992; Harris et al., 2015a; Latham,1994, 1999, 2002). Understanding a child's motivation for a given behavior, when possible, is a crucial first step to rewarding or modifying the behavior. Most child behavior motivations are centered in the goals of meeting needs, achieving autonomy, or wielding power and control. These motivations are mediated by many variables, the most important of which tend to be (1) attributions of perceived attachment to parents and (2) actual parental behavior, such as hostile and rejecting behavior or inductive reasoning and empathy (Cline & Fay, 2006; Lansford, 2019; Latham,1994; see also Pomerantz et al., 2019). Some scholars and researchers have focused on children's misbehavior as a response to specific negative stimuli, such as psychological difficulties (e.g., depressive symptoms, overt anger), dysfunctional attributions for child misbehavior, and inept or lazy discipline strategies which may result in further child

misbehavior (Leung & Slep, 2006). Leung and Slep (2006) also found that the type and condition of a caregiver's mental health were associated with trends in parenting styles. For instance, a depressed parent is more likely to employ a permissive parenting style (Leung & Slep, 2006; see also Buehler, 2020).

Four Positive Parenting Principles

Employing the three general sociocultural parenting strategies (warmth, connectedness, and monitoring) and an adapted version of Dr. Glen Latham's *Power of Positive Parenting* system (1994, 1999, 2002), the PBMS model relies on four behavioral management principles that parents, teachers, and other caretakers can use to manage child behavior effectively:

- **Principle 1:** Behavior is largely a product of its immediate environment.
- **Principle 2:** Behavior is shaped by consequences.
- **Principle 3:** Behavior is ultimately shaped better by positive than by negative consequences.
- **Principle 4:** Past behavior is the best predictor of future behavior.

Using these four general principles (Latham, 1999) as the foundation for behavioral management, the PBMS model employs specific recommended approaches for responding to negative conduct, entitled "Strategies for When Children Misbehave." These strategies include ignoring inconsequential behavior, reinforcing appropriate behavior, stopping and redirecting inappropriate behavior, and avoidance of problematic parent, teacher, and caregiving "traps" (Harris et al., 2015b, pp. 4-6; Latham, 1994, 2002).

The first strategy for managing misbehavior is to ignore inconsequential behavior that is not threatening or harmful (Latham, 1999). By ignoring inconsequential behavior, a parent, teacher, or caregiver avoids reinforcing the negative behavior by not paying attention to it. Many parents, teachers, and caregivers pay less attention to good behavior and spend more energy on rectifying misbehavior. However, responding more consistently to misbehaviors than prosocial behaviors can send unhealthy messages to children, such as misbehavior is a reliable method of "getting" or manipulating adult attention and that the role of adult authority is primarily punitive. Inconsequential behavior should be stopped or intervened with if it will (1) persist beyond simple annoyance or (2) develop into consequential (i.e., harmful or damaging) behavior (Latham, 1999).

The second strategy is to reinforce appropriate behavior within the child's immediate environment, such as by providing praise or another reward to a sibling, classmate, or other child—so that the misbehaving child also seeks to be rewarded by emulating a similar behavior (Harris, et al., 20015b; Latham, 1999). The PBMS model emphasizes the use of reinforcement rather than punishment as past studies have found that reinforcement is more efficacious (Harris et al., 2015b; Welch & Harris, 2023). The third strategy involves intervening to stop misbehavior

and redirecting it toward more appropriate conduct. When the child has been redirected and is exhibiting positive behavior, the parent, teacher, or caregiver can then positively reinforce the positive conduct (Harris, et al., 2015b; Latham, 1999). The fourth strategy is to avoid common traps to which parents, teachers, and caregivers may naturally default as they struggle with a child's misbehavior. Latham (2002) identified the following trap pitfalls in the disciplinary process: (1) criticism, (2) sarcasm, (3) threats, (4) logic, (5) arguing, (6) questioning, (7) verbal or physical force, and (8) despair, pleading, or helplessness. These tactics can mark a deterioration of an adult's level of calmness and control of the situation and thus trigger the beginning of a power struggle (Harris, et al., 2015c).

In addition to Latham's behavioral management principles, the PBMS model also employs Love and Logic strategies by Cline and Fay (2006), who identified five steps in the conflict resolution process that can be effectively used by adult parents, teachers, and other caregivers. The first step in the Love and Logic approach to behavior management is empathy, a strategy in which parents, teachers, and caregivers discuss children's behavior sympathetically. This approach helps initiate a dialogue "rather than [to let] judgment and condemnation guide the negotiation of conflict" (Harris et al., 2015c, p. 3). The second step is to signal to the child that they have ownership over the situation and power to change their conduct by asking, "What are you going to do about this problem?" (Cline & Fay, 2006; Harris et al., 2015c, p. 3). The third step is to offer empowering choices, particularly when a child responds with uncertainty to the previous question. The fourth step is to have the child state the consequences of each proposed course of action, allowing the child to fully understand and assess the results of their potential decisions. The final step is to give permission for the child to solve the problem, allowing the child to make the final decision for how to solve their problem or change their behavior (Cline & Fay, 2006; Harris et al., 2015c).

Another core Love and Logic concept incorporated into PBMS is a series of four principles, represented by the acronym **C**.**O**.**O**.**L**. (**C**ontrol, **O**wnership, **O**pportunity, and **L**etting), which include sharing an appropriate degree of **C**ontrol with the child to promote a child's **O**wnership of the problem, providing **O**pportunities for executive decision-making on the part of the child, and then **L**etting consequences and an empathetic parent, teacher, or caregiver attitude teach the lesson at hand (Cline & Fay, 2006). More specifically, the "C" represents shared control between the parent, teacher, or caregiver and the child and is an important deviation from the authoritarian management approach in which the adult's will completely overwhelms any executive control by the child. Sharing control can be accomplished by presenting a child with a series of choices when they are faced with a problem instead of enacting a show of adult force (e.g., "my way or the highway") which a child will automatically resist or argue against, leading to one of the aforementioned power and control "traps," such as arguing, questioning, and criticism.

Shared control allows both parent, teacher, or caregiver and child to acknowledge that a child does have choices in situations. The power of choice through shared control then creates a way

for the child to assume ownership of the problem (represented by the "O"), meaning that the adult is no longer responsible for or the sole experiencer of the situational outcome. The parent, teacher, or caregiver can signal ownership of the problem to the child by empathizing with the difficulty of the problem and acknowledging its seriousness while not undertaking to "fix it" or to influence its solution. This is not the same as disengaging and distancing, however, as if to abandon the child to cope with their problem alone.

Warmth and connectedness must be maintained to communicate that the parents, teachers, and caregivers do indeed care about the solutions and outcomes and that they are available to provide support and guidance while sharing control. An example would be asking, "Would you like to know how some people solve problems like this?" as opposed to telling the child what they should do. As a result, the child has a stake in the outcome of the choice he or she made or will make. This investment promotes evaluative thinking on the child's behalf by creating a motivation for the child to think and evaluate his or her options instead of merely obeying or resisting a parent's, teacher's, or other caregiver's command.

The adult must then enact the "Opportunity" step or, in other words, provide the child an opportunity to think through his or her choice, using prompts like "Okay, how will you make that happen?" or "How do you think it will work out if you try to solve the problem that way?" This invites the child to employ logic and make testable predictions about their formulated plan of action in a safe environment with the parent, teacher, or caregiver as a supportive mentor rather than dictator.

The "L" represents the principle of "letting" consequences and empathy teach the needed lesson(s) to the child. At this point, parents, teachers, or caregivers must step back and allow the child's plan of action to be carried out and either succeed or fail. In the event of failure, a significant learning opportunity (SLO) is created for a child to reflect on his or her chosen strategy and for the parent, teacher, or other caregiver to offer further support and mentoring without undermining the child's sense of capability (Cline & Fay, 2006).

The Love and Logic approach represents a vast improvement over traditional methods of parenting in which children are assigned an "observer" role while the adults assume full control over potentially consequential situations, or instinctively insulate children from negative outcomes with the intention to protect or overprotect them. In the PBMS approach, a child's executive control, capability, and responsibility are all developed when problems and conflict arise, even when outcomes are positive, but more particularly when they are negative.

Four steps to responsibility, related to the C.O.O.L. approach, are outlined as follows: Step one is to give the child an appropriate task that they can handle and ask them to describe how they believe the finished task will look. Step two involves monitoring the task attempt, as a failure will again create a significant learning opportunity, with a real-world consequence to the child. Attempting the task provides an opportunity for a child to see that failure is real and possible,

and that they must develop ways to process, negotiate, and manage failure when it happens. At younger ages, such lessons are extremely valuable because the costs associated with failure increase with age and responsibility. Step three is to respond to the situation without anger. Parent, teacher, or caregiver anger gives a child a target to which they can attribute their discomfort, even to the point of playing a victim role. Allowing the consequences to unfold and showing empathy for the situation redirects the energy of the situation towards solutions rather than towards a conflict with children as targets or victims. Step four involves trusting the child with the same task again. This communicates the confidence of the parent, teacher, or caregiver and allows the child to understand that a failure is not final or a definitive result; there will be more chances to try again and to improve outcomes, thus promoting capability, self-efficacy, and self-concept (Cline & Fay, 2006).

Telep (2009) advocated for disciplinary measures that are healthy and constructive so that misbehavior results in benefits to both the parent, teacher, or caregiver and the child, rather than becoming adversarial or antagonistic. This positive framing and reframing of misbehavior as a constructive learning opportunity also allows for the child to take responsibility for their own behavior while maintaining warmth between the adult and the child. Telep's research offers four main strategies in response to misbehavior: (1) divert to a positive model, (2) deliberately ignore provocations, (3) state consequences firmly, and (4) provide renewal time. Additionally, Telep (2009) advocated several responses to misbehavior, including to "be detached…as if you are your child's aunt or uncle" (pp. 4-5). This approach, the positive parenting system, and the Love and Logic framework, all target the response and interaction between the parent, teacher, or caregiver and the child, as do the foundations of the PBMS training model, including its focus on positive attention, high expectations, and using relational elements to improve the parent-child, teacher-student, or caregiver-child relationship.

Positive Behavioral Management Strategies (PBMS) Curriculum

The PBMS coursework (Harris, 2016) is arranged into three modules which introduce the four main types of misbehaviors, their motivations, and the strategies for behavioral management. Each module includes a video lecture segment paired with lesson guides, activities, and reading material and concludes with a quiz on the module content. Module 1 explores *4 General Types of Misbehaviors*, *Healthy Parent-Child—Teacher-Student Relationships,* and *Short-term and Long-term Outcomes* of positive parenting. Module 2 covers *4 Principles of Positive Parenting* and *Strategies for When Children/Students Misbehave and Behave Well*. Module 3 investigates *5 Steps to Responsibility*, *C.O.O.L. Principles of Managing Behavior*, and *5 Steps to Conflict Resolution* (see www.smartcouples.org "Classes").

Specific Description and Synthesis of PBMS Coursework

The coursework begins with a classification of misbehaviors into four main types, each of which has a different main objective and motivation which must be understood before an effective

behavioral management strategy can be chosen and deployed. After these misbehavior classifications are identified and explored, three key strategies of effective parenting—warmth (e.g., empathy, availability), connectedness (e.g., responsiveness, encouragement), and monitoring (e.g., consistency with discipline and setting boundaries)—are explored. These three strategies must be consistent throughout caregiving if healthy adult-child relationships are to be maintained (Roggman et al., 2008).

A distinction is drawn in the PBMS model between two important classifications of consequences—natural and logical. Many parents will instinctively attempt to protect children from failure and negative consequences. Situations in which natural or logical negative consequences arise are referred to as significant learning opportunities (SLOs) by Cline and Fay (2006). Failure is one of the most important SLOs a child is likely to encounter. The PBMS coursework includes methods for building a sense of responsibility in the child by giving tasks in which failure can be anticipated, followed by allowing natural and logical consequences to take place, while then offering empathetic guidance before assigning the tasks again. In this way, failure becomes a constructive tool for growth and learning.

Protecting the child from consequences, with the exception of intervening in potentially consequential or harmful situations, often results in missed opportunities for the parent, teacher, or caregiver to pair the consequences with the child's decision(s), which can lead to undermining the development of the child's senses of capability and responsibility. Criticism deteriorates the warmth and connectedness between the adult and the child. Combining insulation from consequences with criticism is likely to give rise to patterns of irresponsibility and lowered perceptions of capability, self-efficacy, and self-esteem.

Another research-based "rule of thumb" in PBMS is the 8-to-1 positive-to-negative interaction ratio (Latham, 2002). In other words, for a healthy and warm relationship to be maintained between parent (or teacher/caregiver) and child, there should be at least eight positive interactions for every negative one. This ratio can be quantified in terms of elapsed time as well. For example, if a parent, teacher, or caregiver spends 20 minutes negatively interacting with a child, a minimum of 160 minutes of positive interaction are needed to re-balance the warmth of the relationship. The interaction ratio rule also promotes adult practices of actively acknowledging children's positive behavior instead of reserving attention for designing and implementing consequences for negative behavior (Latham, 1994, 1999). It should be noted that this interaction ratio is also true of other relationships such as the coparent relationship, although it has been set 5-to-1 positive-to-negative interactions or higher (Gottman, 1994).

The purpose of the current study was to examine the impact of the Positive Behavioral Management Strategies (PBMS) online educational program on participants in the southeastern region of the United States. As noted above, the PBMS program incorporates established behavioral management principles with new research-based practices designed to promote

healthy and positive relationships between adult parents, teachers, and caregivers with children, while constructively managing and preventing problematic behavior. Additionally, the PBMS program assists parents and teachers to recognize the motivations behind a wide range of misbehaviors. The program also offers forewarning of some of the most common mistakes (or "traps") in child behavioral management and describes how they can be avoided. Further, it explains how to recognize and capitalize on "teachable moments," which are indispensable in the developmental process.

Method

Target Populations and Demographics

The target population for the PBMS educational program intervention included anyone (n = 624) who regularly had repeated interactions with children, such as parents, teachers, and caregivers. The PBMS intervention and practices were specifically developed for non-professionals with no clinical training, but could also be used by therapists, counselors, or other practitioners.

The PBMS model and online coursework are applicable in their standard format to the target populations studied. While age-appropriate language and methods of approach must certainly be applied, the principles and strategies taught are valid for children of all communicative ages. The coursework is tailored with consideration primarily for parents and prospective parents and for teachers, but is also designed for other types of caregivers (e.g., nannies, daycare providers).

Demographics of the sample included 472 females (75.6%) and 86 males (13.8%), with 10.6% of the sample choosing not to identify their gender (Table 1). The sample was predominantly single, in their early twenties, and diverse with regard to race and ethnicity. Participants included those who were preparing to become parents, educators, human services professionals, and practitioners who were currently, or would be, working with children and youth someday.

Table 1. Demographic Description of PBMS Participants (n = 624)

Characteristics	***n***	**%**
Gender		
Female	472	75.6
Male	86	13.8
Missing Data	66	10.6
Age		
18	9	1.4
19	97	15.5
20	182	29.2
21	177	28.4
22	50	8.0
23	11	1.8
24	9	1.4

Characteristics	*n*	%
25	4	0.6
26	6	1.0
29	3	0.5
Over 30*	3	0.6
Missing Data	73	11.7
Marital Status		
Single	531	85.1
Married	20	3.2
Divorced	0	0.0
Partnered	5	0.8
Widowed	1	0.2
Separated	1	0.2
Missing Data	66	10.6
Income Level		
Under $20,000	262	42.0
$20,000-$39,999	61	9.8
$40,000-$59,999	56	9.0
$60,000-$79,999	39	6.3
$80,000 or more	137	22.0
Missing Data	69	11.1
Education Level		
Less than high school	2	0.3
High school diploma/GED	184	29.5
2-year college degree (Associate's)	313	50.2
4-year college degree (Bachelor's)	57	9.1
Graduate or professional degree	1	0.2
Missing Data	67	10.7
Race/Ethnicity		
White	324	51.9
Black	92	14.7
Hispanic/Latino	105	16.8
Asian/Pacific Islander	19	3.0
Native American	2	0.3
Other	14	2.2
Missing Data	68	10.9

Sampling

Participants were sampled primarily from the SMART Couples relationship education (CRE) courses which are made available to the public and university students through a major university in the southeastern United States. These courses were designed to serve people in a wide variety of relationship statuses and at different life stages.

Design

Due to the nature of the variables of interest, an important aspect of this study was the inclusion of the retrospective pre-then-post-test design rather than the traditional pretest and posttest before and after the PBMS intervention. Specifically, participants were given a side-by-side pretest and posttest immediately after completion of the program. Response shift, as described by George S. Howard, is "a treatment-produced change in the subject's awareness or understanding of the variables being measured" (Howard et al., 1979, p. 1). Response shift bias poses a significant threat to internal validity, particularly when subjects are being introduced to new information or abstract concepts, such as an understanding of what constitutes effective monitoring or parental connectedness, as opposed to concrete concepts such as income level or the number of children one has. A traditional pretest/posttest design could potentially generate response shifts as respondents would likely be unfamiliar with Love and Logic steps and other principles introduced in the PBMS program. The pretest would, therefore, be collected without the context of a conceptual grasp of the topics as opposed to the posttest, after all new concepts have been presented and explained. The resulting shift would mask real changes in understanding affected by the intervention, thus invalidating the results.

Conversely, the retrospective design allows new concepts to be introduced and for participants to introspectively respond to the changes in understanding they have undergone over the course of the intervention. Response shift bias, which can affect anyone who gives responses before and after a change in their understanding (i.e., by learning) is not to be confused with the Dunning-Kruger effect, in which respondents with lower cognitive abilities are more likely to overestimate their mastery of a concept (although the retrospective pre-then-post design can help control for this effect, as well).

Measure

The 22-item PBMS self-report instrument designed and used for this study distinguishes between the cognitive aspects of understanding the principles taught and understanding how to apply them, as well as confidence levels in applying the principles to real-life situations, and then practicing them behaviorally through skill development. Each item contains a statement of understanding of, confidence with, or application of principles and practices covered by the curriculum, with which participants agreed or disagreed using a 5-point Likert scale response system ranging from "strongly disagree" to "strongly agree."

Cognitive Skills

The cognitive aspects of the content are addressed by items in the instrument concerning participants' understanding of the principles and strategies covered. These include items such as "I understand how to identify consequential and inconsequential child behaviors," "I understand

how to avoid parent/teacher traps," and "I understand how to use C.O.O.L. in Love and Logic." Nine items regarding respondents' understanding of concepts were included in the measure.

Behavioral Skills

The behavioral content included items specific to parenting behavior, such as "I effectively stay connected with children," "I effectively identify consequential and inconsequential behavior," and "I effectively acknowledge appropriate behavior and stop, redirect, then reinforce consequential behavior." Eight of the PBMS items are specific to behavior.

Overall Skills

Overall parenting skills are measured with items such as "I use Positive Behavioral Management Strategies effectively to manage child behavior" and "I use Positive Behavioral Management Strategies to increase positive interaction." Five items are included for self-assessment of overall parenting skills relevant to the lessons of the PBMS curriculum. The full list of assessment items is included in Table 2. The changes in self-report scores are shown in Figures 1–4, ranked in descending order, all of which indicated positive shifts in standardized mean effect size from before to after the PBMS intervention at the $p < .001$ level.

Analysis

The pretest-then-post-test scores for each participant were analyzed using a paired-samples *t*-test to measure shifts in self-reported confidence in the concepts and strategies covered by the curriculum. The instrument was divided into item groups covering cognitive, behavioral, and overall application aspects of PBMS. The instrument is also sensitive to participants' confidence levels in their effectiveness in child monitoring and avoiding parent, teacher, or caregiver traps and to their perceptions of how well they actively implement their understanding.

Results

The most pronounced changes in participant self-reports were observed in behavioral items (Table 2), including effectively avoiding parent, teacher, and caregiver traps ($t = 11.33$, $p < .001$, $d = 1.45$); using C.O.O.L. principles in Love and Logic effectively ($t = 10.64$, $p < .001$, $d = 1.35$); and using PBMS to decrease negative interaction ($t = 10.29$, $p < .001$, $d = 1.31$) and in cognitive items including understanding the 5 steps of Love and Logic ($t = 10.62$, $p < .001$, $d = 1.35$), understanding how to avoid power and control traps ($t = 10.46$, $p < .001$, $d = 1.33$), and understanding how C.O.O.L. is to be used in real-world settings ($t = 10.30$, $p < .001$, $d = 1.31$). Notably, the effect sizes for all 22 items were found to exceed Cohen's convention for a large effect ($d = .80$), and all findings were significant at the $p < .001$ level, increasing the study authors' confidence that Type I and Type II errors had generally been avoided.

Table 2. Results of PBMS Retrospective Pretest to Posttest Change: Before and After Programming (n = 599-624)

Knowledge Change	Retrospective Pretest Mean Score (*SD*)	Posttest Mean Score (*SD*)	Mean Change (*SD Pooled*)	*t*	*p*	Cohen's *d*
I understand how to show warmth to children.	3.72 *(0.81)*	4.53 *(0.69)*	0.82 *(0.75)*	-25.03	<.001	1.08
I understand how to stay connected with children.	3.49 *(0.83)*	4.43 *(0.62)*	0.94 *(0.73)*	-29.22	<.001	1.29
I understand how to monitor children effectively.	3.46 *(0.94)*	4.46 *(0.64)*	0.99 *(0.78)*	-27.72	<.001	1.28
I understand how to identify consequential/inconsequential child behavior.	3.08 *(0.97)*	4.43 *(0.62)*	1.35 *(0.82)*	-33.61	<.001	1.66
I understand how to acknowledge appropriate behavior and to stop, redirect, and reinforce consequential behavior.	3.17 *(0.97)*	4.43 *(0.62)*	1.27 *(0.82)*	-32.22	<.001	1.55
I understand how to avoid parent/teacher traps.	2.79 *(1.03*	4.35 *(0.64)*	1.56 *(0.85)*	-35.59	<.001	1.83
I understand how to use C.O.O.L. in *Love and Logic*.	2.62 *(1.07)*	4.32 *(0.69)*	1.70 *(0.90)*	-36.62	<.001	1.90
I understand the 5 Steps of *Love and Logic*.	2.75 *(1.06)*	4.32 *(0.67)*	1.58 *(0.89)*	-35.06	<.001	1.77
I understand how I could effectively use Positive Behavioral Management Strategies with children.	3.22 *(0.96)*	4.45 *(0.60)*	1.22 *(0.80)*	-31.74	<.001	1.54
I effectively show warmth to children.	3.75 *(0.86)*	4.46 *(0.63)*	0.71 *(0.75)*	-21.77	<.001	0.94
I effectively stay connected with children.	3.58 *(0.88)*	4.38 *(0.67)*	0.80 *(0.78)*	-23.75	<.001	1.02
I effectively monitor children.	3.51 *(0.90)*	4.37 *(0.68)*	0.86 *(0.80)*	-24.24	<.001	1.08
I effectively identify consequential/inconsequential behavior.	3.13 *(0.98)*	4.35 *(0.63)*	1.23 *(0.82)*	-30.61	<.001	1.49
I effectively acknowledge appropriate behavior and stop, redirect, and reinforce appropriate behavior.	3.19 *(0.95)*	4.35 *(0.64)*	1.16 *(0.81)*	-29.92	<.001	1.43
I effectively avoid parent/teacher traps.	2.93 *(0.97)*	4.26 *(0.68)*	1.33 *(0.84)*	-32.11	<.001	1.59
I use C.O.O.L. in *Love and Logic* effectively.	2.74 *(1.01)*	4.22 *(0.71)*	1.48 *(0.87)*	-33.85	<.001	1.70
I use the 5 Steps of *Love and Logic* effectively.	2.81 *(1.02)*	4.23 *(0.72)*	1.42 *(0.88)*	-32.82	<.001	1.62

I use *Positive Behavioral Management Strategies* effectively with children.	3.18 *(0.94)*	4.33 *(0.65)*	1.15 *(0.81)*	-29.85	<.001	1.42
I use *Positive Behavioral Management Strategies* to increase positive interaction in my relationships.	3.27 *(0.92)*	4.35 *(0.63)*	1.09 *(0.79)*	-29.30	<.001	1.37
I use *Positive Behavioral Management Strategies* to decrease negative interaction in my relationships.	3.24 *(0.91)*	4.33 *(0.63)*	1.09 *(0.79)*	-29.51	<.001	1.39
I use *Positive Behavioral Management Strategies* to increase positive bonds (friendship) in my relationships.	3.37 *(0.90)*	4.35 *(0.64)*	0.97 *(0.78)*	-27.66	<.001	1.25
I use *Positive Behavioral Management Strategies* to increase happiness and satisfaction in my relationships.	3.35 *(0.90)*	4.36 *(0.62)*	1.02 *(0.77)*	-27.81	<.001	1.30

Note. Effect Size Change (*d*): .20=small; .50=medium; .80 or higher=large

Figures 1–4 include additional information indicating ordered change in cognitive understanding, effectiveness, and use of the skills that were accredited to the PBMS program intervention. Identifying these ordered changes allowed the researchers to detail the results of the program and what future changes could or needed to be made to increase effectiveness in specific areas. For example, (1) understanding and being effective at promoting warmth, (2) staying connected with children, and (3) monitoring their behaviors showed the lowest increases from before to after the program intervention, indicating that more time and effort needed to be spent discussing specific ways parents and teachers can meet these three objectives.

Figure 1 highlights the ordered change in the interconnections between knowledge and skills gained as a result of the PBMS intervention, evidencing the importance of not only disseminating knowledge but also allowing program participants to develop their behavioral management skills. Figure 2 specifically showcases the ordered change levels of skill development due to the PBMS intervention. Note the specific skills related to avoiding control and power traps and the development of the abilities to identify consequential and inconsequential behaviors. Figure 3 underscores the need to understand behavioral management practices before skill development can occur. PBMS program participants identified knowledge gains in C.O.O.L. and other Love and Logic strategies as particularly helpful. Figure 4 shows ordered change in “actual use” increases from before to after the intervention. Levels of decreased negative interaction, increased positive interaction, bonds, and happiness and satisfaction are tracked across all SMART programs in order to compare and contrast the effectiveness of each program.

Figure 1. Ordered Change in Overall Positive Behavioral Management Strategies

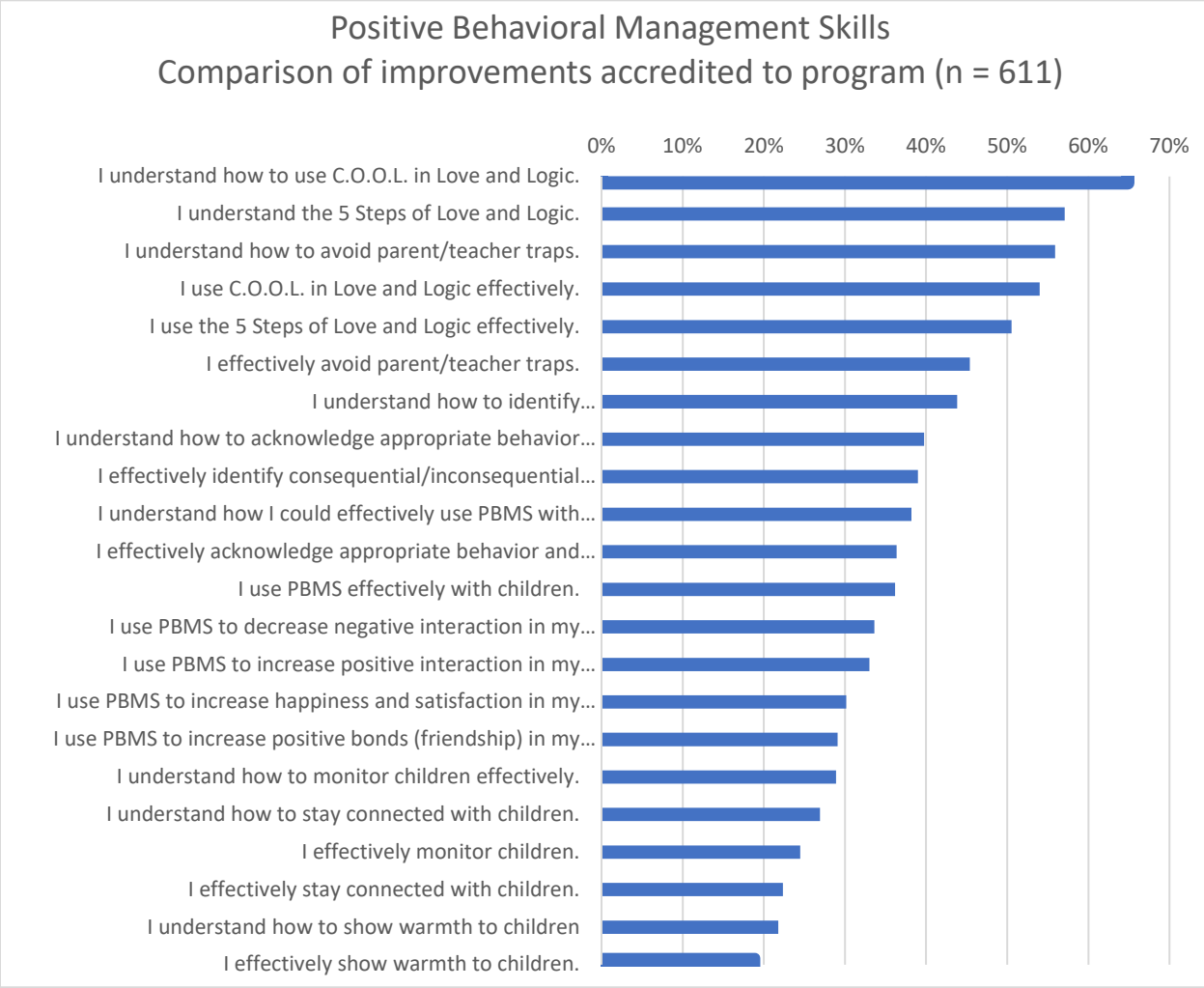


Figure 2. Ordered Change in Effectiveness of Positive Behavioral Management Strategies

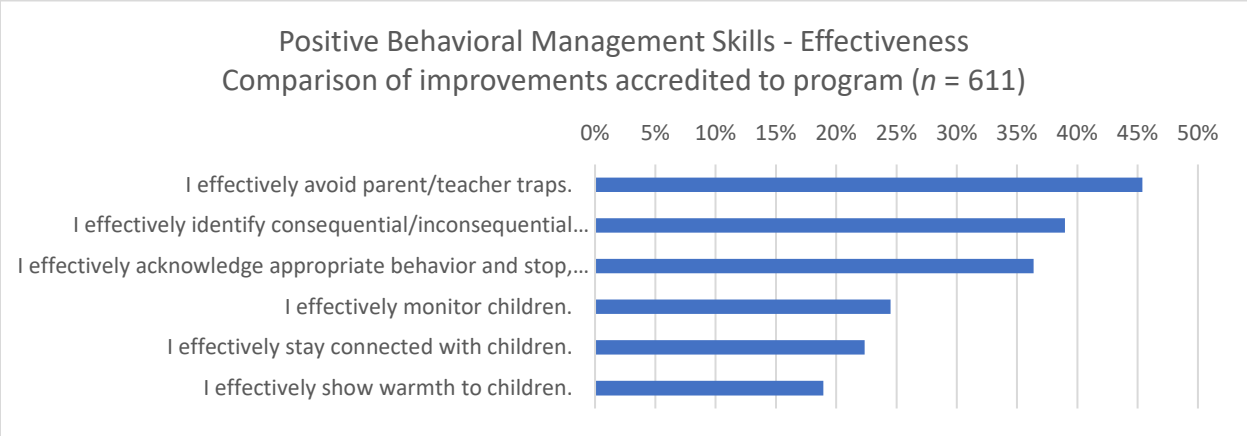


Figure 3. Ordered Change in Understanding of Positive Behavioral Management Strategies

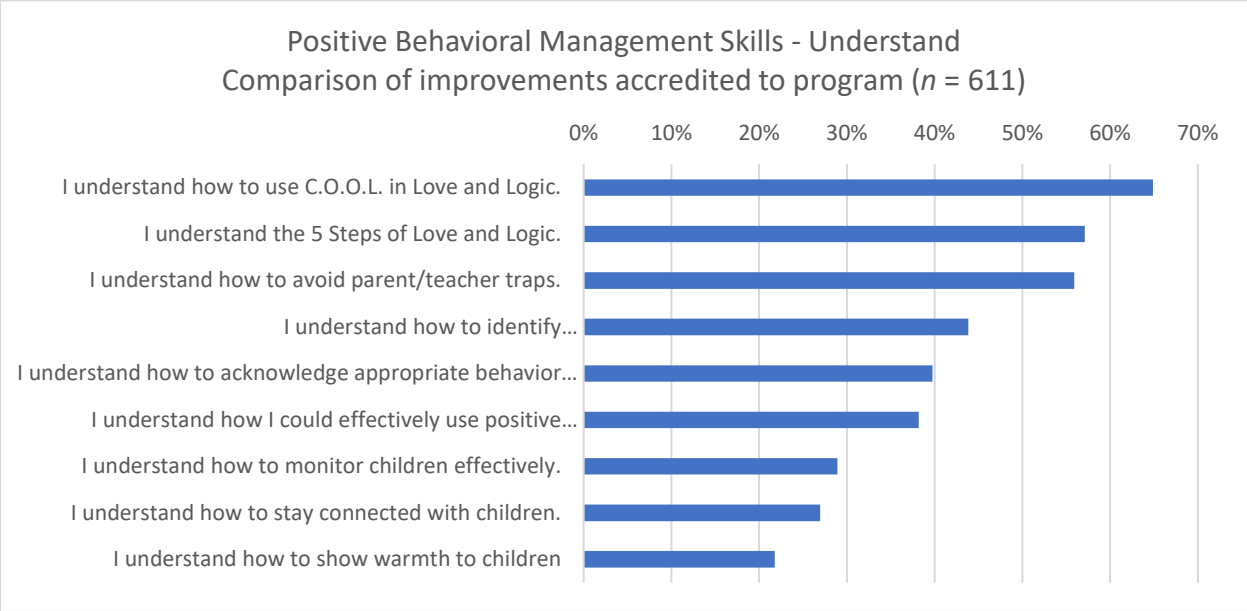
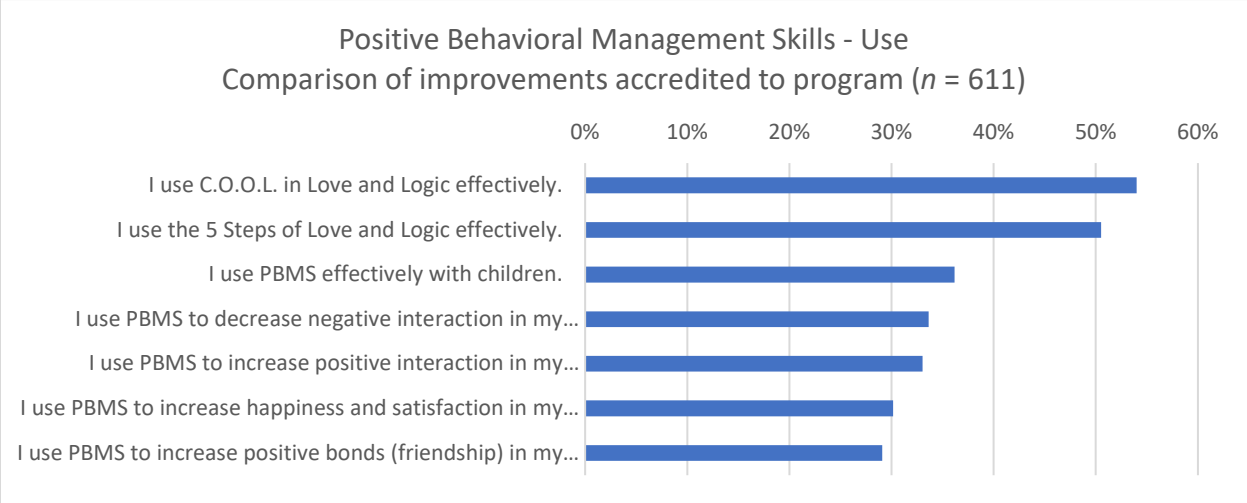


Figure 4. Ordered Change in Use of Positive Behavioral Management Strategies



Discussion

The PBMS educational program intervention was shown in the current study to be effective for increasing knowledge and skills related to managing misbehavior while reinforcing interpersonal relationships and fostering a sense of responsibility and capability within the child. Large changes in standardized mean effect size from before to after the program intervention were documented for PBMS participants on all twenty-two variables studied.

Reinforcement via reward and punishment have typically been accepted as two similarly effective sides of the same behavior-shaping coin. The purpose of the current study was not to suggest that punishment has no place in behavior modification, but to report the findings that

indicated that positive reinforcement approaches are generally perceived as more efficacious to behavior modification than punitive measures are as deterrents. The results of this study showed that PBMS not only has applicability as a remedial approach for extinguishing problem behaviors, but also as a prevention method to be taught to parents, future parents, teachers, and child caregivers. Use of PBMS as an intervention can allow these groups to focus on positive adult-child affirmations while permitting consequences to play out logically and naturally (Latham, 1999). Facilitating child learning and decision-making through exploring and experiencing choices and consequences, rather than required submission to instruction, rules, and persuasion alone, promotes a sense of shared control, ownership of problems, responsibility for behavior, and opportunities for growth and mature development (Cline & Fay, 2006; Telep, 2009).

By specifically identifying participants' perceived understanding, effectiveness, and use of the strategies in the PBMS program, the authors of this programmatic intervention were able to pinpoint which areas of the programming are most useful. For example, Figures 1–4 indicated that following the PBMS intervention, participants generally understood the major components of the program such as C.O.O.L. and the 5 Steps of Love and Logic. Participants also indicated that the PBMS intervention increased their effectiveness or confidence in effectively using the behavioral management strategies, such as to avoid parent, teacher, or caregiver traps and to identify consequential and inconsequential behaviors. Finally, participants indicated that the PBMS program generally increased their positive interactions, bonds, and satisfaction and decreased the negative interactions in their relationships.

Skill development in the use of PBMS can help participants become mindful caregivers who can learn to introspectively question their approaches. For example, they may question whether a behavior is actually consequential (harmful) or inconsequential (merely annoying), be attentive to what purpose their responses to child behavior are actually meant to serve, consider what effects their responses to child behaviors may actually be having, and be mindful of what messages are being transmitted to the child via their interactions with them. The purpose of the PBMS program intervention is not just to provide parents, teachers, and caregivers with a means to manage children's behaviors but to help them impart to children the skills and competencies necessary to effectively govern themselves.

Limitations and Implications

The use of the PBMS program as a positive youth development approach for the reduction of negative outcomes has clear implications for caregivers of children of all ages and communicative stages of development. One limitation of the current study is that the retrospective pretest-then-posttest design is subject to multiple internal validity threats. However, while admittedly subjective in nature, using a retrospective pretest-then-posttest design allows participants to more accurately assess changes in the attitudes, behaviors, or skills learned during

a program by comparing each specific variable side-by-side at the end of the intervention. Because quasi-experimental research designs are often cost- and time-prohibitive in social science implementation research, using a pretest-then-posttest at program exit represents a positive and low-cost design approach for avoiding response shift bias (RSB) and achieving more valid programmatic results.

It is not only important for community outreach relationship researchers and practitioners to better understand the implications of RSB on their specific program outcomes, but also for participants to realize that they may overestimate their ability to develop, nurture, and protect their relationships prior to their participation in outreach programming. Using a retrospective-pretest-then-posttest design at the end of programming allows participants to evaluate thinking and behaviors from before to after programming, motivating them to continue applying what they have learned to promote healthy and successful relationships, as well as to seek additional learning and skills. For this reason, the SMART Couples Project website (https://smartcouples.ifas.ufl.edu/) was developed to provide participants with additional free relationship education courses as well as up-to-date, real-time, research-based information from which they can benefit.

Future recommended directions include conducting the PBMS program with parents, teachers, and caretakers of children and youth who have received a developmental diagnosis. Because of its positive behavioral management focus, the study authors would like to explore how PBMS can be implemented by caregivers of children and youth with or without diagnoses of developmental disorders and how PBMS principles can be disseminated without intensive training to caregivers who do not have a background in mental health or child development.

Conclusion

The PBMS program showed positive and ordered impacts and outcomes for assisting participants in the sample studied to increase their knowledge and skills in managing child behavior successfully. The PBMS program represents another free resource for those who might wish to increase their behavioral management competencies or to effectively develop their parenting, teaching, or caretaking outreach programs using the PBMS methodological design.

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Nutrition Education for Refugees: Successful Strategies and Barriers

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Nutrition education can improve nutrition and health for refugees. Extension program directors providing nutrition education to refugees were surveyed regarding successful program techniques, program challenges, and both the barriers refugees face and the strengths they possess concerning healthy eating. Researchers used grounded theory to explore the qualitative data. Hands-on, skill-based learning emerged as a main theme of successful programs. Language and cultural issues emerged as main program challenges. It is recommended that future refugee nutrition education programs provide culturally sensitive opportunities for skill-based learning.

Keywords: refugee, nutrition, education, program

Introduction

The term refugee refers to someone who is forced to leave his or her country due to persecution, violence, or war, or due to a well-founded fear of persecution for reasons of race, religion, nationality, political opinion, or membership in a social group (UNHCR, 1951). The United States has resettled more than three million refugees since the passage of the Refugee Act in 1980 (United States Department of State, n.d.). Refugees come to the United States from more than 70 countries, with the top five countries of origin, during the period between 2012 and 2022, being Burma (Myanmar), Iraq, the Democratic Republic of the Congo, Bhutan, and Somalia (Ward & Batalova, 2023). Upon arrival in the United States, refugees resettle in nearly all fifty states, with one-third of all refugees resettling in Texas, California, New York, Michigan, and Ohio between 2012 and 2022 (Ward & Batalova, 2023).

After resettlement, refugees face a variety of challenges, including economic, health, and emotional obstacles (WHO, 2023). Inadequate food and nutrition problems contribute to poor health. Research shows that the rate of malnutrition, anemia, and chronic diseases, such obesity, hypertension, and diabetes increased as refugees resettled in their host countries (Bhatta et al.,

2014; Dookeran et al., 2010; Gordon-Larsen et al., 2003). Refugees experience higher rates of these condition, when compared to immigrants and U.S.-born citizens (Yun et al., 2012), and this increase may, in part, be due to a high prevalence of food insecurity commonly seen among refugee populations (Anderson et al., 2014; Hadley et al., 2010). In addition, assimilation to a Western lifestyle and length of stay in the host country are associated with a higher incidence of chronic disease (Centers for Disease Control and Prevention [CDC], 2012). While immigrants desire fresh produce and traditional foods, they generally encounter barriers such as healthier options being unaffordable, easier access to processed foods, and desire from their children to consume less-healthy host-country foods (Berggreen-Clausen et al., 2021). A lack of nutrition education further compounds the effects of food insecurity, diets of low nutritional quality, and high risk of chronic disease (CDC, 2012).

Offering nutrition education may help refugees adjust to their new food environment while still maintaining the healthy practices they often bring from their home country. At the state level, educators from private organizations or government programs, such as the Supplemental Nutrition Education Program (SNAP-Ed) and the Expanded Food and Nutrition Education Program (EFNEP), typically provide nutrition education. The nutrition education delivery strategies commonly used include conducting a needs assessment and providing client-centered education, a collaborative approach in program design, and hands-on activities such as cooking and store visits (Nur et al., 2021). However, there is limited evidence to determine the effectiveness of SNAP-Ed or EFNEP with refugee populations or to determine the gaps or unique needs of refugees when receiving nutrition education. Further, perspectives of staff in agencies providing nutrition education regarding barriers, assets, and challenges related to nutrition for refugees have not been examined.

Purpose

In this study, we examined current Extension programs offering nutrition education to refugees in the United States through surveying SNAP-Ed and EFNEP program directors. Specifically, we determined essential components of successful nutrition education programs and the challenges of providing nutrition education to refugees identified by current providers.

Methods

Utah State University Institutional Review Board reviewed and approved this study under an expedited review process. All participants reviewed an informational letter and provided consent to participate before completing the online survey.

We created a 31-item online (Qualtrics) survey to obtain information about the characteristics and components of nutrition education programs designed for adult refugees. (Survey link: https://usu.box.com/s/7tt7c07rrva37b33x23c0lcg75530rux) A panel of six experts reviewed the questions, including the directors of Utah's SNAP-Ed and EFNEP programs. The authors made

small changes to the survey according to these reviewers' suggestions. Three questions were adjusted in response to the expert review. For example, we added a request to "please describe the outcomes measured and evaluation tools used" as a follow-up to question 27, which asked, "How did you evaluate the nutrition education program?" Then, using publicly available websites, we contacted state SNAP-Ed and EFNEP directors throughout the United States with an email invitation to complete the survey. Utah SNAP-Ed and EFNEP directors made the first participation request, with a follow-up by the project's principal investigator. For states with multiple programs targeting refugee populations, we prompted directors to repeat the survey questions for each additional program.

Five of the survey questions prompted participants to provide open-ended responses, and these responses are the focus of this report. These were questions about techniques producing the biggest program successes and challenges and about barriers refugees face and strengths they possess in eating healthily. Respondents could also provide additional comments or suggestions. Responses were transcribed using Dedoose data analysis software (8.3.17). Two researchers independently gave each response a code, using grounded theory and inductive reasoning (Johansson, 2019; Tie et al., 2019; Ventura et al., 2014). The textual data were broken up into discrete parts to perform open coding. This was followed by axial coding, in which codes were grouped into categories. These categories were then connected into core categories and themes using selective coding. For each of the five open-ended questions, codes were formed by identifying features of the data that were mentioned recurrently or that were considered meaningful regarding the research question. Second, at each stage, the two independent researchers compared codes and discussed discrepancies until reaching an agreement. Two other independent researchers then reviewed codes, code definitions, excerpts, and themes and agreed with the previous independent researchers. Third, themes were then developed based on categories repeatedly mentioned by multiple participants. To ensure trustworthiness, a detailed audit trail was maintained through note-taking of decisions, discussions, theme development, and the refinement of analysis and procedures. Similarly, inter-rater reliability, using several researchers in the study, was used to assure validity and reliability (Cole, 2023). Major themes were defined by characteristics commented on by more than half of the program directors, and minor themes were defined by characteristics stated by less than half and a minimum of three respondents.

Results

Forty-one program directors from 36 states representing all regions of the United States responded to the survey. Thirteen directors from 12 states reported implementing zero programs targeted at refugees in the preceding year (October 2018–October 2019). Twenty-eight directors from 24 states reported implementing at least one program targeted at refugees, with an average of four programs per state. Because the responses represented 72% of the states and all regions

of the mainland United States, we deemed this a sufficient response rate for valid analysis of the results. Several major and minor themes emerged.

Essential Components of Nutrition Education Programs

One major theme (engaging learning activities) and three minor themes (shared experiences, cultural relevance, and community collaboration) emerged as essential components of successful nutrition education programs as identified by the program directors, shown in Table 1.

Engaging Learning Activities. Directors included programs with hands-on, participatory learning opportunities such as grocery store tours, gardening, and food tasting and cooking experiences in programs. Other activities included the use of visual aids and cooking demonstrations.

Shared Experiences. Refugees shared stories, foods, and cultural experiences to benefit and learn from each other. Directors facilitated group discussion and allowed participants to share foods from their home country with the class.

Cultural Relevance. Directors ensured that they were culturally competent and included programs with culturally appropriate curricula and recipes. Cultural competence refers to the ability to understand and communicate effectively across cultures.

Community Collaboration. Directors used programs to team up with their communities in various ways, such as conducting key-informant interviews or working with community leaders to develop lesson plans, using resources provided by the community, and creating local partnerships.

Table 1. Sampling of Extension Program Directors' Written Responses to Survey Question 1: Essential Components of Nutrition Education Programs

Theme	Response
	Major theme
Engaging learning activities	*"Hands-on activities and a lot of visuals work best for ELL [English Language Learners]."*
	"Hands-on activities, use of visuals, PowerPoint presentations, and cooking demonstrations."
	Minor themes
Shared experiences	*"Often several different cultures are in the classes together, so they can learn from each other."*
	"Allowing for participants to cook and bring food to the class."

Theme	Response
Cultural relevance	*"Before the program started, we determined the need to use Halal recipe ingredients. We purchased specific food items from local and known retailers used by the target participants."*
	"CMC [Cooking Matters Colorado] will encourage individuals to discuss the foods that are culturally relevant and integrate those recipes into nutrition education."
Community collaboration	*"Targeting community health workers who are refugees themselves, with the intent that they share the information with the newly arrived refugees they work with."*
	"Working with community leaders to develop lessons and assuring cultural relevance."

Challenges to Providing Nutrition Education

Two themes were identified as challenges to providing nutrition education to refugees.

Language Barriers. By far, the biggest challenge that emerged in providing nutrition education to refugees was the language barrier. Hosting participants with multiple languages in the same class, obtaining an adequate number of interpreters, translating materials, and encountering low literacy levels were all mentioned regarding language barriers.

Learning Environment, Program Attendance, and Evaluation. Other prominent but less common barriers included fostering a safe learning environment in which learners felt comfortable sharing, attending the program, and evaluating the program. Program attendance was reportedly low in the winter months in one program, and several programs mentioned refugees' jobs interfering with attendance. Table 2 displays the challenges.

Table 2. Sampling of Extension Program Directors' Written Responses to Survey Question 2: Challenges to Providing Nutrition Education

Theme	Response
	Major theme
Language barriers	*"It is more difficult to work with groups of refugees that come from varied countries where it would be easier to work with one translator for the entire group."*
	"Translation with a variety of languages spoken. The partner wanted integration and did not want the classes to be offered to only one ethnic group. This made sense but made communication challenging."

Theme	Response
	Minor themes
Fostering comfortable learning environment	*"Establishing initial connection and developing trust [was a challenge]."* *"Language barrier, cultural differences, and religious beliefs were somewhat a challenge at the beginning, but we were able to work those out to have a successful program."*
Program attendance	*"Most are working so have little time to attend classes."* *"We dropped the program for lack of enrollment."*
Program evaluation by participants	*"Conducting evaluation using standard EFNEP tools [was difficult]."* *"They got jobs, so we were not able to evaluate the series."*

Barriers to Healthy Eating

Adjusting to the new food environment, accessing limited food resources, and assimilating to Western eating styles were themes that emerged regarding refugees' barriers to healthy eating (Table 3). Some examples of unfamiliar foods for refugees include cheese, prepackaged foods like cereal, and canned foods.

New Food Environment. Program directors mentioned the following food environment aspects unfamiliar to refugees:

- New cooking equipment
- Food purchasing system
- Foods
- Food preparation methods
- Food safety guidelines
- Eating practices

Limited Food Access. Factors that contributed to poor food access among refugees included:

- Limited financial resources or food resource management skills
- Lack of cultural foods
- Limited or nonexistent transportation
- Difficulty accessing food programs

Language Barriers and Assimilating a Western Diet. Even if refugees have access to food, directors pointed out that language barriers may interfere with refugees' selecting healthy foods. Adopting a Western diet was an additional barrier to healthy eating, especially for children who often prefer American foods.

Table 3. Sampling of Extension Program Directors' Written Responses to Survey Question 3: Barriers to Healthy Eating

Theme	Response
Major theme	
New food environment	*"Clients are challenged by U.S. grocery stores, where most foods are covered by packaging that makes it difficult to tell what you're buying."*
	"Understanding of purchasing, storing, and preparing food-related resources that are new to them."
Limited food access	*"The issues include the cost of food, the lack of availability of culturally familiar foods at large stores, along with the poor quality of fruits and veggies."*
	"Limited income and limited transportation options."
Minor themes	
Language barriers affecting food intake	*"Identifying foods with limited literacy in English and limited literacy with food vocab."*
	"Many do not read/speak/understand English to read food labels."
Assimilation to Western diet	*"Integration into American diet pattern. Children often prefer American foods; older generations prefer cultural dishes."*
	"Acculturation to American eating habits."

Strengths Supporting Healthy Eating Among Refugees

Strengths that refugees possessed that supported healthy eating were evident in the following themes: cultural food practices, strong support systems, and high receptivity to nutrition education (Table 4).

***Cultural Practices and Support Systems*.** Refugees possess many cultural food practices that support health. For example, refugees often have experience gardening and cooking from scratch, consume meals together as a family, and often prefer whole foods, such as fruits and vegetables. Refugees also have strong support systems within their ethnic community.

Education Receptivity. Finally, refugees are highly receptive to nutrition education, making them an important group for targeted nutrition messages.

Table 4. Sampling of Extension Program Directors' Written Responses to Survey Question 4: Refugee Strengths for Healthy Eating

Theme	Response
Major theme	
Cultural food practices	*"Most populations enjoy cooking and sharing meals as a family."* *"Their traditional foods are often quite healthy if they can continue to prepare and eat them."*
Minor themes	
High receptivity to nutrition education	*"Most [refugees] are motivated to learn about healthy eating practices and want to make changes."* *"Strong desire to learn and understand."*
Strong support systems	*"Strong sense of sharing and support within ethnic groups."* *"Strong sense of community."*

Discussion

The results of this study were derived from a survey of SNAP-Ed and EFNEP program directors experienced in delivering nutrition education with refugee participants. Challenges in delivering nutrition education to refugees reported in the survey included language barriers and cultural issues such as establishing trust and access to culturally familiar foods. In addition, these providers of nutrition education reported that successful approaches included hands-on, skill-based learning. Providers also identified strengths of refugees including cooking experience and strong family and community connections. These results are corroborated by a scoping review on nutrition education delivery strategies that identified needs assessment, client-centered, and hands-on activities as important elements of successful programs (Nur et al., 2021).

Resettled refugees are a unique population. As a result, nutrition education programs should be tailored to meet their specific needs. Because internal motivation is high among refugees and many already possess healthy cultural food practices, education should focus on skill development to help refugees adjust to their new food environment and overcome food access barriers (Offelen et al., 2011; Sastre & Haldeman, 2015). Our findings suggest that these skills are best taught through engaging learning activities. Equally important is fostering an environment conducive to skill development. Programs should cultivate a safe learning environment that encourages sharing information and ensures culturally appropriate curriculum. Likewise, addressing and minimizing language barriers is essential. Involving refugee community partners in program development and implementation may help directors develop programs to meet the previously mentioned objectives.

Previous research on nutrition education for refugees is consistent with the findings of our study. For example, engaging learning activities, such as cooking demonstrations, visuals, and other participatory activities, have been shown to increase nutrition knowledge and skills among refugee populations (Gold et al., 2014; Kruseman et al., 2003). Although challenges specific to refugee nutrition education programs have not been previously examined, studies exploring barriers to healthcare among refugees have commonly cited language barriers as a major issue (Lane & Vatanparast, 2022; Morris et al., 2009; Sastre & Haldeman, 2015). Our findings add to these findings and reinforce the importance of practical, skill-based learning that has been foundational and is an ongoing focus with EFNEP and SNAP-Ed.

Similarly, refugees' strengths and barriers to healthy eating found in this study are congruent with current literature. Limitations, including transportation, financial resources, and culturally relevant foods, were reported in several studies as the major barriers for refugees in gaining access to healthy foods (Gichunge et al., 2016; Mannion et al., 2014; McElrone et al., 2019; Rondinelli et al., 2011). Challenges regarding navigating a new food environment was another commonly cited barrier (Hadley et al., 2010; Mannion et al., 2014). Furthermore, two studies found acculturation to American eating habits, which are often less healthy than refugees' traditional diets, as a barrier to healthy eating (Rondeinelli et al., 2011; Tiedje et al., 2014). Other barriers to healthy eating identified in the literature for this group include individuals' taste and cravings, easy access to junk food, role of the family, some cultural foods and traditions, and lack of time and affordability of healthy food (Tiedje et al., 2014). Our work also shows findings similar to those of a recent scoping review assessing immigrants who moved from low- to high-income countries, which indicated that immigrants desired fresh healthy foods, but faced challenges fulfilling these food preferences (Berggreen-Clausen et al., 2021).

The same three themes that emerged in our data for refugees' strengths in healthy eating; namely, cultural food practices, strong support systems, and high receptivity to nutrition education, were also found in a study of Somali refugees (Offelen et al., 2011). Another study reported that refugees possessed prior gardening skills and preferences for healthy eating (Sastre & Haldeman, 2015). One contradictory study found that refugees may come to the United States with poor food habits due to eating styles developed from hardships of the refugee experience (Rondinelli et al., 2011). However, overall, most research shows refugees come to the United States with some nutrition-related skills (Offelen et al., 2011; Sastre & Haldeman, 2015). Often, a primary focus when developing nutrition education are the barriers that the population at risk faces. However, capitalizing on and leveraging the strengths of refugees provides a positive focus and could foster pride and self-efficacy in participants.

This is the first study to our knowledge to examine the factors associated with successes and challenges of providing nutrition education to refugees among SNAP-Ed and EFNEP programs. This study's other strengths include its wide scope as a nationwide survey with representation from 36 states and the use of open-ended questions to capture a diversity of responses and

contextual details. Limitations of the study include that it was a convenience sample and may have missed nutrition education programs in some states that are being conducted with refugees. It also does not include programs being conducted by other community-based organizations not funded through EFNEP or SNAP-Ed. In addition, the format of data collection did not allow for additional follow-up or prompting questions.

Conclusion

Results of this study show that EFNEP and SNAP-Ed are providing nutrition education to refugees in many states. The perspectives of staff delivering the education indicate they have developed strategies to meet the needs of this population and are familiar with their barriers and strengths related to healthy eating. Our research and previous studies indicate that providing nutrition education to refugees may help them adjust to new food environments while maintaining their healthy cultural practices. Education programs targeting refugees should implement engaging learning activities using participatory approaches and instructional strategies that account for participants' literacy levels, learning styles, and goals. Programs should include culturally relevant pedagogy and cultural sensitivity in order to create open and safe learning environments where refugees feel comfortable sharing their unique experiences. Future programs, policies, and research should focus on improving the success of nutrition education delivered to refugees by addressing barriers to food access and implementing innovative strategies to address language barriers.

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Predicting Agricultural Sciences Students' Media Literacy in a Post-Truth Era

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As more individuals turn to various forms of online media to seek information, misinformation and skepticism are on the rise when considering news media. Media literacy, or how individuals evaluate information they see in the news media, is critical to addressing this growing problem. This study aimed to explore the predictors of agricultural sciences students' perceived news media literacy to gather preliminary data around this topic. Through an online survey, students enrolled in an agricultural communication class at the University of Nebraska-Lincoln completed a literacy reflection assignment. Students were asked to answer questions about their news media use, perceived media literacy, perceived value of media literacy, trust in the media, and need for cognition (NFC). Researchers found that most respondents were getting their news from social media and believed they were media literate, despite possessing low levels of trust in the media. However, NFC was the only predictor of perceived media literacy, which indicated that educators should account for NFC when developing media literacy curricula for formal and informal settings. Future research should replicate this study with a larger sample and broader population to better generalize these findings and develop solutions to the media literacy crisis in America.

Keywords: media literacy, science literacy, critical thinking, need for cognition, misinformation

Introduction

Media literacy changes the way consumers digest the information they receive from the media, and, when taught media literacy skills, people can become more critical consumers of information (Maksl et al., 2015). The National Association for Media Literacy Education (n.d.) defines media literacy as "the ability to access, analyze, evaluate, create, and act using all forms of communication" (para. 1). With the proper skills and knowledge, individuals can find credible

and useful information produced by the media to make informed decisions that affect themselves and society (Bulger & Davison, 2018).

Since the digital revolution, traditional media, such as print and broadcast media, have experienced a decline in engagement as a result of the Internet providing alternative online forms of media that the public can use to access the news, such as YouTube, social media platforms, blogs, and search engines (Brossard, 2013). Many individuals interested in seeking a greater understanding of science have relied on online sources to gather information due to the speed, convenience, and amount of obtainable information (Takahaski & Tandoc, 2015). However, the public has faced challenges when differentiating fact versus opinion when exposed to online science information (Brossard, 2013). This inability to distinguish fact from opinion has increased concerns related to misperceptions and misinformation, which is a critical issue in America, specifically in online media environments (Jerit & Barabas, 2012; Kata, 2010; Leiserowitz et al., 2012).

A media literacy crisis has emerged in the United States with the rise of misinformation online. As a result of this growing issue, researchers have suggested that media literacy efforts be incorporated into informal and formal education programs to enable students to critically assess and analyze information (Vraga & Tully, 2021). Education programs centered around news media and media literacy can offer a variety of benefits, including enhancing critical thinking skills, increasing people's trust in the media, and developing conscious processing of media messages (Maksl et al., 2015).

As more information pertaining to science is acquired through online news sources, members of the public will continue to struggle to find reliable and credible information because they do not understand how information is shared and shaped via the media (Lewandowsky et al., 2012; Miles et al., 2017). This inability to distinguish between accurate and inaccurate information in the news has been further exacerbated by what is being called the *post-truth era* in politics, where communication is not necessarily marked by lies, and the truth is no longer essential to political conversations (Bufacchi, 2020). At the same time, there has been a growing trend of skepticism toward the news media as people question the bias and quality of information they receive (Gallup, 2020; Gottfried & Funk, 2017). The public's reliance on mass media to learn about science, and their inability to distinguish between accurate and inaccurate news, may also threaten science and agricultural literacy in society (Gottfried & Funk, 2017).

Media Literacy in the Education

There is a need to increase the public's media literacy to allow them to better decipher the quality of scientific information they received in the news, thus increasing science literacy. Research has demonstrated that students who completed formal higher education instruction about media and news media literacy were better equipped to understand media messaging and

were deemed media literate compared to their non-course-taking counterparts (Maksl et al., 2015), which also contributes to well-informed citizens of society (Bulger & Davison, 2018).

Agricultural sciences students are uniquely situated to communicate scientific information about the production of resources that directly impact daily life, yet, during instruction, media literacy is often neglected. While there have been courses taught on the perception of agriculture in entertainment media (Specht, 2014), formal classroom instruction dedicated to media and news media literacy for college of agriculture students has been slim. Research has suggested that agriculture communications curricula have not historically prioritized media literacy (Leal et al., 2019; Leal et al., 2020). If agricultural sciences students lack media literacy skills after graduation, they will encounter their own issues with sharing credible information in the future related to their discipline. It is a necessity that agriculture students not only possess media literacy, but are also aware of how media literacy, or the lack thereof, influences the public's perceptions of agriculture (Holt & Cartmell, 2013). By recognizing the effects that the media have on public opinion, agriculture students can better communicate and provide consumers with accurate information about science in agriculture (Holt & Cartmell, 2013). In an effort to understand the curricular opportunities related to media literacy, this research sought to explore the predictors of agricultural sciences students' media literacy in a college of agriculture.

Conceptual Framework

Need for cognition (NFC) in relation to media literacy provided the conceptual framework for this study. NFC refers to the extent an individual enjoys engaging in effortful critical thinking (Cacioppo & Petty, 1982). Individuals with a high NFC typically enjoy engaging in problem-solving, analyzing in-depth information, and achieving challenging goals (Hawthorne et al., 2021). Motivation, specifically intrinsic, is critical in education and how one is inspired to learn, resulting in higher academic achievement (Hawthorne et al., 2021).

Knowing the impact that motivation has on academic achievement can help improve media literacy education and foster healthy skepticism toward information in the media, rather than cynicism (Vraga & Tully, 2021). Education pertaining to media literacy is important for individuals to evaluate and identify their knowledge, attitudes, and beliefs that will assist them in identifying partisan misinformation and "fake news" that has not been verified (Vraga & Tully, 2021). Society is becoming more reliant on news media sources, and social media has increased the growth of misinformation and skepticism related to the media (Vraga & Tully, 2021). In turn, higher media literacy is experienced as individuals seek news from more trusted sources (Vraga & Tully, 2021). According to Hawthorne et al. (2021), each individual processes information differently; therefore, when trying to improve media literacy through education, it is important to address the question: "How should we help students learn?" (Hawthorne et al., 2021, p. 4). The answer is to account for students' NFC when teaching about media literacy to best support different learners' ability to identify credible information (Vraga & Tully, 2021).

Those who possess a high NFC can critically analyze information and arguments that they encounter and identify weak arguments (Rhoades et al., 2009). Curriculum changes, such as altering lesson plans and creating assessments that require critical thinking, are crucial to engage students with higher NFC levels (Rhoades et al., 2009). Those who are low in NFC often interpret information using peripheral cues, such as how attractive the information sounds, how many times the source was used, emotion, or appealing credibility (Vidrine et al., 2007). Instructors must design their lessons to support students' ability to use central processing cues like those used by individuals high in NFC, even when that may not come naturally to those with low NFC (Vidrine et al., 2007). Central cues consist of reading, searching for and locating additional information, and problem-solving (Vidrine et al., 2007). By considering students' NFC, educators can better tailor their program to impact how students analyze news and information in the media.

Vraga and Tully (2021) found individuals' skepticism toward news media was related to their news media literacy, perceived value of news media literacy, and NFC. The researchers suggested that, in order to address the spread of misinformation, the value of media literacy for democracy should be emphasized in education to help "promote healthy skepticism towards news while avoiding cynicism that leads to disengagement and distrust," (Vraga & Tully, 2021, p. 160). Some of the distrust associated with the media has been linked to the spread of misinformation on social media (Bessi et al., 2015; Garrett, 2017), which is the channel most young adults use to learn about the news (Shearer & Gottfried, 2017). While media literacy efforts may prepare members of society to better critically evaluate information they receive in the news, there is still a need to better understand media literacy for the 21st century (Vraga & Tully, 2021).

Purpose & Objectives

The purpose of this research was to explore the predictors of agricultural sciences students' perceived media literacy. The following objectives guided this study:

1. Describe where agricultural sciences students get their news;
2. Describe agricultural sciences students' perceived media literacy, perceived value of media literacy, trust in the news media, and NFC; and
3. Predict how perceived value in media literacy, trust in the media, and NFC predict agricultural sciences students' perceived media literacy.

Methods

To fulfill the purpose of this study, an online survey was distributed to students enrolled in an agricultural communications class at the University of Nebraska-Lincoln (UNL) after receiving

proper IRB approval. This survey was part of a *Literacy Reflection* assignment given at the beginning of the semester, in which students were asked to answer questions related to agricultural literacy, science literacy, and media literacy and write a reflection about their scores. The data in this study were collected from a pilot sample of UNL students enrolled in a 300-level agricultural communications class at the beginning of the 2021 fall semester. This class served both agricultural communication and non-agricultural communication students and did not require a communication pre-requisite class to register.

A total of 30 students agreed to participate in the study (n = 30, 100% response rate). The majority of the students were juniors (73.3%, n = 22), followed by seniors (23.3%, n = 7) and sophomores (3.3%, n = 1). Most of the students reported coming from a rural hometown (76.7%, n = 23), and 46.7% (n = 14) reported their family's primary source of income came from agricultural practices. Approximately half of the class majored in agricultural communication (46.7%, n = 14), and the other half were non-agricultural communication majors (53.3%, n = 16). These non-agricultural communication students majored in animal sciences, agricultural economics, and agronomy, for example. Questions related to race/ethnicity and gender were omitted to protect the confidentiality of the respondents due to the small sample size. Additionally, questions like political value were omitted, because the lead researcher for the project was also the course instructor, and this question may have made respondents feel uncomfortable.

The survey instrument consisted of 45 questions that asked about media use and engagement, science literacy, agricultural literacy, media literacy, and demographics. Questions pertaining to media use, perceived media literacy, perceived value of media literacy, trust in the media, and NFC were examined for this study. The survey first asked respondents where they primarily received their news in an average week and asked respondents to check all that applied from the following list: national TV news; local TV news; national newspaper; local newspaper; social media; podcast; email listserv; or word of mouth from friends, family, etc. If respondents selected "social media," they were given a follow-up question that asked about which specific platforms they used to receive news, including Facebook, Twitter, Instagram, TikTok, Snapchat, and YouTube. Twitter was rebranded as X in 2023 (Ivanova, 2023) but was still referred to as Twitter at the time of this study and will be referred to as Twitter throughout this paper.

Perceived media literacy was measured with a 4-item, 5-point Likert-type scale (Vraga & Tully, 2021). The following labels were used for the scale: 1 = *strongly disagree,* 2 = *disagree*, 3 = *neither agree nor disag*ree, 4 = *agree*, and 5 = *strongly agree.* Items included statements like, "I have the skills to interpret media messages" and "I am confident in my ability to judge the quality of the news." The scale's initial reliability fell below the acceptable threshold of a Cronbach's alpha of .70 or higher (Cronbach's α = .63; Field, 2013), but the deletion of one item increased the reliability to a Cronbach's alpha of .70. The construct was created by taking the average of the three remaining items. Perceived value of media literacy was also adapted from

the Vraga and Tully (2021) study and consisted of eight items on a 5-point Likert-type scale with the same labels as perceived media literacy. Examples of items included, “Media literacy is important for democracy,” “It is the role of the press to represent diverse opinions,” and “People need to critically engage with news content.” The reliability for this scale was also initially problematic (Cronbach’s $\alpha = .68$), but the deletion of one item increased the reliability. The average of the remaining seven items was calculated to create the construct (Cronbach’s $\alpha = .72$).

Trust in the media was measured using an 8-item, 5-point Likert-type scale with the same labels as previously described. This scale was adapted from an instrument that Maksl et al. (2015) developed and included items like “I don’t think the news can be trusted” and “I think the news media tell the whole story.” The responses were coded so that distrust in the media was 1 and trust was 5. The average for the items was used to create the construct (Cronbach’s $\alpha = .80$). NFC was measured with four items on a 5-point Likert-type scale ranging from 1 = *strongly disagree* to 5 = *strongly agree*. Examples of items included: “I prefer complex to simple problems” and “I try to avoid situations that require a lot of in-depth thinking about something,” (Vraga & Tully, 2021). Statements were coded so that a high NFC was 5 and a low NFC was 1. One item was deleted due to a low initial reliability (Cronbach’s $\alpha = .69$). The average for the remaining three items was calculated, and the construct was reliable (Cronbach’s $\alpha = .71$). To aid in the interpretation of the data, real limits were created and were labeled as follows (Sheskin, 2004): 1.00 – 1.49 = strongly disagree, 1.50 – 2.49 = disagree, 2.50 – 3.49 = neither agree nor disagree, 3.50 – 4.49 = agree, and 4.50 – 5.00 = strongly agree.

All data were analyzed using Statistical Package for the Social Sciences (SPSS) version 25. Descriptive statistics, including frequencies and percentages, were reported for objectives 1 and 2. Multiple linear regression analysis was used for objective 3. Perceived media literacy served as the dependent variable for the model, and perceived value of media literacy, trust in the media, and NFC were included as predictors based on prior literature (Vraga & Tully, 2021). Due to the small sample size of 30, the model was limited to three predictors (one per 10 responses; Statistics Solutions, n.d.). All variables in the model were continuous and were normally distributed with a skewness and kurtosis between +/- 2. Threat to multicollinearity was not identified for the model – the variance inflation factor (VIF; range of 1.04 to 1.23) and tolerance (range of .81 to .97) were within acceptable limits (Bowerman & O’Connell, 1990; Menard, 1995). Therefore, assumptions were met for the multiple linear regression analysis (Field, 2013).

Findings

RO1: Describe Where Agricultural Sciences Students Get Their News

The majority of respondents reported getting their news from social media (90.0%) and word of mouth (86.7%) in an average week (Table 1). About half of the respondents received their news from local TV channels (53.3%), and a minority of respondents received their news from other channels like podcasts (26.7%), national newspapers (6.7%), and email listservs (6.7%).

Table 1. Where Respondents Get Their News in an Average Week

News Channel	%	*f*
Social Media	90.0	27
Word of Mouth from Friends, Family, etc.	86.7	26
Local TV News	53.3	16
National TV News	26.7	8
Podcast	26.7	8
Local Newspaper	20.0	6
National Newspaper	6.7	2
Email Listserv	6.7	2

Respondents who indicated they received news from social media were asked to select which social media platforms they used in an average week (Table 2). Respondents reported most commonly receiving the news from Facebook (70.0%), Instagram (33.3%), and Twitter (33.3%).

Table 2. Social Media Platform Respondents Use to Get Their News in an Average Week

Social Media Channel	%	*f*
Facebook	70.0	21
Instagram	56.7	17
Twitter	33.3	10
TikTok	30.0	9
Snapchat	26.6	8
YouTube	10.0	3
Other	0.0	0

RO2: Describe Agricultural Sciences Students' Perceived Media Literacy, Perceived Value of Media Literacy, Trust in The News Media, and NFC

Respondents agreed that they were media literate ($M = 3.78$; $SD = 0.46$) and that they valued media literacy ($M = 4.02$; $SD = 0.49$). However, they disagreed that they trusted the news media ($M = 2.30$, $SD = 0.57$). Additionally, respondents reported that they neither agreed nor disagreed that they had high NFC ($M = 3.29$, $SD = 0.78$).

RO3: Predict How Perceived Value in Media Literacy, Trust in the Media, and NFC Predict Agricultural Sciences Students' Perceived Media Literacy

The regression model predicting respondents' perceived media literacy was statistically significant with a medium effect size (Cohen, 1988) and accounted for 41% of the variance in perceived media literacy ($R^2 = .41$; F (3,25) = 5.86, $p < .01$). The only significant predictor in the model was NFC, and, as it increased 1 point, perceived media literacy increased .38 points (b = 0.38, $p < .01$; Table 3).

Table 3. Model Predicting Perceived Media Literacy

	b	***p***
Constant	1.45	.08
Need for Cognition	.38	.00**
Trust in the Media	.11	.41
Perceived Value of Media Literacy	.20	.20

**$p < .01$

Discussion & Implications

The purpose of this study was to explore the predictors of agricultural sciences students' perceived media literacy. While the findings from this research are not generalizable beyond this pilot sample, they still provide valuable insight into students' media literacy and can help guide future education programs in this area. Respondents were not actively engaged with traditional news media channels, like television and radio, and they most commonly received the news from social media, like Facebook, or personal connections, which aligned with prior research (Shearer & Gottfried, 2017). Specifically, the respondents were most commonly receiving news from Facebook and Instagram. This disproportionate use of social media to receive news compared to traditional media may put these students more at risk of being exposed to misinformation (Brossard, 2013), which could lead to major issues related to scientific literacy for future generations, if they cannot identify credible news online.

Respondents did agree that they both possessed and valued media literacy; however, their trust in the media remained low. This low level of trust in the media may stem from the students' use of social media sources for news, which may not provide fully accurate information (Bessi et al., 2015; Garrett, 2017). Based on the questions asked in this study, though, it is difficult to assess whether the low levels of trust reflected healthy skepticism or damaging cynicism toward the news media (Vraga & Tully, 2021). Despite prior research establishing a relationship between skepticism of the media and media literacy (Vraga & Tully, 2021), trust in the media was not a predictor of perceived media literacy in the regression model. The model had a medium effect size (Cohen, 1988), but the only predictor was NFC. For this sample, increased NFC led to increased levels of perceived media literacy, which was a similar finding to past research (Vraga & Tully, 2021). These findings indicate there is a likely link between how much people like to

think about and seek information and to what degree they critically evaluate news media. While this relationship may not be surprising, it will be important to further explore as media literacy curricula are developed to address this growing issue in the United States.

With the increased spread of misinformation in the media (Gallup, 2020; Gottfried & Funk, 2017), coupled with the emergence of the post-truth era in politics (Buffacchi, 2020), it is critical that members of the public possess the ability to critically evaluate information they see in the news related to agriculture and science. Individuals are spending more and more time-consuming media (Potter, 2016), meaning there has never been a more important time to incorporate media literacy into formal and non-formal education than now. Therefore, understanding students' news media use and predictors of perceived media literacy will aid educators in the development of a targeted curriculum to enhance agricultural sciences students' media literacy. Because students recognized the value of media literacy in society, they would be likely to see the value of this type of curriculum and would be willing to engage in the content.

Recommendations

This research provides valuable insight for practitioners and researchers alike regarding media literacy. Agricultural educators should be considerate of students' NFC in secondary and post-secondary education to help address the gap in the current media literacy crisis. Enabling students to critically examine the media can help boost media literacy skills for students who may not have naturally high levels of NFC. Because reading comprehension is the foundation of building media and information literacy skills, students should be reading and analyzing complex texts to better understand science so that they can build upon their media literacy foundation in the future (Miles et al., 2017). Educators can teach students to collect authentic information by conducting their own academic research and finding credible sources of news information (Miles et al., 2017), which would encourage students to use additional news sources beyond social media. Teaching about the production of the news and the role of the media in democracy may also help to increase students' trust in the media without encouraging further cynicism. Furthermore, if industry and society as a whole push to incorporate media literacy as an essential part of secondary and postsecondary curricula and demand it be taught in order to have employable graduates, barriers to incorporating media literacy curricula will be further eliminated (Potter, 2016).

Media literacy programs should be integrated into not only formal education programs but non-formal programs as well. Through youth leadership programs, like 4-H and FFA, educators can develop programming that teaches students about how the news media operate and link to the FFA Agricultural Communications Career Development Event (CDE), which would help to increase news media literacy. Additionally, these programs can work with students to create social media content to promote their local chapter or events, which would further increase students' understanding of how social media content is curated and shared.

The data analyzed in this study were from students who were enrolled in an agricultural communications class, and half of the class were agricultural communications majors, which may have skewed the results. To gain a more in-depth understanding of agricultural sciences students' media literacy and the current media literacy crisis, it would be valuable to collect the data from a more diverse group of students with a variety of backgrounds and majors. Additionally, future research should include a larger sample for the study to allow for additional, relevant predictors to be added to the model, like social media use, major, and political ideology. Because only perceived media literacy was measured, asking questions related to actual media literacy based on knowledge questions may yield more nuanced findings.

Further exploring trust in the media through qualitative interviews, and whether lack of trust reflects skepticism or cynicism of media information, would also be beneficial in developing future curricular efforts around media literacy. Trust in the media may have also changed since this study was conducted and since social media ownership and branding have changed for platforms like Twitter (Ivanova, 2023). Replicating this study may also yield different results regarding which social media platforms students use to receive news because of the ever-evolving nature of these channels. Additionally, researchers should explore how differentiating lessons based on NFC would influence students' perceived media literacy, perceived value of media literacy, and trust in the media. More research is needed to better understand how to best teach these concepts in formal and non-formal settings. Because this study served as a pilot, it should be replicated at other universities to better understand predictors of agricultural sciences students' media literacy.

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Five-Year Review of the Foundations Onboarding Program for the UGA Cooperative Extension

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This paper examines the successes and opportunities for improvement of a comprehensive professional development program at a state land-grant university. The Extension Committee on Organization and Policy (ECOP) recognizes turnover and retention as a systemic issue further compounded by heavy workloads and low salaries. According to the Motivation-Hygiene Theory, job satisfaction can increase when motivating factors, such as personal development opportunities, are implemented. Created over two decades ago, the University of Georgia's Foundations program has been part of its onboarding process that provides agents and educators with the knowledge and skill development for success in their roles. Since 2016, it has largely targeted the same content for each new cohort of educators. While immediate post-evaluations have been conducted, no longitudinal effort existed to look at how well the program worked in preparing agents for their roles. A 5-year retrospective study was developed to examine the perceived success, as well as determine any potential areas that need knowledge and skill development. This article discusses both the agent's and administrator's perspectives on how well it prepared them for success. Additional trainings to address emergent issues are explored, and recommendations on how Extension can better prepare agents for success are made.

Keywords: onboarding, competencies, training

Introduction

In today's workplaces, employee retention is a primary concern of employers (Carucci, 2018), especially as unemployment rates approach 50-year lows (U.S. Department of Labor, 2022). As revealed in a recent Gallup roundtable discussion, competition for talent was the top concern of the world's largest organizations, compounded by a shift in successful approaches to attracting and retaining talent due to the COVID-19 pandemic (Barry, 2022).

Another persistent concern specific to the educational outreach mission of Cooperative Extension is a gap in community services due to employee turnover, which often leads to added workloads and stress for the remaining staff (Baysinger & Mobley, 1982). The Leadership Advisory Council of the National Association of State Universities and Land-Grant Colleges'

Extension Committee on Organization and Policy (ECOP) recognized Extension agent retention as a systemic and critical challenge, attributable in part to low salaries and increased workload (ECOP, 2005). Since increasing salaries is not always an option due to budget restraints, attention to onboarding training and practices could help reduce turnover (Brodeur et al., 2011), which has been found to be the highest among new employees (Allen, 2006). Specifically, it is important to examine standardized onboarding practices when studying and addressing employee turnover and retention (Carucci, 2018).

This study examined the formal organization-wide onboarding program for the University of Georgia (UGA) Cooperative Extension. We focused on training sessions required for all Extension agents (county-based faculty) and educators (county-based professional staff). Most new Extension agents are also new employees to the organization; however, in our study, there was a small subset of existing employees who were changing roles within the organization. The number of new agent and educator hires entering the onboarding process ranged from 18 to 35 people annually from 2017 to 2021.

Onboarding Training and Development Linkages to Turnover and Retention

Turnover and retention have been studied around onboarding training and development. One explanation for employee satisfaction/dissatisfaction level is supported by the Motivation-Hygiene Theory, which focuses on motivating factors (Herzberg, 1968). This theory has been used in the context of Extension when exploring burnout (Benge et al., 2015; Windon, 2019) and retention (Benge & Beattie, 2021; Feldhues & Tanner, 2017). Motivation-Hygiene Theory suggests while job satisfaction increases due to motivating factors (e.g., personal growth opportunities, accomplishment, appreciation, characteristics of work, and career progression), job dissatisfaction levels decrease independently due to hygiene factors (e.g., salary, policies, employee relations).

One motivating factor used often in Cooperative Extension is personal and professional growth opportunities for faculty and staff. For example, Texas Extension has attributed its relatively low turnover rate to its comprehensive staff training program as well as professional development opportunities that provide employees with tools for high performance (University of Texas, 1999). Onboarding professional development utilizes competencies and learning objectives to support agents' and educators' ability to contribute to the community. In fact, Chandler (2004) found that contribution to the community was one of the most important retention factors for county agents. Benge et al. (2015) found that agents attributed a revised onboarding process to reduced turnover. Robertson (2022) found that 4-H agents in the southern region of the United States perceived organizational support as being connected to turnover intention, organizational commitment, and job satisfaction. Likewise, Jayaratne et al. (2021) found that 89% of early-career 4-H educators either *strongly agreed* or *somewhat agreed* that participating in professional development training was an effective strategy for addressing the challenges they were facing.

Previous research has highlighted the consequences of employees leaving an organization, including loss of productivity and an inequitable reallocation of work (Byerly, 2012; Pinkovitz et al., 1997). Effective onboarding has been shown to have significant impacts on retention and employee engagement (Jiwanlai, 2014; Palmer-Roberts, 2020). The current study focused on the influence of Cooperative Extension employees' perceptions of the formal onboarding process on retention in the organization. Retention is one aspect of employee engagement, defined as a state in which employees are wholehearted about their performance, feel proud to be associated with the organization, and therefore make intentional efforts to contribute to its success (Bakhru & Sharma, 2022; Jiwanlai, 2014). Additionally, engagement has been connected to higher retention and lower rates of missed work (Bakhru & Sharma, 2022; Bakker et al., 2005; Schaufeli & Bakker, 2004).

Other state Cooperative Extension systems have examined aspects of onboarding, such as needs assessments for creating onboarding plans and cost-benefit analyses of programs. For instance, Virginia Cooperative Extension conducted a 2020 study to inform the development of an organizational effectiveness plan that included developing an onboarding program (Vines et al., 2021). Researchers with Florida Cooperative Extension created a formula for calculating the return on investment (ROI) to determine if the cost of professional development programs is indeed a sound investment (Harder et al., 2017). A study of the Oregon Cooperative Extension found that training opportunities were limited from the perspective of field faculty (Knight, 2020). In addition, Extension program leaders in the western United States created an online resource for recruitment and onboarding in an attempt to increase recruitment and retention for their organizations (Angima & Carroll, 2019).

The current study adds to the body of knowledge related to onboarding processes by examining the perspectives of district administrators in conjunction with field faculty/educators who experienced a formal onboarding program between 2017 and 2021. The study also contributes insights into the timing of content delivery and experiences within the program.

UGA Extension's Formal Onboarding Program

According to the UGA Cooperative Extension (2022) website, "We translate science of everyday living for farmers, families and communities to foster a healthy and prosperous Georgia" (para. 3). UGA Extension serves all 159 counties in Georgia in the areas of agricultural and environmental sciences, 4-H youth development, and family and consumer sciences.

At UGA, those whose primary role is to deliver community-based education are divided into two categories: agents and educators. Agents are required to have a minimum of a master's degree and to develop, lead, and evaluate programs. Educators are required to hold a minimum of a bachelor's degree and to teach in the community, and they are supervised by agents. Administrators include program development coordinators (PDCs), program leaders, deans, and

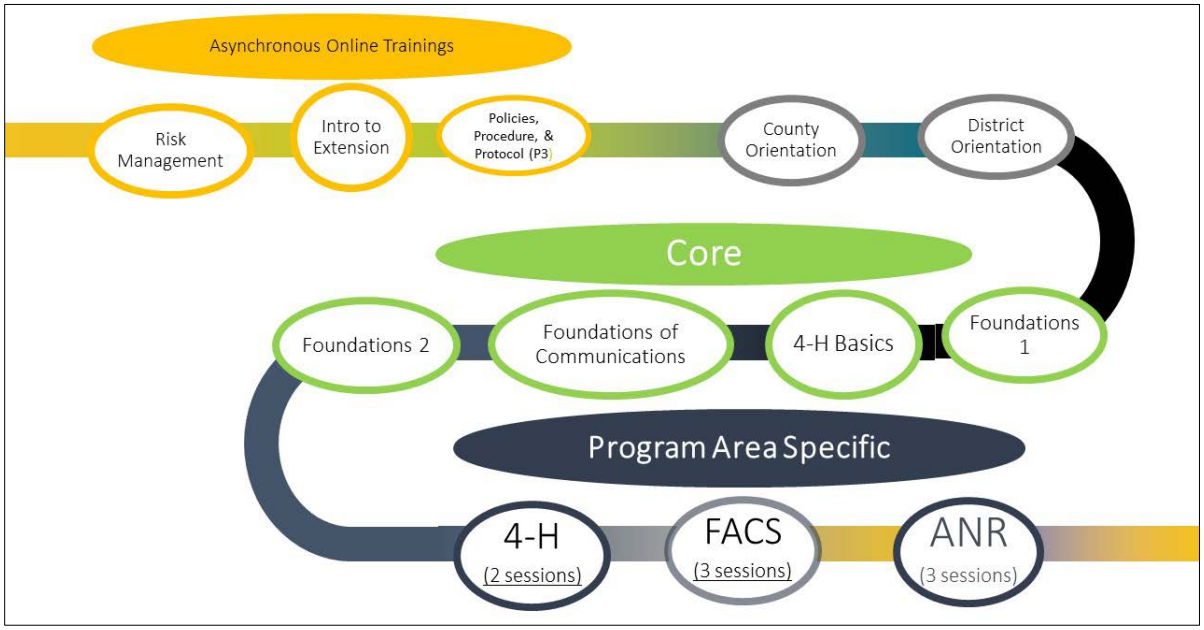
district directors; these positions are tasked with overseeing field personnel and ensuring that they meet the Extension-related educational needs of Georgians.

At the time of this study, UGA Extension onboarding consisted of multiple components based on the role of the new Extension employee, including welcome packets on their desk for their first day of employment, introductory email to the district or state, assigned mentor(s), and university required trainings. The most substantial part of the onboarding experience was the Extension-specific sessions referred to as the Foundations Training Program (Foundations). Based on internal records, the onboarding training for UGA Cooperative Extension agents was established in 2001, with onboarding for educators added in 2019. The program's training sessions and delivery methods have evolved over the years. The first year of the program included one multi-day, in-person training session; however, over time, as the standardization of technical expertise and foundational knowledge of organizational policies, procedures, and protocols became more complex, the program grew into a robust strategic collection of onboarding orientation trainings comprised of several synchronous and asynchronous components at the state and district levels. Based on current research (Knight, 2020) as well as informal personal discussions at regional and national meetings, UGA Extension's onboarding program has the most training sessions, including face-to-face sessions, compared with other states.

The Foundations onboarding program included synchronous and asynchronous trainings situated within a competency-based model adhering to practices in the field. The hope is that a strong onboarding experience leads to increased retention of employees performing quality work and having a positive impact within the communities they serve.

Between 2017 and 2022, the Foundations Training Program encompassed a combination of asynchronous and synchronous training sessions delivered virtually and in person. Each agent or educator completed a core group of mandatory state-level trainings in addition to district- and county-level trainings and checklists (i.e., task lists for new employees to complete). Of the nine statewide sessions, four were asynchronous, online trainings (Youth and Risk Management; Introduction to Extension; Policies, Procedures, and Protocols; and County Funds Policies), and four were synchronous, in-person experiences (Foundations I; Foundations II; Foundations of Communications; and Basics of Youth Development), excepting the transition to full online instruction during the COVID-19 pandemic. Educators typically did not take the second part of Foundations I, Foundations II, or program-area trainings. Figure 1 illustrates a roadmap of the sessions offered in the Foundations Training Program.

Figure 1. Foundations Training Program Roadmap (Agent Onboarding)



The exact sequence of statewide synchronous onboarding training sessions was determined by the employee's start date in this role and program area. Ideally, the sequence would begin with Foundations I, Basics of Youth Development, Foundations of Communications, and Foundations II, with programmatic trainings spread across these core sessions. If too many trainings occurred in the same month, the programmatic training became the priority.

In 2017, the new program and staff development specialist and Extension Southern Region Program Leaders Network (PLN) committee on program and staff development reviewed the main synchronous sessions of the onboarding process and identified core competencies (Program & Staff Development Committee, 2018). This review led to the creation of a detailed roadmap of sessions and facilitator notes, including competencies for each core session for UGA Extension. The roadmap offered greater transparency to instructors regarding the strategic planning and sequencing of sessions for the purposes of sustainability and maintaining rigor. Ten competencies informed the construction of content for the sessions: (1) program planning and development; (2) teaching and learning; (3) program evaluation; (4) application of subject-matter expertise; (5) developing a professional reputation (agent only); (6) Extension organization and administration; (7) external linkages; (8) volunteer development; (9) professionalism; and (10) communication and marketing.

Competencies

Russ-Eft (1995) defined *competencies* as "core elements in a periodic table of human behavior" (p. 329). McClelland (1973) noted that using competencies in the workplace was originally an alternative to relying on intelligence assessments for predicting job success. In Cooperative Extension training and development, competencies have been utilized in a variety of ways. Atiles

(2019) explained that “across the nation, various state-level Cooperative Extension Services have worked toward instituting competency-based education for their Extension educators, administrators, volunteers, and facilitators, among others” (p. 109). Dostilio (2017) also applied competencies related to knowledge, skills, abilities, and dispositions to community engagement professionals who work with Cooperative Extension systems. Atiles (2019) built on this work to include competencies such as “knowledge of the relevance of diversity of partnering communities,” “ab[ility] to cultivate collaborative activities between faculty, staff, students with Cooperative Extension,” and “understand[ing] the power structures behind the diversity and implicit bias issues present in the community and Extension system” (p. 155) to broaden the scope of competency trainings. Table 1 shows how each asynchronous core training session connected with competencies, and Table 2 demonstrates how each synchronous core training session is connected with the same competencies.

Table 1. Asynchronous Core Training Sessions and Competencies

Competency	**Training Session**			
	Youth & Risk Management	**Policies, Procedures, & Protocols**	**County Funds Policy**	**Intro to Extension**
1: Program Planning and Development				
2: Teaching and Learning				
3: Program Evaluation				
4: Application of Subject-Matter Expertise				
5: Developing a Professional Reputation (agent only)	x	x	x	x
6: Extension Organization and Administration		x		x
7: External Linkages	x		x	
8: Volunteer Development				
9: Professionalism	x	x	x	x
10: Communication and Marketing				x

Table 2. Synchronous Core Training Sessions and Competencies

Competency	Training Session			
	Foundations I	**Basics of Youth Development**	**Foundations of Communications**	**Foundations II**
1: Program Planning and Development		x	x	x
2: Teaching and Learning	x	x	x	x
3: Program Evaluation				x
4: Application of Subject Matter Expertise				
5: Developing a Professional Reputation (agent only)	x		x	
6: Extension Organization and Administration	x			
7: External Linkages		x	x	x
8: Volunteer Development				
9: Professionalism	x		x	
10: Communication and Marketing	x		x	

The purpose of this study was to explore the perception of the timing and content of trainings within the onboarding program by new employees and administrators. There were three overarching objectives of the study. They were to:

1. gather feedback from the field on how well the Foundations program prepared them to develop programs that meet community needs;
2. explore administrator perceptions of its ability to develop and/or enhance professional competencies needed for success in the organization; and,
3. determine how the program can be enhanced to meet the emerging needs of our communities.

Methods

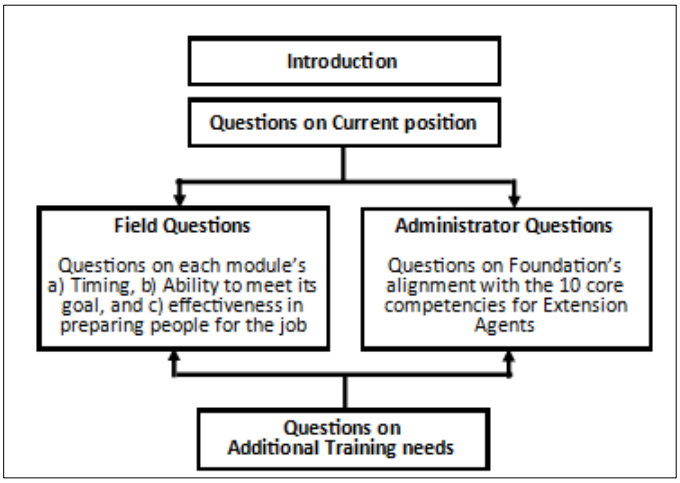
Creation of the Survey

The Foundations Training Program seeks to prepare agents and educators to be effective in their jobs by helping them meet learning objectives. This study examined the impact of the UGA Foundations courses at the agent/educator and administrator levels. As the findings revealed, both agent/educators and administrators held different viewpoints on the success of the program in preparing field personnel for success.

To disseminate the survey, a letter was drafted describing the survey's intent. For the group comprising agents and educators, the letter was sent (by the appropriate District Director) to those who had started in 2016 or later. For the administrator group, the Dean of Cooperative Extension sent the letter asking for administrators' feedback.

The first section of the survey detailed the survey's purpose and how the gathered information would be used. Depending upon the individual's position in the organization, they were asked different questions. Figure 2 shows the survey path logic.

Figure 2. Survey Path Logic



This was followed by a section in which respondents provided their start date and current position within the organization; based on their responses, they were directed to answer questions related to that specific position. Agents and educators were asked to provide the month and year they had started their position. The survey also sought additional information about each individual's preferred learning style.

After completing the first part of the survey, agents and educators were shown the visual Foundations Roadmap, followed by questions about each course in the order the respondent would have completed them. The goals and objectives of each course were listed. Respondents were then asked to rate the Foundations course on three metrics: (a) whether the course met its stated goals and objectives, (b) whether the course was offered during the appropriate timeframe, and (c) how effective the course was in preparing them for their role. The first question used a dichotomous form of yes or no. If no was selected, a follow-up question was provided, asking the respondent to explain why and how this could be addressed. The second question used a 3-point Likert scale of 1 = *no, too early;* 2 = *yes on time;* and 3 = *no, too late*. If the response was either a 1 or a 3, a follow-up question was triggered to solicit feedback on preferred timing. The effectiveness question used a five-point scale, ranging from 1 = *not effective at all* to 5 = *extremely effective*. A follow-up question was triggered if the respondent selected either *not effective at all* or *slightly effective* to solicit feedback about the respondent's reasoning.

If the respondent indicated that the program was offered at the wrong time or was ineffective, they were asked a follow-up question to expand on their response.

Administrators were asked about the efficacy of the Foundations program from an organizational perspective. As noted earlier, each Foundations course was created to align with professional competencies for Extension professionals. Administrators were asked to rate how well each Foundations course prepared field personnel to perform their jobs after the trainings. The 5-point Likert rating scale ranged from 1 = *not at all prepared* to 5 = *extremely prepared*. A follow-up, free-response question was triggered if the respondent selected either *not at all prepared* or *somewhat unprepared* to solicit feedback about the respondent's reasoning.

Both groups of respondents were asked to reflect on additional training needs for the organization. The content-related questions ended with an open-ended question that allowed respondents to provide any additional information or comments not previously supplied. Basic demographic information (i.e., gender, race, and ethnicity) was collected, as well as data related to the respondent's program area, time with Extension, and district served.

The survey was administered in June 2021. Reminder emails were sent twice to each group. Data were analyzed using SPSS. (The Institutional Review Board deemed that the survey's purpose was related to program improvement and was thus exempt.) The limitation of this method is that survey completion was voluntary, resulting in different field response rates statewide. An 80% threshold of positive responses indicating a program was effective (scores ranging from moderately to extremely effective), offered on time, or met its stated goals was adopted for labeling a program as working.

Results

A total of 143 people completed the survey. Of these, the majority were agents (88 or 62%), followed by educators (28 or 20%), program development coordinators (17 or 12%), district directors (4 or 3%), and program leaders or directors (6 or 4%). Thirty-three percent were from 4-H, 40.6% were from ANR, 22.6% were from FACS, and the remainder had split appointments. Finally, 22.8% were from the Northeast District, 32.7% were from the Northwest, 24.8% were from the Southeast, and 19.8% were from the Southwest. Between January 2017 and May 2022, the retention rate for agents was 74%.

Agents and Educators

Survey responses show that 28% of agents and educators indicated that they had started in 2019, followed by 2016 or 2018 (21% each), 2020 (18%), 2017 (13%), and 2021 (4%). Regarding start month, many indicated they had started during one of two time periods: the winter months of December and January or late summer/early fall of August–October.

To inform future training efforts, respondents were asked to indicate their preferred learning style, including in-person training, online training via Zoom, online recorded training, and hybrid training consisting of online and face-to-face instruction. The majority of participants (53%) rated in-person training as their preferred method, followed by hybrid training (39%), recorded training (6%), and online training via Zoom (2%).

Table 3 shows each Foundations course and respondents' perceptions regarding (a) their ability to meet each stated goal, (b) the timing of the course, and (c) the course's effectiveness in preparing them to do their jobs. For three courses—Foundations II, Basics of Youth Development, and Foundations of Communications—participants indicated they had not yet completed the curriculum; in those cases, rankings were adjusted to reflect only those who had taken the course.

For all courses, the majority of participants indicated that they had met their stated goals and objectives. However, ratings decreased when participants were asked about the timeliness and effectiveness of the course. For only one course—Basics of Youth Development (91%)—did 80% or more of participants state that it was offered on time. This was followed by Youth and Managing Risk (84%), Policies, Procedures, & Protocols (83%), Foundations I (83%), Introduction to Extension (81%), and Foundations II (77%). The lowest-rated course was Communications (63%). Regarding effectiveness rates, 85% of participants indicated that two courses were at least moderately effective: Foundations II (82%) and Communications (80%).

For those who indicated that a course was not offered in time, a follow-up survey question was triggered to determine what timeframe the respondent felt would have been appropriate. The majority of participants would have preferred Foundations I be held within the first month of hire. For Communications and Foundations II, participants would have preferred that the courses be offered within the first three months of hire. Asynchronous courses were not included in the analysis because they were available on demand.

Finally, people who stated the program was not effective were asked to explain why and what could be done to improve it. The responses centered around four issues. The first three were (a) lack of organized structure, (b) too many theoretical concepts without time to apply them, and (c) too much information covered in the time allotted. The fourth issue centered around different viewpoints between program areas. People with a 4-H appointment believed youth-centered training(s) needed to have everyone involved, with the same information covered for everyone, while those without a 4-H appointment felt the courses were not necessary for all program areas.

Table 3. Participants' Perceptions of Foundations Courses

Course	Met Goal			Offered on Time			Effectiveness			
	Yes	***No***	***Have not done***	***Too early***	***On time***	***Too Late***	***Not at all***	***Slightly***	***Moderately***	***Very****
Introduction	101 (99%)	1 (1%)	0	3 (3%)	83 (81%)	16 (16%)	0	12 (12%)	47 (46%)	43 (42%)
Policies, Procedures, & Protocols	98 (100%)	0	0	6 (4%)	81 (83%)	11 (11%)	0	4 (4%)	42 (43%)	52 (53%)
Youth and Managing Risk	104 (97%)	3 (3%)	0	8 (8%)	88 (84%)	9 (8%)	2 (2%)	5 (5%)	51 (49%)	47 (45%)
Foundations I	85 (90%)	9 (10%)	0	2 (2%)	78 (83%)	14 (15%)	1 (1%)	12 (13%)	32 (34%)	49 (52%)
Communications	70 (73%)	9 (9%)	17 (18%)	2 (3%)	50 (63%)	27 (34%)	5 (6%)	11 (14%)	24 (30%)	39 (50%)
Basics of Youth Development	83 (88%)	6 (6%)	5 (5%)	1 (1%)	80 (91%)	7 (8%)	2 (2%)	10 (11%)	25 (28%)	51 (58%)
Foundations II	67 (93%)	2 (3%)	3 (4%)	3 (4%)	53 (77%)	13 (19%)	2 (3%)	10 (15%)	20 (29%)	37 (54%)

Note. * Very effective includes both *very effective* and *extremely effective* responses.

Administrators

Administrators were asked to rate how well the Foundations series prepared agents and educators to succeed in their jobs. As shown in Table 4, the majority of respondents were neutral to positive about how well the Foundations program had prepared field faculty and staff to do their jobs effectively.

Table 4. Administrator Perceptions of Foundations' Effectiveness Regarding Professional Competencies

Competency	*Not at all prepared*	*Somewhat unprepared*	*Neutral*	*Somewhat prepared*	*Extremely prepared*
1: Program Planning and Development	0	5 (21%)	0	19 (79%)	0
2: Teaching and Learning	0	3 (13.5%)	5 (23%)	11 (50%)	3 (13.5%)
3: Program Evaluation	1 (5%)	5 (24%)	3 (14%)	11 (53%)	1 (5%)
4: Application of Subject Matter Expertise	0	1 (5%)	3 (14%)	15 (71%)	2 (10%)
5: Developing a Professional Reputation (agent only)	0	4 (20%)	4 (20%)	11 (55%)	1 (5%)
6: Extension Organization and Administration	0	2 (10%)	1 (5%)	8 (38%)	10 (48%)
7: External Linkages	0	2 (10%)	3 (14%)	14 (67%)	2 (10%)
8: Volunteer Development	1 (5%)	6 (29%)	4 (19%)	8 (38%)	2 (10%)
9: Professionalism	0	0	2 (10%)	11 (52%)	8 (38%)
10: Communication and Marketing	0	1 (5%)	5 (24%)	12 (57%)	3 (14%)

A closer examination of responses reveals that ratings of four of the 10 competencies fell below the benchmark of at or below 80%: Competency 1 (79%), Competency 3 (71%), Competency 5 (80%), and Competency 8 (66%). When asked to explain their lower ratings, participants' responses fell largely into three overarching categories:

- The basics are taught, but time is needed to integrate them into practice. Example comments included the following:
  - "Staff seems to be requiring more information and some of this comes with time. They do have good general information." (Competency 3)
  - "The agents haven't had enough experience to grasp what needs to be evaluated. They are still at the Program Development stage of their career. This is a process. They are exposed, but some are not fully comprehending the concepts or relevancy." (Competency 3)

    - "I teach plans of work at our new agent training and conduct at least four new agent visits during the first year of our new hires. I see an awareness of needs and that program should be planned. I still have to explain plans of work in detail at new agent training even after they take Foundations II. I also have several conversations about marketing, identifying target audiences, and translating ideas to programming." (Competency 1)
- There is not enough time to teach the topics. Example comments included:
    - "This … takes time and experience." (Competency 8)
    - "Having to go over it with new agents." (Competency 1)
- It may not be part of the job description. Comments included:
    - "FACS agents do not learn how to recruit, train, and manage volunteers as an on-going part of their program. There is not a volunteer program they clearly identify with."

Competency 5 (Gaining a Professional Reputation) was an outlier. Participants' comments indicated that while Foundations does lay the groundwork for gaining a professional reputation, additional support is needed, including time to put learning into practice, issues at the county level, and working with mentors and/or PDCs to make this happen. As one respondent commented:

> I haven't seen this as a result of Foundations. If it's happening, I have(n't) been made aware. I hear agents attribute what they learn about developing a professional reputation mostly through interacting with their mentor or PDC.

Joint Issues and Questions Related to Additional Training Needs

The last section of the survey focused on training needs for agents and educators around three topics: teaching and facilitating, marketing to diverse audiences, and diversity, equity, and inclusion. Administrators were asked if they believed each topic area represented a need, while agents and educators were asked if they felt they needed additional training in each area. Table 5 summarizes the responses.

Table 5. Perceptions of Additional Training Needs by Administrators and Agents and Educators

Topic Area	Respondent	No	Maybe	Yes
Teaching and Facilitating	Agents and educators	8 (9%)	34 (37%)	49 (54%)
	Administrators	2 (10%)	4 (19%)	15 (71%)
Marketing to Diverse Audiences	Agents and educators	20 (22%)	22 (24%)	49 (54%)
	Administrators	1 (5%)	7 (33%)	13 (62%)
Diversity, Equity, and Inclusion	Agents and educators	48 (53%)	15 (17%)	28 (31%)
	Administrators	2 (10%)	8 (38%)	11 (52%)

Teaching and Facilitating

The perceived need for training around teaching and facilitation was somewhat aligned between the two groups. Nearly equal percentages of both groups (9% and 10%, respectively) indicated that such training was not needed. However, administrators were more likely to indicate that it was needed (71% vs. 54%), while agents and educators were more likely to be unsure about the need (37% vs. 19%).

Marketing to Diverse Audiences

There was a moderate difference in perceptions of the need for marketing to diverse audiences between the two groups. Sixty-two percent of administrators felt this was a need compared with 54% of agents and educators. Conversely, 22% of agents and educators stated it was not a need compared with 5% of administrators. For those who were unsure, 33% of administrators responded *maybe* compared with 24% of agents and educators.

Diversity, Equity, and Inclusion

There was a vast difference in perception of the need for diversity, equity, and inclusion between the two groups. The majority of agents and educators indicated this was not a need (53%), while the majority of administrators stated it was a need (52%). Additionally, administrators were more likely to be unsure about the training need (38%) than agents and educators (17%).

Additional Training Needs

The last part of the survey requested feedback from respondents on additional training needs not addressed previously in the survey. Administrators focused primarily on people skills, teaching, and outreach, while agents and educators shared concerns about content, technical skills, and people skills essential to navigating their counties. There were some areas of overlap within and between groups, including:

- building relationships with stakeholders;
- how to deal with difficult clients and resolve conflict;
- office dynamics;
- communications with clientele and partners;
- technology skills (e.g., video production and editing); and,
- optional re-training.

What We Learned

When examining the results, three global lessons emerged from these data: (1) The Foundations Program's Ability to Meet Stated Needs and Competencies, (2) Targeted Courses Are Needed to

Enhance Extension's Impact, and (3) Practice and Operations Courses Are Needed to Address Everyday Needs.

This study provided one way of exploring Herzberg's (1966) Motivation-Hygiene Theory as a framework connecting motivation factors to job satisfaction through onboarding trainings. The results of this study indicated that the Foundations trainings were on the right track and could benefit from some minor adjustments to increase effectiveness further. This study design could be transferable to other state Extension systems to inform onboarding. Hygiene factors were outside the scope of this study.

The Foundations Program's Ability to Meet Stated Needs and Competencies

Results from the field show the stated goals were met and helped them prepare for success. A high benchmark of 80% was set for success across the three parameters, with even the lowest ranked course (Communications) having 80% stating it was effective.

From the administrators' perspective, it was felt that the majority (6 of 10) of competencies identified for Extension professionals were met. For the ones not met, the reasons given largely reflect the intent of Foundations and the unique needs of each field. For example, most 4-H agents and educators routinely interact with and manage volunteers, and some ANR agents have Master Gardener volunteers. Therefore, Competency 8 (volunteer development) is not valid for all field personnel. Of the three categories of reasons why competency is not met, only one (lack of time) is directly related to the content and training format of the program.

Targeted Courses Are Needed to Enhance Extension's Impact

At the University of Georgia and within the College of Agricultural and Environmental Sciences, an increased focus on enhancing Diversity, Equity, and Inclusion has emerged. This effort is particularly vital for Extension as the mission is to serve all residents through its services. This has led to an increased demand for programs and services to be accessible community-wide.

To assist in these efforts, there has been discussion about offering additional trainings on how to reach diverse audiences. However, the perceived need for these trainings was not aligned between the field and administrators. The greatest alignment was seen in how to market to diverse audiences (54% agents/educators and 62% administrators said yes), while training on diversity, equity, and inclusion (DEI) had the greatest disparity (53% vs. 10% said no). This may be a result of the perceived roles each position fulfills. For example, to be successful, agents and educators need to reach and teach throughout the community. This means that marketing is vital for success. However, efforts to increase diversity, equity, and inclusion are perceived as administrator roles in that standards of operation and practices need to be updated to reflect this value. Once explicitly integrated, the field will likely perceive system-wide training as needed.

Another factor in the contradictory viewpoints may be that administrators have gone through DEI training and discussions prior to taking this survey that were not offered to new agents.

Practice and Operations Courses Are Needed to Address Everyday Needs

The Foundations training course currently focuses on the technical skills and concepts needed to develop and execute a teaching plan successfully. It is necessary to focus on everyday needs to be successful as a coworker and the face of UGA Extension. This may be of particular importance as Extension is found in all 159 counties statewide, serving diverse groups of people. Establishing a consistent standard operation was seen as a need by the identification of people skills. This may include training on building relationships and navigating difficult personalities. Additional technical skills around emergent technology and re-training related to Foundations topics were cited, as well as soft and technical skills for team members.

What This Means for Foundations

The Foundations Program Works

Perhaps the most significant finding from the study is that most participating agents and educators found that the Foundations Training Program (a) met its stated goals, (b) was timely, and (c) was at least moderately effective. As the survey data revealed, 80% or more of the participants indicated that the stated goals had been met for all courses. This was also consistent with the evaluations distributed immediately following each course. This suggests alignment between the immediate and recall feedback about the courses.

Likewise, the administrators' feedback was largely positive. The six competencies with an 80% or higher rating relate primarily to skill-based or knowledge-based applications. In many instances, this is an explicit part of the job description with immediate orientation from the first day of employment. This indicates that the day-to-day operations of agents and educators are being filled using the knowledge and skills gained from the Foundations program.

Scheduling Is a Factor

When looking at the courses that respondents indicated were either not offered on time or not effective, two trends emerged. First, the course may have been asynchronous in that it had been recorded and housed online. Lack of timeliness and effectiveness in these cases could be attributed to administrators not inviting participants quickly enough or new employees not completing the course(s) when the invitation was sent. Second, regarding the "live" courses (i.e., synchronous), lower ratings of effectiveness and timeliness occurred mainly when either (a) the participant started their position during the month or the month following when the course was being taught (therefore, they may have been on the job for up to five months before receiving the training) or (b) during times when a training session was being revamped or when there was

turnover among those teaching the course. For the latter, participants' feedback was more positive when the course was consistent.

Course Intent Needs to Be Remembered

Regarding the four competencies on which less than 80% of respondents indicated that personnel were trained effectively, the majority of respondents indicated that the lower rating was due to the nature of the course. Each Foundations course is designed to provide a solid grounding in concepts, but, as respondents noted, full integration into practice is a time-consuming process. The second reason centered on agents not being trained in each Foundations course. For example, most FACS agents are not trained in volunteer development; thus, they are not able to achieve all competencies. The reason with the greatest implications for practice related to there not being enough time allotted to teach all concepts, meaning that concept-related work must continue after the course, even if that was not the intent.

As mentioned earlier, feedback related to Competency 5 (Gaining a Professional Reputation) varied for two main reasons. First, only agents are required or expected to produce scholarship. Second, the focus on scholarship and professional reputation is meant only to raise awareness of the expectation, not to address knowledge or practice around these concepts. Thus, follow-up and mentorship are central to the full realization of this competency; therefore, this competency might not be a good fit for Foundations and better suited after onboarding.

Additional Training Courses Are Still Needed

When asked about additional training needs, participants' feedback seemed to align with the focus of each position. Both administrators and field faculty felt that training in teaching and facilitation, as well as marketing to diverse audiences, represented a need; however, they had opposing viewpoints on training around diversity, equity, and inclusion. This divide was further evident in the open-response section. Similarly, administrators focused on people skills, teaching, and outreach, while field faculty were primarily concerned with content, technical skills, and people skills. This could be due to several factors, including the viewpoint required of each position, the community in which agents are situated, and individuals' experiences.

Moving Forward

Based on survey respondents' feedback, several next steps have already been set in motion. Moving forward, the post-class evaluations are being updated to gather more real-time information on the effectiveness of each course. The above survey is a retrospective view of the overall training course. This adjustment will ensure the training courses are responsive to emerging concerns.

Second, participants suggested that hybrid learning is a preferred approach to training. To address the finding that some courses were not offered in a timely manner, the authors and course instructors are exploring the feasibility of offering basic concepts asynchronously to provide agents and educators with immediate tools while using the in-person component of the training to examine topics more deeply.

The authors and course instructors team will conduct a training review every 5–8 years. This review will occur after the adoption of a new Extension Strategic Plan, ensuring that Foundations concepts align with the stated goals of the organization. Additionally, as new technology becomes available, the digital delivery specialist will work with the administration team to determine which platforms UGA Extension will support and for which it will provide training.

In response to study participants wanting the option to retake courses after completion, the staff, organizational development specialist, and team are exploring a refresher course for seasoned agents. Such refreshers might be more necessary for certain competencies (e.g., Communications) as new technology and practice methods are adopted and others are de-emphasized. A model similar to the University of Georgia's Human Subjects Training for Research is being considered as an approach to developing these refresher courses.

Additionally, Extension has had difficulty quantifying the return on investment to the system. Harder et al.'s (2017) model provides a means of determining ROI for onboarding training programs based on competency development by the participant. The authors plan to use this model to determine the value of the Foundations Training Program for UGA Extension.

Since the completion of this study, the organization has moved forward with implementing a few of the suggestions. As part of the revamp, two new sections were added to the Foundations of Communications session to address DEI-related topics. In 2022, a DEI track of educational breakout sessions was included in the biannual internal Extension Conference for agents and specialists as a source of ongoing professional development. For the 2024 Extension Conference, a new track is being added to enhance the supervisory skills of agents, as this is currently only offered in the training sessions for County Extension Coordinators. Finally, after this study was completed, a new facilitation program has been piloted as ongoing professional development. It is offered to any agent to apply after they have completed their Foundations trainings.

As the study findings highlight, UGA Extension's Foundations Training Program provides a proven model for the successful onboarding of field faculty. Though other programs have been described in the literature, none appear to be as comprehensive as the UGA Foundations program. The study results show that this approach to onboarding is successful and could inform other state Extensions as they develop their own programs. Lessons learned from this study and the curriculum developed for Foundations comprise a template for other systems seeking to address their unique onboarding needs.

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Cascading Effects of Assumption Violations in an Extension Program Development Model

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The Cooperative Extension Service delivers informal educational programs that can help to improve the lives of citizens and communities. Planning, design, implementation, and evaluation are crucial considerations for Extension programs and serve as the foundation for the Extension Program Development Model. The Extension Program Development Model has underlying assumptions that may not be explicitly stated or apparent to Extension practitioners, but if the assumptions are violated, it can lead to cascading effects that impact the effectiveness of an Extension program. This paper will discuss the assumptions of the Extension Program Development Model and the potential impacts of assumption violations. We present a case study of a hypothetical Extension timber harvesting program that violates one assumption during the planning stage—identifying the target audience—and how the assumption violation cascades throughout the rest of the model. The target audience in the hypothetical Extension timber harvesting program case study uses two forest landowner subpopulations in South Carolina, members of the South Carolina American Tree Farm System, and landowners in South Carolina as described in the National Woodland Owner Survey. Comparisons are made between the two subpopulations that describe the impact of an assumption violation on the Extension Program Development Model.

Keywords: South Carolina, national woodland owner survey, forestry, landowner, timber harvesting

Introduction

The use of program development models in Extension has been around for over 100 years and continues to evolve to meet the changing demands placed on Cooperative Extension Services (Franz et al., 2015). There are numerous Extension program development models in existence, such as those described by Baker (1994), Boyle (1981), Forest and Baker (1994), and Arnold (2015). However, the most common program development model in Extension was presented by Seevers and Graham (2012) and is still the most widely applied Extension model in use today (Arnold, 2015; Franz et al., 2015; Gagnon et al., 2015). There are many reasons a program

development model might be used; this includes meeting the educational needs of stakeholders, clearly defining outcomes, and increasing program impact and success (Franz et al., 2015). Seevers and Graham (2012) also suggest that using a program development model can help to reach intended audiences, a crucial component of any Extension program.

All program development models have underlying assumptions regardless of application, origin, or context. Sometimes, these assumptions are explicitly stated; other times, they are implied, and some are not even considered. Assumption violations occur when assumed underlying conditions, such as education level or land ownership size, are not met and thus lead to unintended outcomes, consequences, and/or spurious conclusions. Assumption violations can have cascading effects that impact the utility and outcome of the model under consideration. A cascading effect is a chain of events that happens when an unforeseen initial circumstance or negative event/action (such as an assumption violation) negatively impacts subsequent events. In other words, the consequences of the negative event trickle down to subsequent events/actions. Boone (1992) specifies assumptions for the Program Development Model commonly used in Extension but fails to discuss potential implications of assumption violations. Further, the assumptions described by Boone (1992) do not consider how assumption violations in one component of the program planning model may impact the other components. The assumptions presented by Boone (1992) are presented as independent within each program planning component, although they most likely have cascading effects on subsequent components.

The scientific literature suggests how to implement each stage or steps within a stage so the Extension Program Development Model can effect change within individuals or communities. These suggestions discuss a variety of ideas, including identifying a target audience (e.g., Gibson et al., 2020; Warner et al., 2017), developing program content and materials to match the characteristics and needs of a target audience (e.g., Brownlee et al., 2014; Joshi & Arano, 2009), and evaluation of programs (e.g., Chen, 2015; Hubbard & Sandmann, 2007). Understanding how each stage in the Extension Program Development Model is intertwined with the other stages is essential to program success (Forest & Baker, 1994).

Our paper provides an example of how one assumption violation in the first stage of the Extension Program Development Model carries throughout the model and the consequences of that violation when using various forest landowner demographics for South Carolina (SC). We provide a case study using forest landowner demographics described in a secondary data source to describe a target audience (Butler et al., 2021a) versus demographics information collected through a targeted survey to demonstrate how violating the assumption of correctly identifying a target audience can lead to cascading effects throughout the remainder of the Extension Program Development Model process.

The Extension Program Development Model

The Extension Program Development Model depicted by Seevers and Graham (2012) and also articulated by Boone (1992) has three layers or stages: (1) planning, (2) design and implementation, and (3) evaluation. These three layers build upon each other, starting with planning and ending with evaluation. Further, steps within each layer are necessary to implement the Extension Program Development Model fully. While the model is presented with each layer being mutually exclusive, in reality, steps within and across layers may occur simultaneously.

Regardless of whether the steps are sequential or simultaneous, the first action toward the success of the Extension program is to identify the audience that the program will target (Boone, 1992; Warner et al., 2017). Once the target audience has been identified, a needs assessment may be conducted to elicit information about current conditions versus desired future conditions and other sociodemographic factors important to program development. This information may then be translated into prescribing program objectives and serve as the basis for the other two stages (design and implementation, evaluation). The planning stage is also where a theory of change, sometimes called the program theory, is identified and articulated to guide the design and implementation and evaluation stages (McLaughlin & Jordan, 2015).

The second stage, design and implementation, is based on information learned in the previous planning stage (Forest & Baker, 1994; Seevers & Graham, 2012). During this stage, subprocesses occur that include selecting and/or developing content and materials and selecting teaching methodologies that seem most suited for the situation (Boyle, 1981; Forest & Baker, 1994). This stage is important for relaying information to the target audience and dictating a strategy for increasing the adoption of an innovation.

The final stage of the Extension Program Development Model, evaluation, is crucial to programming, particularly since evidence of program success relative to invested resources is increasing (Newcomer et al., 2015). There are different types of evaluation (e.g., formative, summative, one-shot, etc.), and criteria for selecting the most appropriate evaluation method should be considered early in the planning stage (Newcomer et al., 2015; Seevers & Graham, 2012). Further, some evaluation frameworks, such as utilization-focused evaluation, outline processes to follow in the planning and design and implementation stages and must be incorporated early in the planning stage (Patton, 2008).

Although the Extension Program Development Model encompasses three distinct stages, it is evident that these stages are interconnected and inseparable. An Extension professional may need to move back and forth from one stage to another in non-sequential order and, likewise, may need to visit a stage more than once to achieve the desired outcome. This interplay between the three stages will be the basis for demonstrating the effects of an assumption violation that cascades throughout the entire Extension Program Development Model.

The Importance of Forest Landowners

Across the United States (US), more than 11.4 million private forest landowners make decisions on managing over half of the nation's forestland (Butler et al., 2016b). Eighty-nine percent of the nation's annual timber harvest volume can be attributed to this group (Oswalt et al., 2019). Of the private forest ownerships, 10.7 million are categorized as non-industrial private forests, or family forests, and they control 36% of the nation's forestland (Butler et al., 2016a). Due to differences in management objectives and the feasibility of traditional forest management practices, this group is often separated into two family forest categories: 1–9 acres and 10 acres or more (Butler & Snyder, 2017). This separation is essential for sustainable forest management certifications, such as the Certified Tree Farm, administered by the American Tree Farm System (ATFS), which requires a minimum forest size of 10 acres (American Tree Farm System, 2021). However, it is assumed that the landowners' demographics remain unchanged across the nation and at a state level, despite the acreage separation.

In SC, 87% of the forest land is privately owned (USDA Forest Service, 2019). The importance of family forests in SC is emphasized by the fact that 60% of the privately owned forest land is characterized as family forests (South Carolina Forestry Commission, 2021). This is particularly important given that the ATFS does not collect demographic information about their membership (G. Sabin, personal communication, January 14, 2019) despite members being an active group of local forest owners engaged in forest management activities.

Methods and Hypothetical Program Description

One significant challenge for the family-owned forestry industry is keeping owners interested and engaged in current forest management practices. Forestry Extension agents are a tool that can be used to address this challenge by facilitating the transfer of information gained from research on accepted forestry practices to forest owners (Sim & Hilmi, 1987). Partnerships and collaborations between Extension and forest owners are another way that stakeholders' needs can be addressed (Anderson & Farrington, 1996). Sim and Hilmi (1987) and Anderson and Farrington (1996) also emphasize that the focus of forestry Extension is on local people, which highlights the need for forestry organizations, including Extension, to have a robust understanding of the demographics of their stakeholders. We will present landowner demographic information from two data sources, the South Carolina American Tree Farm System and the National Woodland Owners Survey, and describe a hypothetical timber harvesting planned program. We will then apply the Extension Program Development Model to the hypothetical timber harvesting program using the two data sources to demonstrate how the difference in the target audiences (i.e., the assumption violation) could potentially influence program effectiveness.

Data Sources

South Carolina American Tree Farm System Member Survey

As part of a survey of ATFS membership regarding damages experienced from flooding and hurricane events in 2015 and 2016 in SC, information was collected on ATFS member demographics and their forest management practices (Hiesl & Rodriguez, 2019). The sample frame for the survey consisted of 655 SC ATFS members, as provided by the Forestry Association of South Carolina, the acting ATFS agency in SC.

National Woodland Owners Survey

A commonly cited source for describing forest landowners in the US is the National Woodland Owners Survey (NWOS), conducted by the USDA Forest Service. The purpose of the survey is to gain a better understanding of the number of forest landowners, reasons for owning forestland, and past and future forestland practices (USDA Forest Service, n.d.). The most recent NWOS was completed in 2018, and results were published in 2021 (Butler et al., 2021a). A Google Scholar search showed that the previous NWOS report (Butler, 2008) has been cited over 500 times, indicating how often this source of forest landowner demographics is used.

Data Comparison of SCATFS and NWOS

In Tables 1 and 2, we show that there may be differences between two subpopulations of the total population of family forest owners in the US. Research suggests that many landowners do not engage in forest planning and management activities and, thus, are not likely to seek certification, such as the ATFS (Rickenbach, 2002). Reasons for seeking certification on private lands relate to environmental stewardship, education, age, and management activity levels (Rubino et al., 2022). Further, some impediments to certification have been cited as the cost of certification and the strict program requirements (Rubino et al., 2022). This research provides evidence that there are likely differences between SC ATFS members and landowners included in the NWOS.

Table 1 shows the differences in sociodemographic indicators between SC ATFS members and results from the 2018 NWOS (Butler et al., 2021a). Using a chi-square test to test for differences in the sociodemographic indicators between SC ATFS and NWOS data, we found statistically significant differences ($p < 0.001$) in only the educational level.

Table 1. Comparison of Sociodemographic Indicators Between SC ATFS Members and 2018 NWOS Results

	SC ATFS Members	2018 NWOS*
Sociodemographic Indicator	**%**	**%**
Age		
< 45	4.5	5.0
45–54	8.7	8.0
55–64	24.3	35.0
65–74	34.4	31.0
75+	28.1	21.0
Gender		
Male	83	75
Female	17	25
Race		
Alaska Native	0.0	2.0**
Asian	0.4	<1.0
Black	2.5	6.0
Native American/American Islander	0.4	N/A**
Native Hawaiian/Pacific Islander	0.4	<1.0
White	92.8	95.0
No Response	3.5	N/A
Education Level		
Less than 12th grade	0.0	5.0
High School/GED	6.9	14.0
Vocational School	2.7	N/A
Some College	5.9	24.0
Associate Degree	8.0	10.0
Bachelor's Degree	42.4	26.0
Advanced Degree (master's, doctorate)	34.0	21.0

Note. *Source is Butler et al., 2021a, with results for SC forest holdings of 10 acres or larger. **Results for Alaska Native and Native American were listed as a combined value in Butler et al. 2021a, so we show a Not Applicable (N/A) since it cannot be directly compared.

Another set of important indicators for forest landowners is the characteristics of the forest property. Property characteristics have been shown to influence forest landowner attitudes and behaviors (Butler et al., 2021b; Rickenbach, 2002), and in turn, attitudes and behaviors are known to influence communication and education strategies to effect change (Brownlee et al., 2014; Gibson et al., 2020; Tidd, 2010). Table 2 presents a comparison of forest property characteristics between SC ATFS and NWOS results and shows a substantial difference in the average acres of forested land owned.

Table 2. Mean Property Characteristics Comparison Between SC ATFS and NWOS

Property Characteristics	SC ATFS Members	2018 NWOS*
Properties per Ownership	1.7	44% of ownerships have more than one parcel
Length of Ownership (years)**	26	N/A***
Average Forested Area per Ownership (acres)	707	97.3
Average Non-forested area per Ownership (acres)	172	N/A
Average Forested area per property (acres)	432	N/A
Average Non-forested area per property (acres)	123	N/A

Note. *Source is Butler et al., 2021a; **Ownerships that were reported to be less than 100 years. *** N/A stands for Not Applicable. The NWOS survey did ask the specific question posed to the SC ATFS members.

Description of Hypothetical Timber Harvesting Planned Program

Timber harvesting operations are a capital-intensive business (Conrad et al., 2018a, 2018b) that requires a large quantity of timber to offset expenses and result in a profit for the logging business owner. In the past, some logging businesses were hesitant to harvest forest areas of less than 20 acres, with others setting the lower limit at 40 acres, and may have required up to two loads per acre and one week's worth of timber to consider a harvest (Moldenhauer & Bolding, 2009). With recent changes in logging business structures, however, very few low-production logging businesses are still in existence, especially in the southern US, likely pushing this limit to a larger minimum acreage (Conrad et al., 2018a, 2018b). While stem size and, subsequently, harvestable volume per acre are factors influencing productivity and cost of harvesting operations, so are terrain, species composition, and skidding distance (Parajuli et al., 2020).

As such, landowners with 100 acres of forest land or less would likely be advised to harvest all or most of the forest land during a single harvesting operation to capture enough volume to offset logging expenses and attract a timber buyer. While landowners may contract directly with a logging business to harvest timber, in the southern US, a timber buyer often acts as an intermediate entity that buys timber from the landowner and contracts with a logging business. In contrast, a landowner with over 700 acres will likely have multiple harvesting operations scheduled on the forest land spread out over several years. Due to smaller harvest volumes, it is also likely that landowners with less than 100 acres of forest land receive a lower stumpage for their timber than landowners with larger properties. Thus, varying property sizes require different Extension programming focuses to meet the needs of the target audience (Table 3).

Table 3. Differences in Timber Harvesting Planned Program Topics Between Small and Large Landowners

Presentation Topic	Small Landowner (< 100 acres)	Large Landowner (> 700 acres)
Harvest strategy	Single harvest	Multiple harvests
Income Expectations	Lower income expected since single, smaller tract	Higher income expected since larger and multiple tracts
Road Maintenance	Not emphasized because likely only one primary road	Extended discussion to maintain conditions for varying types of roads on property
Logging Decks	Not emphasized since likely a single harvest with one deck	Strategic placement of logging decks to optimize efficiency

More than half of family forest landowners in the US have their primary residence within one mile of their forest land (Butler et al., 2021a). For landowners with 100 acres of forest land, this likely means that any harvesting operation will impact the access road to their residence. As such, it is important to discuss road maintenance and rehabilitation following a harvest with landowners. While small forest owners may only harvest timber every 15 years or more, road building and maintenance other than to their primary residence may not be a topic they think of except in harvest years. However, larger forest owners who plan to have more frequent harvesting operations will need more in-depth information about road building and road maintenance to keep the access roads to their forestland in working condition for the next harvest (see Table 3).

Harvesting less than 100 acres may be done from one or two logging deck locations. However, larger properties may require more strategically located logging decks. The skidding distance can impact productivity and unit cost of production (Hiesl et al., 2015; Hiesl & Benjamin, 2013; Parajuli et al., 2020), and the impact can be reduced and controlled by the strategic placement of logging decks. As such, one focus of a training program for larger property owners would be the strategic placement of logging decks that provide access to multiple stands to limit the acreage impacted by logging decks (see Table 3).

Model Development Framework and Assumption Violations Discussion

Planning Stage

The first underlying assumption of the Extension Program Development Model is that the target audience is correctly identified. If this assumption is violated, subsequent aspects of the model may be negatively impacted (Boone, 1992; Boyle, 1981; Warner et al., 2019). One of the first steps in the planning stage is to closely examine the characteristics of an audience that will guide decisions in the design and implementation stage (Kretzmann & McKnight, 1993). Some characteristics to consider in understanding a target audience include sociodemographic indicators, learning preferences, and capacity to modify changes or behavior, among others

(Boyle, 1981; Hitchner et al., 2021; Warner et al., 2019). Boone (1992) specifically states that this stage must correctly identify, understand, and analyze the sociocultural characteristics of the target audience in order to develop an effective program.

In our hypothetical program example, the majority (76.4%) of landowners' educational level in the SC ATFS group is over a bachelor's degree, while the NWOS shows only 47% of landowners with an educational level of some college or higher. Since we found statistical differences in the education level between SC ATFS and NWOS, the capacities and skills of the audience may differ (see Table 1; Autor, 2014; Smith, 2009; Watson et al., 2013). Differences in educational levels have also been shown to impact other fields such as medicine, recreation, and education, suggesting that this is also an important consideration in an Extension program (e.g., Autor, 2014; Patterson, 2018; Petty & Thomas, 2014; Piccininni et al., 2023; Rutter et al., 2021). Another difference is that the SC ATFS data indicates an average forest landownership size of 707 acres, whereas the NWOS shows an average forest landownership size of 97 acres (see Table 2), creating additional differences in potential program design (see Table 3)

Research has shown that while the exact barriers to starting and completing post-secondary education are not well understood, educational level can predict participation in adult learning programs (Van Nieuwenhove & De Wever, 2022). As such, participation in a program is more likely to be attended by landowners with higher levels of education than those landowners with little to no education. Barriers such as gaps in knowledge, literacy, and parental educational attainment may also explain why lower educational attainment may prevent participation in continuing education (Autor, 2014; Patterson, 2018; Van Nieuwenhove & De Wever, 2022).

If an Extension Specialist were designing a program to address harvesting techniques that targeted ATFS participants and used the landowner description from the NWOS, the program would most likely fail to meet the needs of ATFS participants or, at the very least, not effect change to move toward a desired condition (Warner et al., 2017). This is because a forest landowner with over 700 acres may have different timber harvesting options available than a forest landowner with less than acres (see Table 3). The Extension Specialist designing the program may also be utilizing the results of a needs assessment that asked about broad topics (e.g., harvesting strategy), did not ask for sociodemographic information or other indicators (e.g., acreage owned), and assumed the target audience was larger landowners, thus inducing an assumption violation. It may also be the case that the needs assessment may not have targeted the correct population or assumed the needs identified were applicable across populations, such as large and small landowners (Garst & McCawley, 2015).

Design and Implementation Stage

The design of a program is paramount to the adoption of the practices taught in the program, and research has shown that various factors influence the adoption of various forest management practices and strategies (e.g., Gutierrez-Castillo et al., 2022; Joshi & Arano, 2009; Karppinen &

Berghall, 2015). The diffusion of innovation (DOI) theory was initially conceived and applied to increase the adoption of agricultural innovations (Tidd, 2010). Thus, this theoretical framework can be used as a starting point for designing and implementing an Extension program. The DOI framework is complex and incorporates various sub-concepts that describe barriers to the adoption of innovations by landowners.

When designing a program targeting a specific audience, various factors influence the adoption of a practice (Rogers, 2003). The four primary elements of the DOI framework are (1) innovation, (2) communications channels, (3) time, and (4) the social system. Within each of the four primary elements are subtheories that attempt to explain the adoption of an innovation.

A subtheory related to innovation is the theory of perceived attributes of the innovation. This subtheory describes how program participants perceive the innovation (or practice being taught). There are five elements of this subtheory: complexity, compatibility, trialability, relative advantage, and observability (Rogers, 2003). The first element, complexity, is simply how difficult the innovation is to understand and implement. For example, while a harvesting strategy is relatively easy to understand, it may be more difficult to implement based on how large a property is to be harvested (see Table 3). Therefore, if a program is designed for larger landowners, a small landowner may see the practice as difficult to implement since they do not have a large enough land base. This line of thinking can also be extended to the second element, compatibility. If a small landowner does not have the resources (e.g., land) to implement a harvest, the landowner will perceive the innovation as incompatible (Hubbard & Sandmann, 2007). Trialability, the third element, along with harvesting operations, may create the most significant barrier to adoption. For example, a small landowner may not have the ability to implement a harvesting operation on a smaller tract of land to “try it out” before deciding to implement it on a larger scale since they are likely only to have enough land to implement a single harvest (see Table 3). Thus, a small landowner is less likely to adopt a practice since they are not able to try it out first. The fourth element is relative advantage, which describes the possibility of increased income or revenue for implementing a practice (Hubbard & Sandmann, 2007; Rogers, 2003). For example, if a program is designed for a large landowner, there is likely to be a difference in expected income between large and small tracts that are harvested (see Table 3). This means that an economic barrier is manifested in the DOI framework since a larger timber harvesting operation usually yields higher returns. Thus, a landowner does not have the information necessary to implement an innovation (see Table 3).

The final consideration of the four primary elements of the DOI framework is that of the social system. As stated by Rogers (2003), “Diffusion occurs within a social system” (p. 24). The social system may be predicated on cultural factors, which studies have shown differ based partly on sociodemographic indicators (e.g., Joshi & Arano, 2009; Karppinen & Berghall, 2015; Rogers, 2003). Therefore, a critical element of the theoretical framework for the adoption of innovation is

violated if an audience is incorrectly identified. Thus, the program may not be effective, such as if an audience is assumed to have larger tracts of forestland.

Aside from the DOI framework, the theory of change that is associated with a planned program is also violated because incorrectly describing the target audience would be an external factor that could influence the program outcomes and impacts (McLaughlin & Jordan, 2015). These factors will undermine the theory of change prescribed for a program. Thus, the program will fail to meet the needs of the landowners and, ultimately, fall short of creating the future conditions the program is intended to bring about. When DOI, theory of change, and other frameworks are considered, the success of an Extension Program Development Model may fail because an underlying assumption is violated.

Evaluation Stage

Program evaluation is both an art and a science that can produce meaningful measures of success toward a prescribed goal. Yet there are only suggestions when developing an evaluation, such as those of Dillman et al. (2014). However, a variety of frameworks exist that can guide the development of an evaluation instrument, such as utilization-focused evaluation (Patton, 2008), transformative evaluation (Mertens, 2009), and culturally responsive evaluation (CRE; Hood et al., 2015; Hopson & Shanker, 2023).

In our hypothetical harvesting operations program model, the evaluation results may be invalid if a CRE framework were used because it targeted the wrong group. A CRE "rejects culture-free evaluation and recognizes that culturally defined values and beliefs lie at the heart of any evaluative effort" (Hood et al., 2015, pp. 282–283). Previous studies have shown that various segments of landowners face different challenges and, thus, may represent different cultures of landowners (e.g., Joshi & Arano, 2009; Hitchner et al., 2021). Even the NWOS segments landowners (1–9 acres and 10 acres or more), thus implying a potential difference in culture, which can predict behavior (Rogers, 2003). Research in the adult education, recreational, and health sciences has shown that a rural vs. urban upbringing for the first 12 years of life (i.e., childhood residence), along with income, also influences behavior and cultural norms (Boyle, 1981; Chitwood et al., 2011; Duda et al., 2010; Lindberg et al., 2022; Wilcox et al., 2000), thus further mandating a need to identify a target audience correctly. To further this point, Boyle (1981) stresses that adult education should focus on differences in culture and the need to strive to help nurture education within a cultural framework. This point is later echoed by both Boone (1992) and evaluation professionals that the evaluation process is based on an understanding of sociocultural differences and contexts (e.g., Alkin, 2023; Hopson & Shanker, 2023; Patton, 2023).

Gifford and Nilsson (2014) concluded that there are differences in concern about the environment based on cultural norms, and thus, cultural norms may influence how landowners may synthesize a problem and potential reactions. Cultural norms of urban landowners may

demonstrate more biocentric views, while rural landowners may have more anthropocentric views (Gifford & Nilsson, 2014; McGrady et al., 2016). Thus, these differences may influence a landowner's willingness to implement various forest management activities. While the NWOS does not collect income and childhood residence information, it is an important indicator of expected behavior (see Table 4).

Table 4. Childhood Residence and Income Indicators for SC ATFS Landowners

		Male	Female
Indicator	**N***	**%**	**%**
Main place of residence for 1st 12 years of life			
Rural (Farm)	99	81.8	18.2
Rural (Non-Farm)	24	91.7	8.3
Small Town (up to 10,000 people)	88	86.4	13.6
Suburb of a City	24	79.2	20.8
City (up to 100,000 people)	30	76.7	23.3
Large City (over 100,000 people)	21	76.2	23.8
Household Income in 2016			
Less than $100,000	85	87.1	12.9
$100,000 to $199,999	105	75.2	24.8
$200,000 or more	35	82.9	17.1
No Income Reported	63	90.5	9.5

Note. *Number of responses for each category. It does not include responses that did not report gender.

Referring to the hypothetical timber harvesting program, if a program were designed using a CRE, especially if it were considered during the planning stage, there would likely be cultural differences between large and small landowners. If the program were designed for large landowners with more financial resources and perhaps less dependent upon timber income, the evaluation might fail to capture the nuances of the group because it was not designed to be sensitive to the target group (see Table 4). Thus, the evaluation fails in its design and implementation because of an assumption violation in the planning stage.

Conclusions

We have presented a hypothetical case study on how assumption violations within the Extension Program Development Model planning stage, specifically from an incomplete needs assessment, can have cascading effects. While assumption violations for quantitative data can be tested for and corrected, there is no test for assumption violations in the Extension Program Development Model.

A recommendation for avoiding assumption violations early in the Extension Program Development Model is to conduct a thorough and complete needs assessment. Needs assessment techniques have evolved over time, and with advances in computer technology (e.g., internet and social media), they have provided more tools to Extension personnel for gathering and analyzing

data (Garst & McCawley, 2015). Despite advances in needs assessment techniques, challenges still remain for needs assessments to be accurate and beneficial. One such challenge is assuming the results from a needs assessment apply to all groups or target populations, such as landowners (Garst & McCawley, 2015). A flaw in a needs assessment creates assumption violations that create cascading effects that may render a program ineffective. Following best practices for needs assessment, such as those proposed by McCawley (2009), Royse et al. (2009), or Etling and Maloney (1995), can help to overcome critical mistakes.

Further, Extension personnel should carefully identify and consider assumptions when designing a program to avoid assumption violations that may have cascading effects. As stated previously, assumptions are oftentimes overlooked and/or disregarded without consideration for the consequences. Assumptions are not always clearly defined or stated, and it may be necessary to critically evaluate a planned program so assumptions can be revealed.

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Using Mentimeter in Online Book Clubs to Engage and Educate Extension Audiences

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During the COVID-19 pandemic, Cooperative Extension professionals, like many others, were tasked with quickly adapting to accommodate limited face-to-face interactions. The pandemic necessitated that Extension educators leverage online resources to deliver tailored programming in informative and innovative ways while providing engaging, hands-on learning experiences. This article highlights two studies using Mentimeter as a tool to educate and engage Extension audiences through subsequent installments of an online book club. The presented case studies examine the processes and outcomes of a unique educational approach to Family and Consumer Sciences (FCS) in a non-traditional setting. The studies represent two distinct FCS disciplines: Family Finance & Resource Management and Food & Nutrition and demonstrate how audience response systems (ARS) like Mentimeter can be used to promote learner engagement.

Keywords: technology, Extension education, virtual programming, nutrition education, financial education, webinars, audience response systems, Mentimeter

Introduction

The COVID-19 pandemic fundamentally impacted how we use technology. Notably, 90% of Americans felt the internet became essential during the pandemic (McClain et al., 2021). The surge in technology use, and subsequent dependency on internet modalities as a primary mode of communication, were especially prevalent in the workplace (De' et al., 2020). To comply with social distancing guidelines, many professionals were tasked with quickly adapting standard operating procedures to accommodate limited and/or prohibited face-to-face interactions. Cooperative Extension professionals were no exception. Reaching 3,000+ counties across the United States through local educators with social and cultural context (USDA NIFA, 2023), the pandemic necessitated that Extension educators leverage online resources to deliver tailored programming in a way that was informative and innovative, while remaining engaging and hands-on. Extension professionals adapted existing programs to fit online formats and developed new pedagogical practices that brought the spirit of face-to-face learning to virtual platforms. To illustrate this, the present article highlights two case studies using Mentimeter as an audience

response tool to educate and engage Extension audiences through subsequent installments of an online book club. The case studies represent two distinct Family and Consumer Sciences (FCS) disciplines (*Family Finance & Resource Management* and *Food & Nutrition*) and demonstrate how audience response systems (ARS) can be used to promote learner engagement.

Literature Review

Technology Use in Extension

Even before the COVID-19 pandemic, Extension professionals used technology-based programmatic delivery formats to engage audiences in various settings. For example, in Kentucky, Facebook Live has been used as a real-time delivery modality to expand the reach of nutrition education programming beyond traditional audiences (Adedokun et al., 2020). Similarly, Extension professionals have used webinars to deliver financial literacy materials to participants throughout Montana and South Dakota (Johnson & Schumacher, 2016). Virtual programs like these have increased since the pandemic, with noted benefits that resulted from the rapid shift to online programming. For instance, Extension professionals in Nevada reported higher attendance rates, with some programs reaching 400 attendees per class, compared to an average of 60-80 attendees per class pre-pandemic (Chichester et al., 2020).

Despite the ability to reach a wider audience, challenges to online Extension programming have been identified. Among the most reported challenges, both pre- and post-pandemic, were lack of knowledge and/or confidence using technology effectively for Extension work. Some Extension personnel found it difficult to effectively integrate technology into educational experiences and/or lacked the technological skills necessary to stay relevant to their clientele (Jernigan et al., 2015; Lubell & McRoberts, 2018). Others noted a lack of confidence in their ability to develop new online programs or adapt in-person programs to an online space (Narine & Meier, 2020). Because educators rely on technology they are familiar with and have access to (Walker & Kim, 2015), there is a need for expanded use of virtual tools and platforms to deliver Extension programming to an array of audiences while maintaining levels of engagement that face-to-face instruction offers.

Audience Response Systems

Webinars, like other online modalities, provide a low-cost alternative to traveling and hosting in-person programs while allowing programs to reach a wider audience, including those unable to attend an in-person program (Zoumenou et al., 2015a). Webinars proved helpful for Extension professionals during the COVID-19 pandemic, providing a mechanism for continued engagement with local clientele and community partners (Bamka et al., 2020). However, Extension personnel should take action to provide enhanced opportunities for audience interaction to keep attendees engaged (Zoumenou et al., 2015a, 2015b) because of short attention spans, distractions, and the difficulty of reengaging an audience once participants lose focus

(Forest, 2012). In webinar formats, two phenomena are especially concerning: *death by PowerPoint*, coined in 2001 by Angela Garber, and *video call fatigue*, experienced by 40% of video call users in a 2021 Pew Research survey (McClain et al., 2021). Reports such as these suggest a need for innovative online programming that elevates the webinar experience.

Using ARS (e.g., student response systems, clickers) is one approach to reset attendees' attention and draw them back into the program. These platforms provide opportunities for participants to synchronously engage with other attendees without interrupting program facilitators. When used in face-to-face learning, ARS allow educators to project questions for all participants to view and respond to using a handheld tool provided by the instructor (historically) or a personal electronic device (with the rise of smartphone use). Traditional ARS require the purchase of a handheld clicker and often require the user to be in the same room as the person or computer projecting the questions. Newer ARS, such as Mentimeter (Iona, 2018; Rudolph, 2018), allow participants to answer questions using a personal electronic device by linking to a corresponding account or webpage.

Application and Benefits of ARS

While commonly used in undergraduate educational settings (Cavender & Gannon, 2019), ARS have potential in a variety of settings, including Extension education. Previous work highlights the success of ARS in agriculture-focused programming. Maine Cooperative Extension used ARS as a foundation for small-group discussion with blueberry farmers who reported feeling more engaged and enjoyed the interaction and critical thinking that clicker questions sparked (Smith et al., 2012). North Carolina Cooperative Extension used ARS during farmer pesticide training and noted similar outcomes between ARS and traditional education settings (LePrevost et al., 2021). The success of ARS in these settings suggests the modality may be effectively used with other Extension disciplines to strengthen programmatic delivery.

Benefits of the use of an ARS include increased attendance, attention, participation, engagement, peer interaction, discussion, learning performance, and learning quality (Forest, 2012). These platforms are also relatively easy to use and integrate into existing presentations, providing a helpful mechanism to reinforce content being presented (Salzer, 2018). Additional benefits include assessment of audience understanding and adaptation of teaching based on the feedback obtained through the ARS (Forest, 2012). These benefits could be especially helpful in Extension efforts to engage attendees more consistently through distance learning technology such as webinars and other online programming formats.

Mentimeter

The case studies presented in this article used Mentimeter (https://www.mentimeter.com), an ARS that allows participants to respond to questions and prompts in real time using a personal electronic device. Responses are displayed in aggregate for participants to view. This platform

has been successfully used in formal education settings to enhance engagement and learning outcomes (Bejda & Huff, 2022; Mayhew et al., 2020; Mohin et al., 2022). Unlike other ARS, Mentimeter does not require the audience to create accounts or enter their names, which keeps responses anonymous from fellow participants and instructors (provided no identifying information is included in the responses an individual shares). This makes Mentimeter well-suited for use in Extension programming, as participants do not need to create and maintain an account, and personal responses cannot be identified by Extension personnel.

Mentimeter provides a visual method of engaging participants with customizable polling options such as word clouds, scales, traffic lights, and more (Iona, 2018). The platform presents a mechanism for participation that may limit distractions during the presentation and increase the focus and engagement of participants. Posing questions not only allows participants to interact in a large group setting, but they can also provide time for participants to reflect on what they know or test their knowledge and serve as a transition to the next segment of the program.

Anonymity of Mentimeter

Polling responses in Mentimeter are retained anonymously, offering benefits to Extension professionals. The anonymity of Mentimeter can decrease barriers to participation in both in-person and virtual settings. Mentimeter has been used in sensitive topic discussions such as sexuality education (Bejda & Huff, 2022), economics (Lucey et al., 2021; Mayhew et al., 2020), and mental health (Sullivan et al., 2022). It has also been used to collect potentially sensitive data on relationships, suicidality, and sexual behaviors (Toscos et al., 2019). In these and other applications, the full anonymity provided by Mentimeter was reported as a key benefit (Bejda & Huff, 2022; Lucey et al., 2021; Mayhew et al., 2020; Van Daele et al., 2017). This anonymity aided in lowering barriers to participation, such as perceived lack of knowledge, fear of conflicting perspectives, or sharing confidential information.

The benefits of anonymity may be relevant to Extension educators who regularly facilitate discussions and conduct learning activities on similar topics. Extension personnel may experience additional challenges when discussing sensitive subject matter, including client misinformation, topic complexity, internal conflict, emotional responses, personal beliefs, politics, and religion, as they often take on the role of mediators when discussing or teaching about sensitive or potentially controversial topics (Leal et al., 2020). Research suggests these challenges can be minimized using ARS because of the anonymity provided, while still soliciting honest responses from participants (Cavender & Gannon, 2019).

Theory and Purpose for Two Case Studies

This research is a practice and pedagogy report that discusses the process and outcomes of informal teaching and learning in non-traditional settings. The presented case studies demonstrate the effectiveness of Mentimeter in improving participant engagement during virtual

Extension programming focused on distinct online book club topics within FCS Extension [i.e., *family finance* (Study 1) and *human nutrition* (Study 2)]. For each study, Mentimeter was chosen to increase real-time user engagement, participation, and discussion for larger online audiences. Both studies use Mentimeter to demonstrate achievement of session learning objectives; however, they take different approaches for program evaluation. The first case study demonstrates the impact, perceptions, and comfortability of participants using Mentimeter. The second case study showcases the use of Mentimeter as a tool to collect data at multiple time points for comparison and to show knowledge change over time with virtual programming.

To undergird both case studies, the authors used Robideau and Matthes' *Webinar Evaluation Rubric for Extension Teaching* (2021) as a conceptual foundation, which provides considerations for the planning, peer-review, and reflection phases of webinar programming. Robideau and Matthes detail seven components of webinar teaching deemed critical for Extension professionals to consider when delivering a high-quality webinar. Although all components of this rubric were considered in the development of the online book club sessions, Mentimeter specifically aided with four of the seven key components identified: technology, delivery, visual aids, and participant interaction. Table 1 details how Mentimeter was used in the presented studies to fulfill these components of the *Webinar Evaluation Rubric for Extension Teaching*.

Table 1. Mapping Mentimeter Use in Online Book Club Sessions Across Case Studies

Technology	Delivery	Visual Aids	Participant Interaction
An overview of Mentimeter is provided in detail at the beginning of each session. Options are provided for joining Mentimeter during sessions (e.g., QR codes, URL).	Mentimeter: (1) allows for changes in presentation modes during sessions, (2) provides reflection points for participants, and (3) provides transition points for presenters.	The design of Mentimeter questions is clear with minimal text. Various question types allow for the scaffolding of information during sessions.	Various question types support active learning approaches and provide interactive opportunities. Opportunities for participant engagement with questions are clearly defined during the sessions.

Methodology

Building upon the conceptual foundation provided by Robideau and Matthes (2021) and leveraging the known benefits and flexibility of an ARS like Mentimeter, University of Kentucky Family and Consumer Sciences (FCS) Extension implemented a virtual book club, titled the *Big Blue Book Club* (BBBC), featuring six books since 2020. Topics covered include mental health, substance use recovery, retirement planning, identity theft, and food and nutrition. For the current studies, two disciplines within FCS Extension are used to demonstrate the flexibility and applicability of Mentimeter in virtual learning sessions. The presented case studies showcase evaluation data from two different installments of the BBBC, for a total of 7 webinars,

with one focused on *Family Finance & Resource Management* (BBBC1) and the second focused on *Food & Nutrition* (BBBC2). For both installments, the respective book author joined the final session for a time of question and answer (Q&A) with the facilitator and the audience.

Attendance

All sessions for both book clubs were approximately 60 minutes in length and offered through Zoom webinars, limiting microphone and camera privileges for participants. In total, 159 overlapping attendees registered for both BBBC1 and BBBC2. Average attendance across webinars was $N = 105.57$ ($SD = 31.11$). Note, all webinars were also recorded for later viewing; however, the attendance data presented here is for synchronous webinar attendance only.

Mentimeter Integration

Mentimeter was selected for the book clubs to promote user engagement while providing educational content and to facilitate virtual, anonymous discussion around sensitive topics such as identity theft, credit reports, and personal dietary choices. Instructions on how to access Mentimeter were provided by the presenter, shown on the screen at the start of each session, and added to the webinar chat by a moderator. Participants could link to Mentimeter through a unique QR code or URL using their personal electronic device (e.g., computer, tablet, smartphone). Zoom chat features were available for users who wished to participate in the virtual discussions apart from Mentimeter, and relevant Extension professionals moderated the chat.

Book Club Design

By BBBC design, facilitators select non-fictional books that are interesting to the reader but are also educational. Each installment is led by a content-specific FCS Extension specialist whose role is to help participants unpack the text while finding ways to apply related research-based information to their financial or nutritional situations, as demonstrated by the presented case studies. Table 2 and Table 3 summarize book selections, learning outcomes for each session, and the scope of Mentimeter engagement in both book clubs.

Table 2. Sessions and Key Learning Outcomes Related to Mentimeter Engagement (BBBC1), The Less People Know About Us: A Mystery of Betrayal, Family Secrets, and Stolen Identity

Session	Session Topics	Learning Outcomes	Mentimeter Engagement
1	Family Dysfunction: Finances, Fraud, & Family Dynamics	• Examine generational dynamics within families • Compare healthy and unhealthy coping strategies • Identify financial red flags	16 Total • 1 Pinned Image • 7 Word Clouds • 4 Polls • 3 Open Ended • 1 Scale

Session	Session Topics	Learning Outcomes	Mentimeter Engagement
2	Financial Despair: Identity Theft, Credit, & Consumer Protection	• Identify warning signs of fraud, scams, identity theft • Develop strategies to reduce identity theft • Discover ways to improve credit scores	11 Total • 7 Open Ended • 2 Polls • 1 Word Cloud • 1 This or That
3	Financial Discoveries: Concluding Thoughts	• Q&A with Author	Mentimeter not used

Table 3. Sessions and Key Learning Outcomes Related to Mentimeter Engagement (BBBC2), Is Butter a Carb?: Unpicking Fact from Fiction in the World of Nutrition

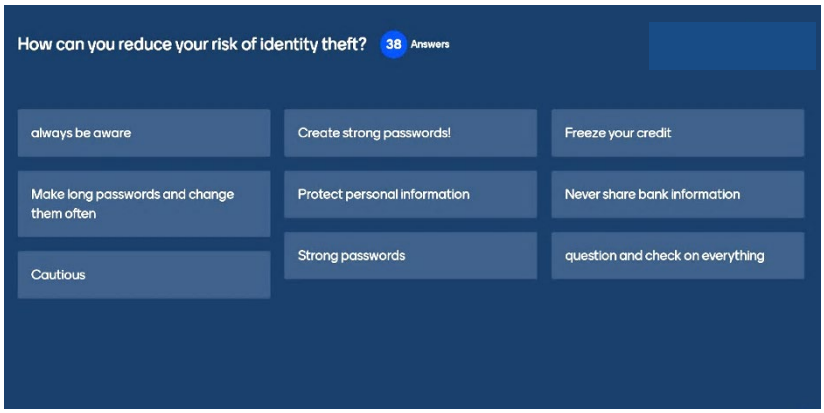
Session	Session Topics	Learning Outcomes	Mentimeter Engagement
1	Harm of Nutrition Misinformation, Calories, & Fats	• Explain spectrum of harm that can occur when led by nutrition misinformation • Discuss importance of nutrient quality rather than focus on calories in food • Identify ways to prioritize unsaturated fats in the diet	12 Total • 1 Pinned Image • 1 Word Cloud • 3 Scales • 5 Polls • 1 Traffic Light • 1 Open Ended
2	Carbohydrates, Sugar, Protein, Micronutrients, & Supplements	• Identify ways to add high-quality carbohydrates and fiber into the diet • List benefits of diversifying protein sources in the diet • Explain why choosing a variety of foods over time is preferred to supplements	13 Total • 5 Polls • 2 Open Ended • 4 Scales • 1 Guess the Number • 1 Ranking
3	Balanced Eating, Plant-based Eating, Supporting a Healthy Gut, Food Allergies & Intolerances	• Discuss components of balanced eating • Identify ways to include more plant-based foods • Describe similarities of supporting a healthy gut with balanced eating	11 Total • 3 Open Ended • 1 Spin the Wheel • 5 Polls • 1 Scale • 1 Guess the Number
4	Diet Culture, Weight Stigma, Nutrition Fads, Exploring Evidence Q&A with Author	• Explain physical & mental impacts of weight stigma • Define diet culture & how it impacts our daily lives • Identify red flags associated with nutrition misinformation	3 Total • 1 Word Cloud • 1 Scale • 1 Open Ended

Education and Engagement

When designing the webinars, the Extension specialists were intentional in incorporating Mentimeter questions that promoted or measured gains in participant knowledge, confidence, or intended behavior changes. Audience polling was followed by educational content to reinforce learning concepts. To illustrate this, in BBBC1 Session 2, one learning objective was to develop strategies to reduce identity theft. Using the open-ended function of Mentimeter, participants were asked, *"How can you reduce your risk of identity theft?"* (see Figure 1). Thirty-eight responses were submitted, which continuously looped on the screen as participants typed. Panel (A) offers a still-shot sample of this question-and-response sequence. The facilitator read aloud the responses as they appeared in real time. After polling, the facilitator discussed ways to reduce the risk of identity theft using Kentucky Extension educational materials, as shown in Panel (B).

Figure 1. Example of Using Mentimeter as an Educational Prompt

(A)



(B)

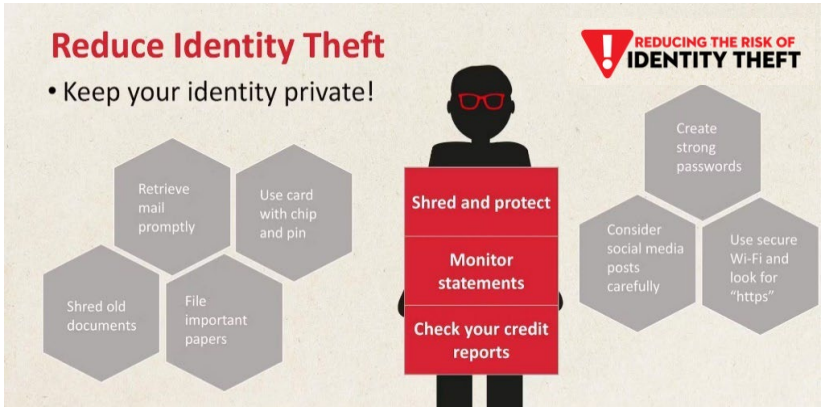
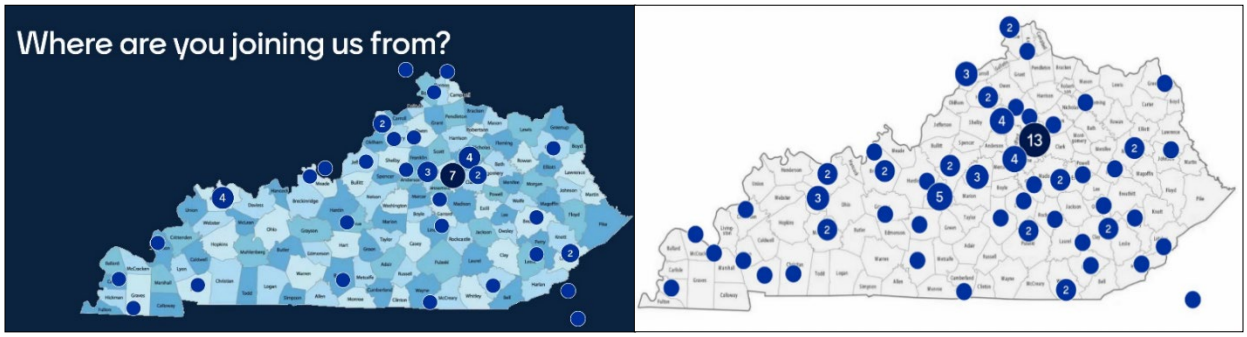


Figure 2 shows a state-level map where participants identified their location in real time using Mentimeter to show the reach of virtual programming. Using the pinned image function in Mentimeter, both installments of BBBC used an interactive Kentucky state map during their first session to introduce participants to the interactive features of Mentimeter and to demonstrate the scope of audience participation in the book clubs.

Figure 2. Example of Using Mentimeter to Demonstrate Participant Reach



BBBC1 *N* = 48 responses **BBBC2 *N* = 90 responses**

Methodological Differences Between Case Studies

Although a similar framework was used for both installments of BBBC, there were distinctions between the two book clubs. The number of sessions correlated with the book chapters/sections in each book, and the times they were offered were determined by external factors such as book author schedules, facilitator schedules, and accommodating participants in multiple time zones across the state. Both case studies received exempt status from the Institutional Review Board at the University of Kentucky.

Case Study One

A 3-week installment of the BBBC was held virtually in April 2022 featuring the book, *The Less People Know About Us: A Mystery of Betrayal, Family Secrets, and Stolen Identity* by Axton Betz-Hamilton (2019). The series was led by the state Extension Specialist for Family Finance & Resource Management with a focus on identity theft, financial fraud, and consumer protection. Each session focused on one of the three distinct sections of the book. Mentimeter was used during the first two sessions of the series but was not used during the final session to allow adequate time for audience interaction with the author. Prior to Sessions One and Two, participants were instructed via email to have available a personal computing device (e.g., computer, smart phone, tablet) for in-session polling, if desired.

Program attendees were invited to complete an online evaluation survey through Qualtrics XM (Qualtrics, Provo, Utah, USA) after each session to measure progress towards learning objectives, intended behavior changes, and their experience with the teaching tool Mentimeter. Average attendance across sessions was $N = 80.33$ ($SD = 15.95$). Demographic data were

collected in each evaluation survey. All respondents self-identified as female and represented 54 Kentucky counties. Table 4 presents additional demographic data in BBBC1.

Table 4. Synchronous Demographic Data Reported Across BBBC1 Session Evaluations

		Evaluations submitted				
	Total attendees	***n (% of attendees)***	***White***	***Black***	***Age 66-74***	***Age 56-65***
Session One	98	73 (74.5%)	91.8%	5.5%	34.3%	30.1%
Session Two	76	35 (46.1%)	97.1%	2.9%	34.3%	28.6%
Session Three	67	63 (94.0%)	90.5%	7.9%	28.6%	34.9%

Descriptive statistics and response frequencies were calculated using Qualtrics XM (Qualtrics, Provo, Utah, USA) and SPSS (IBM Corp. Released 2022. IBM SPSS Statistics for Windows, Version 29. Armonk, NY). Thematic patterns were also identified from open-ended response questions across sessions.

Case Study Two

A four-week installment of the BBBC was held virtually in March 2023 featuring the book, *Is Butter a Carb?: Unpicking Fact from Fiction in the World of Nutrition* by Rosie Saunt and Helen West (2019). The series was led by the state Extension Specialist for Food & Nutrition with a focus on nutrition literacy and the ability to understand and apply nutrition information to address overall health. Each session covered multiple chapters from the book. Mentimeter was used during all four sessions of this series, including the final session with the author Q&A. No demographic data were collected using Mentimeter during sessions; however, the number of respondents was captured for each question and is reported when appropriate.

Using Mentimeter, participants were asked to indicate their change in understanding of specific nutrition topics after reading a specific chapter in the book. Responses were measured with a five-point Likert scale; however, categories were collapsed into three categories (none, a little/somewhat, and quite a bit/a great deal). Confidence questions were asked at the beginning of Session 1 and again at the conclusion of Session 4. Again, responses were measured on a five-point Likert scale, with 1 representing strongly disagree to 5 being strongly agree. Finally, two Word Clouds generated in Mentimeter with the same question were prompted at the beginning of Session 1 and the conclusion of Session 4.

Descriptive statistics and response frequencies were calculated. Responses were analyzed using Microsoft Excel (Microsoft 365, 2021). Statistical comparison of change as a result of the online book club was not feasible because of the anonymity of the sample and respondents potentially being different at the two time points.

Results

Case Study One

Following BBBC1-Session One, participants who submitted an evaluation ($N = 73$) were asked about their prior experience with Mentimeter. A majority (77.1%) indicated first-time use with the application. Participants also indicated whether Mentimeter aided them in feeling more *comfortable* sharing their opinions with the group, as well as whether Mentimeter helped them feel *engaged* in the discussion. Both questions were measured on a 3-point scale (yes, somewhat, no). Most participants indicated that Mentimeter helped them to feel more comfortable (71.6% yes; 16.4% somewhat) and engaged (73.5% yes; 17.7% somewhat) during the book club.

Participants were also asked to rate Mentimeter's *ease of use*, as measured on a five-point Likert scale, with 1 representing extremely difficult and 5 being extremely easy; however, categories were collapsed into easy, neutral, and difficult. The *ease-of-use* score was $M = 4.37$ ($SD = 1.05$).

Following BBBC1-Session Two, participants were asked to rate their agreement with three statements about Mentimeter. No participants reported disagreement with the statements; thus, only agreement and neutrality are presented in Table 5.

Table 5. Participant Agreement with Mentimeter Statements after BBBC1 Session

Using Mentimeter during the virtual discussion allowed me to...	**Agree** ***n (%)***	**Neutral** ***n (%)***
Stay engaged in the discussion	27 (81.8%)	6 (18.2%)
Express my opinions in a large group	26 (78.8%)	7 (21.2%)
Share information anonymously	27 (81.8%)	6 (18.2%)

Note. $N = 33$ evaluation responses.

Participants were also given the option to provide open-ended feedback about Mentimeter and the book club overall across the sessions. Of the emergent response patterns, two positive themes (*management* and *engagement*) and one negative theme (*distraction*) were identified specifically related to the use of Mentimeter in the book club discussions, as detailed below.

Management

Participants commented on the positive presentation of the material, the organization of the session and discussion, and the way Mentimeter helped manage and facilitate discussion. One participant responded, *"It was my first time participating in any book club. I really enjoyed the book, participating with a group, and the way the Zoom was presented. I plan to do another one."* Another added regarding Mentimeter, *"It was the only way to manage this many readers."*

Engagement

Respondents also noted that Mentimeter made it easier to follow along with and participate in the discussion. One participant commented that they enjoyed *"the new interaction tool,"* highlighting the interactive element of Mentimeter. Another echoed, *"I liked the way it was presented and especially think the use of menti.com is a great way to be interactive."*

Distraction

Not all open-ended responses regarding Mentimeter were positive; although it is of note that only two responses were negative across all three session evaluations. Specifically, two participants commented that the spinning motion of the Word Cloud question in Mentimeter was distracting and/or dizzying.

In addition to participants' experience with Mentimeter, BBBC1 evaluation data was captured to measure progress towards learning objectives and intended behavior changes as a result of participating in the book club (see Table 6). Of Session Two participants, 97% indicated they understood factors to consider when using credit wisely; 85% indicated they increased their knowledge of identity theft and consumer protection; and 85% feel more confident in their general knowledge related to financial management. Regarding intended behavior changes, 87% of Session Three participants indicated they planned to check their credit report as a result of participating in the book club, and 92% plan to take better steps to protect themselves from fraud and identity theft.

Table 6. Changes in Understanding Reported during BBBC1

	Session 2 *N* Session 3 *N*	**Agree** ***n (%)***	**Neutral** ***n (%)***	**Disagree** ***n (%)***
I gained new knowledge /skills about the financial topics presented.	34 61	31 (91.2%) 58 (95.1%)	3 (8.8%) 3 (4.9%)	0 (0.0%) 0 (0.0%)
I am likely to apply the new knowledge/skills I gained.	35 63	28 (80.0%) 60 (95.2%)	7 (20.0%) 3 (4.8%)	0 (0.0%) 0 (0.0%)
I discussed the reading/ topic with someone outside of the book club.	34 61	29 (85.3%) 54 (88.5%)	3 (8.8%) 2 (3.3%)	2 (5.9%) 5 (8.2%)

Case Study Two

Almost all participants reported gains in knowledge related to key chapter content (see Table 7). The greatest gains in knowledge, as demonstrated by scale questions in Mentimeter during the online book club sessions, were related to fats (69%), carbohydrates (66%), and micronutrients and supplements (72%).

Table 7. Changes in Understanding Captured by Mentimeter during BBBC2

	N	None *n (%)*	A little/Somewhat *n (%)*	Quite a bit/A great deal *n (%)*
Calories	77	4 (5%)	32 (42%)	41 (53%)
Fats	64	2 (3%)	18 (28%)	44 (69%)
Carbohydrates	59	1 (2%)	19 (32%)	39 (66%)
Sugar	54	1 (2%)	25 (46%)	28 (52%)
Protein	51	2 (4%)	34 (67%)	15 (29%)
Micronutrients & supplements	47	0 (0%)	13 (28%)	34 (72%)
Balanced eating	36	2 (6%)	15 (42%)	19 (52%)

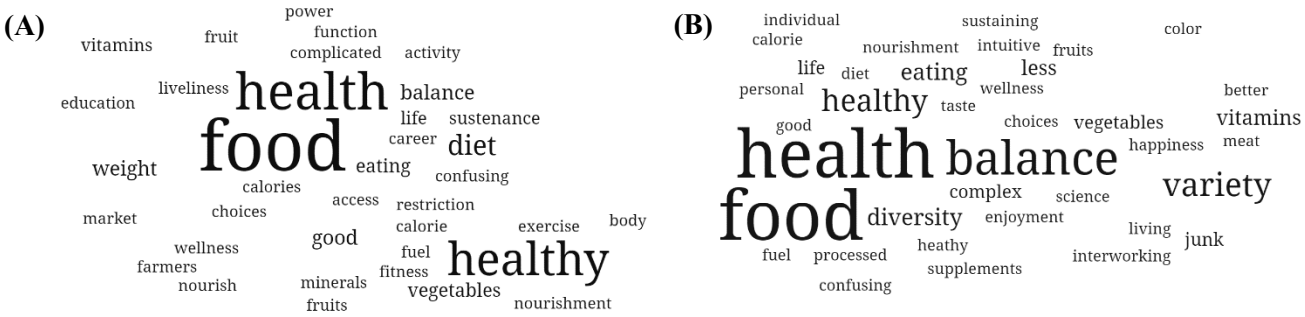
Participants were asked to rate their confidence related to nutrition on a scale from 1 (strongly disagree) to 5 (strongly agree) at the beginning of Session 1 and at the end of Session 4 (see Table 8 for mean responses). At both time points, participants self-reported that nutrition was highly important. However, there were increases in confidence related to making food and nutrition choices and feeling confident in determining if nutrition information is fact or fiction.

Table 8. Changes in Confidence Between Session 1 & Session 4 Captured by Mentimeter

	Session 1 (*N* = 89)	**Session 4 (*N* = 48)**
Nutrition is important to me.	4.61	4.73
I feel confident making food and nutrition choices.	3.60	4.27
I feel confident knowing if nutrition information is fact or fiction.	3.38	4.32

Using the word cloud function in Mentimeter, the prompt, *"When you hear the word "nutrition," what is ONE word that comes to mind?"* was used at the beginning of Session 1 and at the end of Session 4 to capture changes in the perception of nutrition in a unique qualitative format. At the beginning of Session 1, 145 submissions, including 38 unique words, were submitted with the following most frequently cited: food (39), health (26), healthy (22), diet (9), and balance (4) (see Figure 3). At the end of Session 4, 121 words were submitted, representing 40 unique words, with a shift in the five most frequently mentioned: food (23), health (22), balance (14), variety (8), healthy (7). Further, 18 words (e.g., complex, enjoyment, happiness, intuitive) were cited at the end of Session 4 that were not included in the first session. Finally, the word "weight" was not mentioned once at the end of Session 4, which represents a clear shift in thinking about food and nutrition (see Figure 3). Panel (A) represents the word cloud generated from the beginning of Session 1 and Panel (B) represents the word cloud generated at the end of Session 4 using the same prompt in Mentimeter.

Figure 3. Sample Word Clouds Created in Mentimeter



Discussion

Previously documented applications of Mentimeter in Extension education have been limited. However, Mentimeter has the potential to address concerns regarding engagement and technology use in Extension, as mentioned by Jernigan et al. (2015), Lubell and McRoberts (2018), and Narine and Meier (2020). The anonymity and comfort provided by Mentimeter can help facilitate a more honest discussion in both online and in-person programming, especially when discussing sensitive topics (e.g., Lucey et al., 2021; Mayhew et al., 2020). Participants in the current studies largely reported that Mentimeter helped them feel engaged in the program, echoing previous research on Mentimeter and other ARS (Mayhew et al., 2020). Mentimeter could be used in future programs to engage an audience and allow them to interact, regardless of whether the program is delivered in-person or virtually.

In the current virtual delivery settings, Mentimeter may have been a new engagement method for participants. As with any new technology, adequate training would be needed for Extension personnel to improve comfortability and skill (Cummings et al., 2015; O'Neill et al., 2011). Allen et al. (2014) detail their experience holding a single-day training for Extension personnel on social media use. A similar strategy could be used to introduce Extension personnel to Mentimeter or a comparable ARS, including pedagogy on how to create more engaging educational presentations using technology to facilitate and/or promote discussion.

The variety of question types available through Mentimeter, as used in the current studies, allows instructors to engage their audience in different ways, such as meeting the needs of diverse learners. Customizing questions to different learning styles allows more participants to engage with the presentation, whether by answering quiz-style questions or sharing their opinion through anonymous open-ended questions. The question types available also allow for both quantitative and qualitative data to be collected from the same sample. As demonstrated through the BBBC installments, using a mix of question types in the same presentation — such as scale questions and word clouds — allows a wide range of data to be collected through audience participation.

Further, as highlighted in BBBC2, Mentimeter can be used to collect data that capture real-time changes in participant understanding and confidence during programming.

Limitations

The case studies presented here were conducted using evaluation data from two online Cooperative Extension programs in Kentucky. Participants who attended the online program(s) may have demonstrated self-selection bias and exhibit more positive attitudes towards technology than those who chose not to attend. For example, their existing attitudes towards technology use (e.g., choosing to participate in one or more virtual book clubs) could have impacted their perceptions of Mentimeter's ease of use. Further, social desirability bias may have contributed to improvements in knowledge and confidence knowing that responses would be viewed by all participants and that instructors would hope to see changes, even though submitted answers were anonymous. The authors also recognize digital inequality exists in some rural and low-income settings, which may limit engagement in virtual programming (Office of Policy Development and Research, 2016). Research should examine the application of Mentimeter and other ARS in a variety of Extension-based contexts such as online programming, in-person programming, and Extension personnel training with consideration of these limitations.

Lessons Learned and Practical Application

For others looking to leverage Mentimeter in virtual learning environments, several important considerations were identified during these studies. Lessons learned are outlined below.

- Zoom now has a Mentimeter application that lets the host run a Mentimeter presentation using Zoom. This feature allows participants to directly answer questions using Zoom, which may reduce the burden on participants to respond from a separate personal electronic device (or through another window on the device viewing the online program).

- While Mentimeter is user-friendly overall, well-curated presentations require ample preparation time to build out content and explore creative question formats and overall program design. Using this type of ARS requires educators to intentionally map out polling questions and integrate them into the educational narrative of the presentation. The time required to do this effectively should not be underestimated.

- Because polling responses can be retained, the use of Mentimeter as an evaluation tool should also be explored. Studies are limited examining the potential use of Mentimeter for data collection and program evaluation. However, Mentimeter functions provide quantitative and qualitative data collection methods that could align with evaluation tools routinely used to evaluate, assess, and report on Extension programming.

- The use of novel technology-based platforms like Mentimeter will take time and patience for professionals and participants to adopt. In addition to personnel training, professionals should consider appropriate user training or slow integration of technology into Extension programs to reduce the adoption burden on participants. Placing emphasis on technology training for professionals and participants helps to ensure that Extension agents are comfortable in adopting platforms like Mentimeter, particularly in educational settings (e.g., Allen et al., 2014; Beattie, 2021).

Conclusion

Although Extension programming has largely returned to in-person delivery after the COVID-19 pandemic, Kentucky FCS Extension has continued the virtual BBBC due to its success, with the next installment slated for Spring 2024. The online platform, Mentimeter, shows potential as a teaching tool to increase engagement in online Extension programming for various audiences. While further research is needed to determine the effectiveness of its application and establish best practices for use, Extension educators should consider exploring this tool in a variety of settings across practice disciplines.

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Leveraging a Team Approach for Emergency Preparedness in Georgia

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This project cultivated a foundational level of training that will grow as an integral part of the University of Georgia Cooperative Extension's organizational commitment to provide systemic readiness in support of the emergency response. The development of four geographically dispersed, specially trained small teams within the University of Georgia Extension System built capacity for readiness, response, and recovery to natural disasters and local emergencies. These teams help facilitate a timely and skilled response to the needs of employees and stakeholders before, during, and after natural disasters and local emergency events. Specialized training continues to be provided to all team members.

Keyword: emergency preparedness, small teams, recovery

Introduction

The probability of emergencies impacting the United States has increased over the past decade (National Oceanic and Atmospheric Administration [NOAA], 2023). Emergencies are divided into two categories: natural disasters and human-made disasters (Seddighi, 2020). Examples of natural disasters include hurricanes, tornados, illnesses, and floods (Seddighi, 2020), while human-made disasters include terrorist activities, nuclear disasters, and train derailments. During and immediately following a disaster, emergencies can cause mass destruction of property, illness, injury, and displacement. Long term, these can cause significant and costly agricultural damage, chronic health conditions, and major interruptions of supply and logistics chains.

Emergencies can devastate economic impact on individuals and organizations within rural and urban communities (Koundinya et al., 2020). In 2022, NOAA (2023) reported that the total cost of natural disasters was over $165 billion, making that the third most costly year after 2005 and 2017. Though the full cost of the COVID-19 pandemic is unknown, the International Monetary Fund (2021) reported that the United States had spent 28% of its gross domestic product on fiscal responses to the crisis, with an anticipated cost to the global economy of $13.8 trillion by 2024 (Gopinath, 2022).

Located in the southeastern United States, Georgia is susceptible to many types of natural disasters, including tropical storms, floods, tornadoes, winter storms, drought, heat, and forest

fires (Georgia Emergency Management and Homeland Security Agency [GEMA/HS], 2023; Marine Extension and Georgia Sea Grant, 2020), as well as human and animal illnesses. Poultry accounts for almost 40% of the state's agricultural economy, contributing significantly to national and global markets (University of Georgia Center for Agribusiness, 2021). The 2014–2015 avian influenza outbreak throughout the poultry industry cost the United States $850 million in response activities and indemnity payments, with total costs exceeding $3.3 billion when accounting for restocking fees and future production losses (Ramos et al., 2017). In 2018, Hurricane Michael tore a devastating path from the Florida panhandle through southwest and central Georgia, destroying generational farms, crops, and infrastructure and causing more the $4.7 billion in damages and a $2.5 billion loss to agriculture (Georgia Department of Agriculture, 2020).

In many states, Cooperative Extension faculty and staff may be called on to aid in disaster response. According to the Extension Disaster Education Network (EDEN, 2023) website, Extension members have created resources in four main topic areas: agricultural and zoonotic, community and economic, family and heath, and naturally occurring emergencies. Trainings are offered through the network to help Extension personnel assist communities share resources in preparation and recovery from disasters (Washburn et al., 2010).

Further, Extension nationwide is often called on by local, state and federal organizations to health in emergency response. This has prompted several states to develop comprehensive programs to help communities prepare for emergencies. Below are a few examples:

- Mississippi State University Extension created the MyPI program, an award-winning national program for youth emergency preparedness and leadership (MyPI, 2023). The program is now taught in 27 states and 3 territories.
- The University of Florida Institute of Food and Agricultural Science provides drone training and certification preparation for Extension agents to facilitate agricultural damage assessment caused by disasters (Krimsky, 2017)
- Purdue Extension developed the Purdue Rural Emergency Preparedness program (IN-PREP) to help rural communities and first responders to partner for emergencies and disasters (2023).

These programs and others have been recognized by state and national partners for their success in community emergency preparedness (Kerr et al., 2018; MyPI, 2023; Ready.gov, 2023). However, assisting in and helping to lead emergency response can impact Extension personnel. While it is common for victims of disasters to experience mental health impacts (Substance Abuse and Mental Health Services Administration, 2022), caregivers and first responders may also experience disaster-related distress, especially in juggling their professional and personal needs. Post-storm situational analysis and feedback from Extension agents have revealed widespread concerns (Ali et al., 2020) about insufficient training and preparation for emergency

response, particularly around understanding the role Extension personnel should play in local, regional, and statewide disaster response, recovery, and preparedness.

The increase in the overall number and severity of emergencies, coupled with the need to better prepare Extension faculty and staff in emergency response, led the University of Georgia Extension to apply for and receive a USDA NIFA Smith-Lever Special Projects Grant (2021–2022). The grant increased internal capacity, strengthened external relationships for emergency preparedness/response, and developed continuity of operations plans (COOPs) for each county Extension office (157 of the state's 159 counties have offices) in Georgia. This article describes the process undertaken to build internal capacity using a small-teams approach to emergency response at the local level with 30 selectively recruited Extension agents from across the state.

Background

The Smith-Lever Special Projects Grant established three goals for Georgia Extension: (a) develop internal capacity for emergency response, (b) strengthen external relationships with partners and other organizations for emergency response, and (c) develop COOPs as blueprints for disaster response. Understanding the importance and urgent need for better-informed and timely emergency response, the Extension administration supported this project and committed to self-funding should the grant not be awarded.

The project directors and administrative leadership developed four regional, interdisciplinary teams aligning with the state Extension districts. The teams are comprised of one team leader, one backup or co-leader, and members from the three program areas: agriculture and natural resources (ANR), family and consumer sciences (FACS), and 4-H. Members and leaders were identified in consultation with district administrators based on their interest and expertise in emergency management. For example, team members include Army Reservists, volunteer first responders, former military members, and current response team members for Georgia counties. Members were invited to participate by their supervisors and program leaders. Team membership follows a 3-year cycle, with ongoing training occurring throughout the cycle and the third year centering on onboarding new members.

Planning and training development began in April 2021 among the project leaders, which include an agricultural climatologist, food safety and home emergency expert, a local member of a large coastal emergency response team, a former State of Virginia Extension emergency response leader, and two public health experts. An ANR agent and former military member who was heavily involved in responding to Hurricane Michael provided crucial guidance, sharing his observations and suggestions for how to prepare Extension employees for future emergencies, including an emphasis on what happens and what is needed in the first 72 hours after an emergency. To prepare team members for emergency response, the project leaders provided a 3-day intensive training on the preparation, action, and recovery phases of emergency response, followed by quarterly professional development opportunities.

3-Day Training

Pre-work was assigned to the small-team members to prepare them for the 3-day in-person training held at the Rock Eagle 4-H Center. A 2-hour virtual "setting the stage" kickoff training orientation—which is part of the Federal Emergency Management Agency's (FEMA, 2023b) Incident Command System (ICS) 100—was conducted a week prior to the in-person workshop. Due to the all-encompassing nature of the emergency response, each of the 3 days focused on a different phase of response: preparation, action, and recovery. The training began with a real-life scenario of a past emergency (aka, tabletop activity). District teams were instructed to answer questions about what they would do and what decisions they would make leading up to an actual emergency.

After a debrief, or "hot-wash," a partner panel was held with representatives from Georgia's Emergency Management Agency and Homeland Security (GEMA/HS), the Georgia Department of Behavioral Health and Developmental Disabilities (DBHDD), the Georgia Department of Public Health (DPH), and the Georgia Department of Agriculture (GDA). Panelists representing these agency partners were asked to discuss their agency's roles in emergency response and their vision of how the project leadership integrated partners from state agencies into the training sessions. The first day closed with introducing the COOP template and team meetings on completing each section.

Day 2 focused on both the preparation and action phases of emergency response. The morning centered on the first 72 hours of response/action, and the afternoon consisted of two rounds of breakout sessions. Topics were selected based on common issues and needs of Georgia residents during emergencies. These included:

- household cleanup after emergencies,
- emergency preparedness for families,
- food safety issues during power outages, and
- well water testing and remediation.

Each small team was instructed to provide at least two members per training topic/class session to account for team attrition. The second day closed with additional time for work on the COOPs.

Day 3 focused on the recovery phase of emergency response and included a wrap-up of information provided during the entire training. This included a session on mental health and well-being for Extension first responders taught by the University of Florida and a partner from the Department of Behavioral Health and Developmental Disabilities. A session on economic assessment of disaster damage was taught as a second tabletop activity, and there was time built in for the district teams to meet.

Ongoing and Quarterly Training Activities

After completing the 3-day training, quarterly training opportunities were offered for team members and, in some cases, non-team members to increase their knowledge of and confidence in emergency response. The following training sessions were offered:

- Heirs' property training—This term refers to the transfer of physical real estate among family members over the course of generations without appropriate legal documentation (Bailey et al., 2019). The lack of legal documentation can prevent families from accessing relief if disasters happen. The session discussed what heirs' property is, how the situation is created, its impact on families, and ways to avoid it from happening.
- COOP training in the Extension districts for county Extension coordinators on what a COOP is and how to create one for their counties.
- Community emergency response training (CERT) for community members to provide basic knowledge and skills training around the fire, light search and rescue, team organization, and disaster medical operations. Each district hosted its own training.
- Drone training for economic assessment, a 2-day training covering the basics of drone operation and how to capture the information needed for economic assessment.
- A webinar on household cleanup after disasters, including resources and information about safely cleaning one's home after a natural disaster and safe sheltering during a health emergency.

Additionally, there were activities with state and local partners. Each district identified a local partner to facilitate the CERT training (FEMA, 2023a) for team members. Conversations about current and future collaborations with state agencies were ongoing to identify ways the different organizations and Extension could leverage expertise for future work. Partners were consulted in the development and/or refinement of many COOPs to ensure the accuracy and viability of plans.

Evaluation Activities

A process evaluation was conducted throughout the 3-day training to determine whether people were becoming more comfortable with the material. Participants provided evaluations at three points during the training: before the start of the training, midway on Day 2, and after completion on Day 3.

To assess changes in a person's knowledge, skills, and confidence before and after the 3-day training, separate pre/post-surveys were developed. The same 5-point Likert scales were used for both the pretests and posttests. For knowledge, the scale points ranged from 1 = *no knowledge* to 5 = *extremely knowledgeable*; for skills, the scale points ranged from 1 = *strongly disagree* to 5 = *strongly agree*; and for confidence, 1 = *no confidence* to 5 = *extremely confident*. Session

evaluations were provided for each of the breakout sessions to determine knowledge and skill gain in these areas. Three evaluation questions were created to measure the project's progress in members' perceived confidence in and capability of responding to an emergency, their team's ability to respond to an emergency, and their confidence in helping colleagues create a COOP. These questions were asked at three periods: before the 3-day training, after the 3-day training, and at the project's close. Participants were also asked about additional training opportunities they desired; responses were used to plan quarterly activities.

To assess the CERT training, the team created post-retrospective knowledge and confidence questions based on FEMA's standards for the training. Members completed post-retrospective surveys to assess perceived changes resulting from participating in the internal quarterly training sessions. The same Likert scales were used as appropriate. One exception to this process was the household cleanup session, since this was offered by an external agency, limiting the ability to gather data. Because not all members participated in each training, the three "global" evaluation questions were not included. COOPs were developed and reviewed by the administration to ensure they met minimum requirements. An end-of-project survey asked people to indicate their knowledge, skills, and confidence around emergency response. Finally, team members were asked what additional training sessions they would like and to share their vision of how the teams would operate within the county, district, and state moving forward.

Results

The surveys measured knowledge, skills, and confidence related to the respondents' ability to respond to a natural disaster before and after the 3-day training, before and after quarterly training sessions, and at the end of the project. Approximately half of the questions were asked across all three time-points for all attendees, since the topics were addressed multiple times during the project. Table 1 shows the pre, post, and follow-up responses (as appropriate) for the 3-day training.

Table 1. Extension Professionals' Knowledge, Skills, and Confidence Regarding Emergency Preparedness Before the 3-Day Training, After the Training, and at the End of the Grant

Statement	Before (n = 29)	After (n = 28)	End (n = 17)
Personal Knowledge (Knowledge Scale)			
Extensions' role in emergency preparedness response	2.63	3.89	NA
Basic knowledge of a continuity of operations plan	2.07	3.93	NA
The ability to identify county or district resources to include in a continuity of operations plan	1.96	3.96	NA
The ability to prepare my community for an emergency and/or natural disaster	2.44	3.93	NA
To access the resources needed to respond to an emergency and/or natural disaster	2.37	3.96	NA

Statement	Before (n = 29)	After (n = 28)	End (n = 17)
To access resources to care for my mental health and well-being	2.78	4.07	NA
Mean	2.38	3.96	NA
Familiarity with Team and University Processes (Agreement Scale)			
Understand the decision-making process on when and how my district crisis team will be activated	3.22	4.26	4.24
Familiar with the roles of state partners in emergency preparedness and natural disaster response	2.96	4.40	4.39
Understand how other agencies will collaborate with Extension when responding to an emergency or natural disaster	2.92	4.37	4.28
Understands the role in the three stages of emergency preparedness and disaster response: preparation, action, and recovery	2.81	4.37	4.33
Ability to respond in the first 72 hours of an emergency and/or natural disaster	2.92	4.33	4.28
Understand how mental health and well-being can be impacted as an Extension first responder	3.48	4.55	NA
Mean	3.05	4.38	4.30
Confidence and Capability to Respond (Confidence and Agreement Scales)			
Apply knowledge and skills to respond to an emergency	2.56	3.63	3.94
Apply knowledge and skills to help my district offices create a COOP	2.19	3.74	4.06
District crisis team has the capability to respond to an emergency and/or natural disaster	2.85	4.07	3.94
Total	2.53	3.81	3.98

Personal Knowledge

The respondents' mean level of knowledge was 2.38 (*a little knowledgeable*) before the 3-day training and 3.96 (*very knowledgeable*) after the training. No questions were repeated on future surveys as these were topical based on the goals of the first training. The greatest increase in knowledge was seen in a person's ability to identify resources for a COOP (from 1.96 to 3.96).

Familiarity with Team and University Procedures

The respondents' mean score related to procedural familiarity prior to the 3-day training was 3.05 (*neither agree nor disagree*). All measures increased after the training to an average of 4.38 (*agree* to *strongly agree*). There was a slight decline at the end of the grant period, with a mean score of 4.30 for the five questions that were repeated. The greatest increase from pre- to post-training pertained to understanding Extension's role in disaster response (from 2.81 to 4.37). The

largest decrease from post-training to the end of the project related to understanding how other agencies would collaborate with Extension during an emergency.

Confidence

Training knowledge ranged between 2 and 4. The data indicated that respondents were satisfied with their ability to prepare for an emergency and/or natural disaster. The district teams showed an increase in knowledge regarding topics around emergency preparedness and/or natural disasters, but the results did suggest some room for improvement. A common theme that emerged from the pre- and post-training evaluations centered on respondents' need to divide the teams based on their Extension content area. For example, one respondent stated,

> I would have broken the sessions up by each Extension group (Family and Consumer Sciences, Agriculture and Natural Resources, 4-H), so they could gain more clarity about what their roles are as a group. Then brought back everyone so they can share their thoughts.

CERT Training

Table 2 shows the changes in participants' knowledge and confidence related to the CERT training.

Table 2. Participant Knowledge of and Confidence in CERT Training Procedures Before and After Training

Statement	Pre (n = 14)	Post (n = 14)
Knowledge		
Recognize life-threatening conditions and apply appropriate life-saving techniques	2.07	3.79
How to conduct patient head-to-toe assessments	1.92	3.62
Employ basic treatment for injuries	2.43	3.79
Disaster medical operations	1.79	3.64
Procedures in a post-disaster emotional environment and the steps that can be taken to relieve stressors	2.07	3.79
Current terrorism trends and measures CERT volunteers can take to increase preparedness before and safety during a terrorism event	1.93	3.71
Mean	2.04	3.72
Confidence		
Take steps to prepare yourself, your family, and your community for a disaster	2.57	4.21
Use the function and organization of a CERT program and the role CERTS serve in immediate disaster response	2.29	3.86
Identify and reduce potential fire hazards	2.21	4.00

Statement	Pre (n = 14)	Post (n = 14)
Perform basic fire suppression strategies and safety measures	2.14	4.14
Use the most common techniques associated with light search and rescue operations	2.00	4.00
Mean	2.24	4.04

Participants experienced increases in both knowledge and confidence in community emergency response training components. The average pretest knowledge was 2.04 (*a little knowledgeable*), which increased to 3.72 (*somewhat* to *very knowledgeable*). The largest increase in knowledge was related to how to implement disaster medical operations (1.85), while the lowest increase was related to knowledge about how to employ basic treatment for injuries (1.36).

Heirs' Property

Table 3 shows the changes in participants' knowledge and skills related to heirs' property.

Table 3. Participants' Heirs' Property Knowledge and Perceived Skills Before and After a Training

Statement	Pre (n = 11)	Post (n = 11)
I can explain the cause of the heirs' property.	2.36	4.00
I can describe how heirs' property can be impacted by natural disasters.	2.00	4.09
I can locate appropriate resources to help people address heirs' property issues.	2.27	4.09
Mean	2.21	4.06

The average pretest score was 2.21, which increased to an average posttest score of 4.06. The greatest increase was related to participants' knowledge of how natural disasters can impact heirs' property. The lowest increase was related to the cause of heirs' property issues.

Drone Training

Table 4 shows the changes in participants' knowledge, skills, and confidence around operating drones for a disaster assessment.

Table 4. Participant Knowledge, Skills, and Confidence Before and After a Drone Training

Statement	Pre (n = 13)	Post (n = 13)
Knowledge		
I can identify the three different sectors of a drone operator.	1.27	3.67
I can explain the rules and regulations for operating a drone.	1.17	3.67

I am familiar with the certification eligibility requirements of a drone operator.	1.50	4.00
I am knowledgeable of the alternative waiver options to become a certified drone operator.	1.08	3.83
Mean	1.26	3.79
Skills		
I have the skills to use a drone for natural disaster damage documentation.	1.75	4.33
Confidence		
I am confident I can use the drone documentation to complete a disaster assessment.	1.08	3.67

Participants' knowledge, skills, and confidence increased from pre- to post-training. The average knowledge pretest score was 1.26 (*a little knowledgeable*), and the average posttest score was 3.79 (*very knowledgeable*). The greatest increase was related to the participants' knowledge of waiver options for becoming a certified drone operator (2.75). The smallest increase corresponded to knowledge of the different sectors of a drone operator (2.40). By the end of the course, most participants agreed or strongly agreed (4.33) that they had the skills to use a drone. While they reported slightly less confidence in their ability to complete a disaster assessment than in their skills to use a drone, the participants still reported having more confidence after the training (3.67; *neither agree nor disagree* or *agree*).

Team Suggestions for Structure and Future Training Opportunities

Team members were asked in the closeout survey to provide feedback on how they envisioned the teams working at the county, district, and state levels, as well as future training sessions in which they would like to participate. When asked about operating at the county and district levels, the majority of respondents felt that Extension's primary role should be as a connector between organizations and as a resource for community preparedness. The following are some examples of how they viewed this role:

- "Teams can provide guidance, counsel, and communication to the district office."
- "We should coordinate and collaborate with our local EMAs [Emergency Management Associations]. CECs [County Extension Coordinators] should be able to indicate when they need help from the team."
- "Prepare county office and local communities for emergencies by preparing emergency kit and using educational resources."
- "The local office should be the primary response, but the district office should be prepared to assist by providing extra people and other resources."

When asked about how the two levels should work with the state office, respondents felt that a reciprocal relationship was appropriate. That is, the state should provide training to the teams and resources to fund activities while the teams and districts communicate about when to deploy and report activities back when they are engaged. The following examples highlight this collaboration:

- "I think that we are accountable to the state office and should report on activities; activations; and outcomes of training, community outreach for risk awareness and assessment, preparation for personal and community emergencies, mitigation actions, and recovery assistance."
- "State office needs to allocate resources to support [the] training and deployment of teams."
- "Funding for this team should come from the state office."
- "Take direction from the state office; do not self-deploy."

Finally, participants indicated they wanted future training sessions in the following categories:

- Animals and disasters
- Drone training
- Volunteer management at shelters
- How to respond to an emergency 101
- Workplace security
- Team tabletop activities

Discussion

The project sought to provide foundational knowledge and skills to small teams to begin the development of a coordinated emergency response approach for Georgia. This involved sequential training, designed to give all team members the same foundational knowledge but allow people from different areas to build skillsets related to what they normally teach. As shown, the 3-day kickoff training was successful in increasing individual knowledge of emergency response but also strengthened knowledge of how each team would operate and ways it would be called to action.

Some of the variability in responses was likely to be related to the participants' diverse backgrounds. For example, one team leader is in the Army Reserve, and a few members are current or former emergency responders in their area. This probably increased the starting knowledge for these individuals and facilitated their comfort with the team approach.

For the CERT training, the district-focused approach helped build cohesion among team members and strengthen partnerships. Both emergency response agencies and first-responder organizations were engaged in providing the training. Though all the training sessions met the

standards outlined by FEMA, there was variation in the activities offered throughout. Whether this variability in approach impacts response outcomes is not known.

Both a strength and a limitation of this approach relate to offering multiple trainings on different topics throughout the year. The goal was to offer training sessions relevant to multiple program areas; however, time and resources impeded the ability to do so. For example, there was no youth-focused training offered outside the 3-day session breakouts; resources were limited for drone training; and because of logistics around securing drones and licenses, the number of participants was limited.

Closing feedback from agents was largely positive but highlighted some areas needing improvement. As discussed earlier, members' knowledge, skills, and confidence decreased slightly from the end of the 3-day training to the end of the grant. This suggests the need for continuous reinforcement of principles. Further, comments showed that there remained a lack of clarity about how teams would function in the field. To ensure that teams are set up for success, the administration needs to provide guidance on how teams will operate moving forward.

Because of the limited number of participants, it is not statistically possible to show the significance of any observed change in knowledge, skills, and confidence. However, the application of these elements offers anecdotal evidence of success. Emergency situations in the state have led to the implementation of skills learned during the grant. The first situation related to tornado response. Two team leaders conducted training for 39 CECs in the Southeast Extension District on how to develop COOPs. One attendee was from Bryan County, Georgia, and the CEC updated her COOP during this training to include current information on partners and how the county would operate in different emergencies. The following week, two cities in Bryan County experienced a tornado classified as an EF 3, with wind speeds between 136 and 165 miles per hour (NOAA, 2023). During the immediate response, the local Bryan County Extension employees were called upon to distribute contributions by the Bryan County Emergency Response Team. The county Extension coordinator worked to find housing for 14 4-H families whose homes were destroyed.

One of the team members coordinated communication between the Bryan County CEC, GEMA/HS, and the Georgia Department of Agriculture. The team member's involvement allowed the Bryan County CEC to focus on local needs. GEMA's and GDA's involvement resulted in state-level response and resources for Bryan County that would not have been available otherwise.

The second reported situation involved using skills from the CERT training conducted in the Southeast Extension District. This training was enhanced with advanced first aid, including Stop the Bleed and CPR certification. Approximately 2 weeks after the training, one team member was called upon to perform CPR until emergency responders arrived on site. The patient made a full recovery, and doctors and emergency responders credited the team member with saving the

patient's life. The team member reported that they felt very comfortable implementing the knowledge they had gained in training only a couple of weeks earlier.

Moving Forward

Since the conclusion of the project, the teams have moved forward with building capacity for the teams to operate. Based on feedback, a second drone training was scheduled for March 2023 to help agents obtain their FAA 107 commercial sUAS (small, unmanned aircraft system) pilot license, which allows them to legally operate drones in the state. In turn, agents became eligible for licenses.

To lend dedicated leadership and expertise to emergency response, Extension applied for and was awarded a 2-year Public Health Associate Program (PHAP) fellow from the Centers for Disease Control and Prevention (CDC). Located in southeast Georgia, the fellow is focusing on emergency preparedness work, including providing technical and programmatic support related to the planning and training needs of Extension personnel. Further, the fellow is also representing Extension on a community health advisory board for Plant Hatch, a southeast Georgia nuclear power plant.

Because of the administration's interest in this work, Georgia Extension hosted the 2023 EDEN Annual Conference in Savannah, Georgia. The conference team planned highlights of the work related to climate response and mitigation strategies, a tour of the port showcasing strategies to limit the potential for natural and human-made disasters, educational sessions on initiatives in other states, and a closing tabletop activity focused on avian influenza. Additionally, the team presented a session highlighting the partnership between a district team member and their local fire department and how it has benefited both organizations.

Finally, the team is working to secure additional funding to refine its approach. Regardless of the grant application outcome, the administration views this work as vital to the organization and has committed to its implementation, regardless of outside funding. Because of the success of the project, the teams have expressed interest in continuing to build expertise and relationships with the partners. Future plans focus on developing more defined plans for response, engaging counties in an annual tabletop or emergency response exercise, and creating lasting reciprocal partnerships with other organizations.

Cooperative Extension is a trusted resource in communities. As the number of emergency situations grows, Extension's expertise can be leveraged to provide emergency preparedness, response, and recovery resources. The approach described in this article is just one way to provide this expertise. Lessons learned and training sessions offered can help inform other efforts to fulfill this critical need.

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Were The "Best Made Better"? A Content Analysis of South Carolina 4-H Programming

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Since 1902, 4-H Youth Development programs have been implemented by Cooperative Extension agents or educators for teaching, influencing, and leading youth to new life skills that can positively impact their futures. The 4-H motto is "learn by doing" and is practiced with a hands-on learning approach. Unfortunately, during the COVID-19 pandemic, 4-H programs and clubs around the nation were confined to home or distance learning and no group interaction, limiting this hands-on learning approach. This study analyzes how 4-H, specifically in South Carolina, was implemented without meeting in person and how it affected retention rates during the pandemic. Analysis of quantitative data revealed a change in knowledge after participating in the virtual and take-home activities. The theoretical framework undergirding this study was McClelland's Need for Achievement Theory, which comprises three factors, or needs: achievement, affiliation, and power. Future recommendations include, but are not limited to, gathering more input from 4-H youth and their families to understand needs and to ensure programs are relevant and appealing to all eligible persons, as well as aligned with the Essential Elements of 4-H, plus training for Extension professionals to create consistent surveys using 4-H Common Measures.

Keywords: achievement theory, Extension education, youth development.

Introduction and Problem Statement

Land-grant universities across the United States are home to Cooperative Extension Services for each state, serving as an *extension* of the university's resources to each county in that state (Gould et al., 2014). Those *university resources* come in the form of Extension agents, specialists, and educators who have a degree or background relevant to their area of specialization (Contributor, 2020). Extension professionals are the connection between the public

and the university; therefore, they must be adaptable to various teaching and learning styles to meet the needs of their constituents (Cooper & Graham, 2001). As noted by Gould et al., "in the last decade, Cooperative Extension has rapidly diversified its portfolio in many ways to respond to the needs of people in our rapidly changing society, including adapting to online learning environments and the cloud" (2014, para. 7).

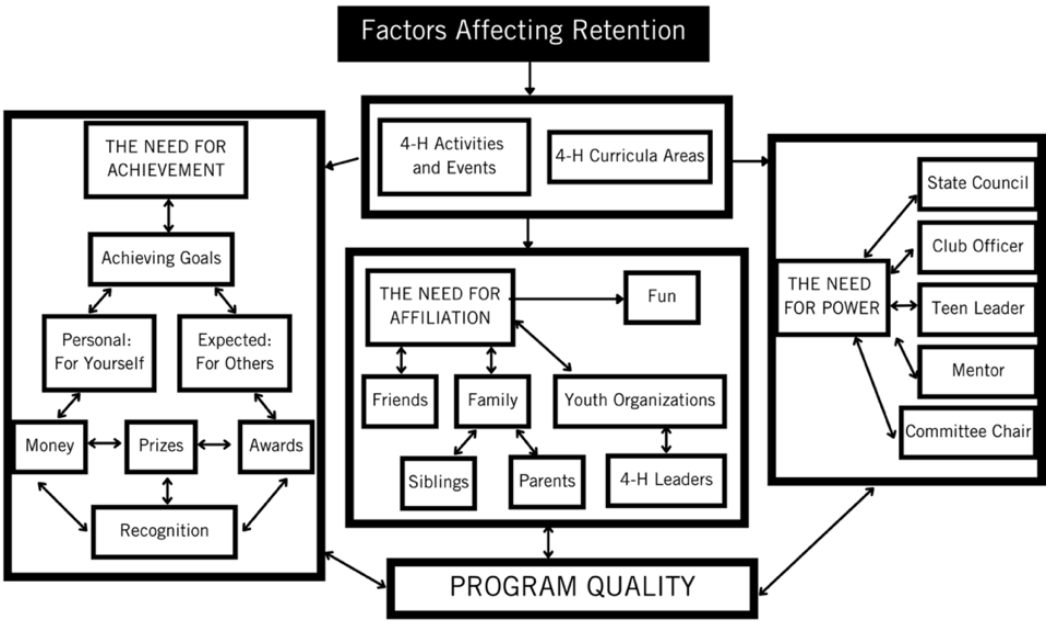
During the pandemic, school closures meant that youth were learning virtually from home. Because of the quick thinking of Cooperative Extension and 4-H staff and volunteers, virtual and kit-based programs were developed to aid in learning virtually. Extension personnel recognized that, "during this time of uncertainty, Extension [could] act as an important resource to help people adapt to new life circumstances such as homeschooling and unemployment" (Narine & Meier, 2020, p. 13). The primary solution to the problem was offering virtual programming (Arnold & Rennekamp, 2020). While this virtual solution, just like the K-12 schools' approach, worked well for some, it did not work for all (Garbe et al., 2020). Lack of Internet, technology resources, understanding of technology or Internet, etc., discouraged many people who had grown so used to in-person activities and opportunities from participating (Morefield & Fabregas Janerio, 2020). The 4-H motto, "To Make the Best Better," encourages each member to do his or her best and improve with each successive effort to reach his or her full potential (University of Idaho, n.d.). 4-H staff and volunteers worked tirelessly to create ways "To Make the Best Better" in their communities during COVID-19-related shutdowns.

This article seeks to describe the extent to which 4-H members, particularly in South Carolina, have been positively impacted by efforts made by South Carolina 4-H Extension agents, educators, specialists, and volunteers. For this study, we define "positively impacted" as having gained knowledge, becoming a new 4-H club member, or re-enrolling as a 4-H member after participating in the virtual 4-H programs.

Theoretical or Conceptual Framework

The theoretical framework undergirding this study was McClelland's (1987) Need for Achievement Theory. McClelland proposed a theory of motivation that is strongly associated with learning concepts (Pardee, 1990), which explains that the main theme of McClelland's theory is that needs are learned through coping environments. McClelland's (1987) theory is made up of three factors: a need for achievement, a need for affiliation, and a need for power (Gill et al., 2010; see Figure 1).

Figure 1. Conceptual Framework of Factors Affecting Retention, Based on McClelland's Motivational Needs Theory



Note. From "Factors Affecting Teen Involvement in Pennsylvania 4-H Programming," by B. E. Gill, J. C. Ewing, and J. A. Bruce, 2010, *Journal of Extension, 48*(2), https://archives.joe.org/joe/2010april/a7.php.

As shown in the conceptual framework diagram, "the need for achievement can be met through the projects that members complete and goals that they reach" (Gill et al., 2010, para. 5). During the pandemic, many schools shut down and shifted to home-based distance-learning models (Golberstein et al., 2020), and 4-H changed many of its learning opportunities and projects to be free or low-cost online and printed resources to support 4-H families during school and club closures (Sirangelo, 2020). In the case of this study, South Carolina 4-H agents developed online curricula that were relevant and challenging for participants.

According to Gill et al. (2010), "the need for affiliation can be met through the relationships made with friends, parents, siblings, and 4-H leaders. By joining 4-H, youth have the opportunity to associate with a group of individuals with similar interests." In South Carolina, 4-H members stayed connected with their clubs via Zoom meetings, social media, and email newsletters. Gill et al. (2010) discussed that, in Pennsylvania 4-H, various leadership roles assist in meeting the need for power. South Carolina 4-H members were offered opportunities to apply for leadership roles, such as serving as project area ambassadors (Livestock; Natural Resources; Healthy Lifestyles; and Science, Engineering, Mathematics, & Technology (STEM)) or state teen council officers and in Pinckney Leadership programs. These opportunities were essential for allowing members to feel a sense of power.

McClelland's (1987) theory is seen in 4-H studies relating to member retention (Gill et al., 2010) and participation (Baney & Jones, 2013). The conceptual model ultimately connects overall member retention primarily back to program quality. Since 4-H programs and activities were affected by COVID-19, 4-H faculty and staff adapted traditional programs for innovative delivery (Arnold & Rennekamp, 2020). This study used the conceptual model and the Essential Elements of 4-H to determine the impact virtual/distant delivery had on 4-H members' achievement and development. As documented in the 4-H literature, "the Essential Elements of a 4-H experience are the 'best practices' that help staff and volunteers address the four basic developmental needs of youth—belonging, generosity, independence, and mastery" (USDA, 2016).

Purpose

Prior to shutdowns caused by the COVID-19 pandemic, 4-H clubs conducted meetings in person with leadership from Extension agents, educators, and specialists, as well as 4-H volunteers (Arnold & Rennekamp, 2020). Grégoire (2004) noted that dedicated staff and volunteers of the 4-H program have aided in evolving and adjusting to changing needs. In a time of shutdowns and virtual programming (Arnold & Rennekamp, 2020), it is more important than ever to determine the extent to which 4-H members, particularly in South Carolina, have still been positively impacted by efforts made by South Carolina 4-H Extension agents, educators, specialists, and volunteers. Four research objectives guided this study:

1. Describe the virtual 4-H opportunities available in South Carolina during the COVID-19 pandemic.
2. Establish the demographics (i.e., age, state of residence) of the youth participating in the virtual 4-H opportunities.
3. Determine participants' self-perceived change in knowledge after participation in 4-H virtual opportunities.
4. Identify participants' future interest in 4-H and 4-H opportunities.

Methods

This non-experimental research study was conducted online with 1,669 youth participants from across South Carolina. The youth ranged in age from 5 to 18 years old. The youth were selected because of their previous participation in a South Carolina 4-H-related activity or program that took place from March 2020 until June 2021. Different virtual programs and activities (i.e., 4-H at-home kits that were mailed from the county Extension offices) were offered in all corners of South Carolina for varying costs. Families were not limited to one option but could choose multiple options from their respective regions and even from other regions. To best answer the established research objectives, a mixed-methods research design was implemented, but the quantitative analysis approach will be discussed for this publication.

When this study came to fruition in December 2020, virtual 4-H programming was in progress, and quantitative data was collected through surveys designed in Qualtrics. Because neither a list of programs offered nor their respective survey data was available in a bank at the South Carolina 4-H State Office for review, the research team searched through 2020 4-H summer camp advertisements on social media platforms (i.e., Facebook and Instagram) to gather the list of programs from around South Carolina. The research team then contacted the 4-H agents who offered the programs to request permission to use their survey data for this research study. Therefore, this study implemented an existing data design using the end-of-program surveys which were created by the host South Carolina 4-H agents in different 4-H regions.

Privitera (2020) describes an existing data design as the collection, review, and analysis of any type of existing documents or records. Since the surveys were created by different individuals for different programs, the formats varied slightly. However, there was overlap in the overarching concepts, allowing the data to be purposeful in conducting this study. This study could also be called a content analysis (Privitera, 2020), since the participants of the virtual 4-H programs recalled their perceptions of those programs in surveys which are now being evaluated further. Validity and reliability (Privitera, 2020) of the data are of concern when using multiple survey instruments, which the research team acknowledges. In the case of this study, individual Extension agents developed program evaluation surveys in conjunction with the Clemson Extension director of assessment, providing continuity between surveys. Additionally, the raw Qualtrics survey data were acquired from the respective agents via email and compiled into one file for further statistical review through SPSS, further providing validity and reliability to the data analysis. A limitation of this existing data design is the relatively low response rate for each of respective surveys. Although 1,669 youth participated in the virtual programming, complete survey responses were received from only 198 participants (11.86%).

Using SPSS, the quantitative data were analyzed using descriptive statistics (i.e., frequencies and percentages). Eight different South Carolina 4-H programs were identified for the study. Each program was delivered in a virtual format and used related program evaluation questions pertaining to demographics, involvement in 4-H (member or non-member, county where they live/participate in 4-H), and opinion of the activity or kit offered (i.e., was the activity fun/educational, worth the cost, did participating influence youth to join 4-H or re-enroll the next program year, and other perceptions).

Findings

Research Objective 1: Describe the Virtual 4-H Opportunities Available in South Carolina During the COVID-19 Pandemic

Eight different virtual 4-H activities were identified for the study:

- South Carolina 4-H@Home

- 2020 The Fair—A Virtual 4-H Summer Camp
- 2020 Camp America—A Virtual 4-H Summer Camp
- 2020 International Culinary Tour—A Virtual 4-H Summer Camp
- Chester & York Counties 4-H Virtual Summer Camp—Explore SC
- Chester & York Counties 4-H Virtual Summer Camp—Around the World
- Tri-County 4-H Virtual Tree Camp
- Pee Dee Region Grab & Go Camp Kits Summer 2020

Each activity was assembled into a kit offering a lesson and including most or all necessary materials (except for *South Carolina 4-H@Home*). Each activity kit or experience was designed to align to the Essential Elements of 4-H, which are "the 'best practices' that help staff and volunteers address the four basic developmental needs of youth—belonging, generosity, independence, and mastery" (USDA, 2016). Table 1 identifies the virtual 4-H opportunities and participation during the COVID-19 Pandemic in South Carolina, along with the response rate for the post-program surveys.

Table 1. Virtual 4-H Opportunities and Participation During the COVID-19 Pandemic in South Carolina

Virtual 4-H Program	***N***	***n***	***Response Rate %***
2020 4-H International Culinary Tour	23	1	4
2020 Camp America—A Virtual 4-H Summer Camp	26	3	12
Chester and York Counties 4-H Around the World Camp	11	0	0
Chester and York Counties 4-H Virtual Explore Camp	11	2	18
Pee Dee Region Grab & Go Camp Kits	68	17	25
South Carolina 4-H@Home	1,448	166	12
The Fair—A Virtual 4-H Summer Camp	16	5	31
Tri-County 4-H Virtual Tree Camp	77	4	5

South Carolina 4-H@Home was a daily lesson emailed to those who registered beginning March 18, 2020. The lesson included a materials list consisting primarily of items already found around the home. The lessons were emailed daily until schools were dismissed for summer break in May 2020. Lessons were then emailed once per week until the schools resumed in August. From August 2020 until January 2021, the lessons were emailed once per month, with at least three themed lessons in a bulk packet.

The Extension 4-H programs in Newberry, Saluda, Aiken, and Edgefield Counties offered a series of three "virtual road trips" that lasted 1 hour per day for a week at a time. The activities were also designed so that youth were not sitting in front of a computer the entire time. Each registered youth, ages 5 to 19, received a packet prior to the start of camp including any hard-to-find materials needed to complete the activities. *The Fair—A Virtual 4-H Summer Camp* provided daily activities that brought to mind the sights, sounds, and smells of the fair. Registrants received an email on Monday, June 8, 2020, with instructions for each day.

Participants explored the "fair" using recipes, virtual tours, hands-on activities, guest speakers, books, and more. *Camp America* was designed to expose youth to all things American: foods, landmarks, history, heroes, and more. Registrants received an email on Monday, June 22, 2020, with instructions for each day. The camp explored America using recipes, virtual tours, hands-on activities, guest speakers, books, and more. Finally, beginning Monday, July 20, 2020, *The International Culinary Tour—A Virtual 4-H Summer Camp* "toured" a different country each day though recipes, virtual tours, hands-on activities, books, and more.

Chester and York Counties created two virtual camps and a series of kits for summer 2020 programs. *Explore S.C.* gave participants the opportunity to "tour" South Carolina and learn the sights, sounds, and symbols of the state from June 22–26, 2020. Virtual tours included the State House in Columbia, Lemaster Dairy at Clemson University, a peach orchard in Aiken, and the beach in Charleston. Activities dealing with the state symbols were also included in the kits. The online activities remained available through July 15th. *Around the World* was the second virtual camp opportunity. This camp was a virtual tour around the world. Daily activities included hands-on lessons and activities, virtual tours, and crafts that could be completed at the participant's own pace. Daily presentations were not live but were released daily through a slideshow in Google Classroom (no prior experience with Google Classroom was needed). The online activities remained available through September 1st.

Chester and York Counties' series of kits consisted of *Slammin' Science*, *4-H Down on the Farm*, and *Virtual Tours with 4-H. Slammin' Science* consisted of six individual activities that revolved around STEM. Participants became true scientists and made slime, created paper circuits, explored properties of air, created a stop-motion video, and created a geyser. *4-H Down on the Farm* allowed participants to create a desktop greenhouse, grow five different crops in a glove, learn the many uses of corn with a few hands-on experiments, and create a farm web to learn about life's necessities. Finally, *Virtual Tours with 4-H* allowed participants to "take" tours of various places around the United States and the world using an application and a virtual-reality viewer that fit over most smartphones.

Tri-County 4-H (Anderson, Oconee, and Pickens Counties) offered a series of virtual summer kits: (a) trees, (b) baking, (c) pollinators, (d) pirates, (e) dissection, and (f) wildlife. This study focuses on the *Virtual Tree Camp*, which consisted of daily activities to be done over the span of a week to teach participants how to identify trees, create a tree book, press leaves, and more.

Finally, the Pee Dee Region offered a series of "grab & go" kits. *The Great Outdoors Camp Kit* taught youth how to make casts of animal tracks, dissect an owl pellet, go on a scavenger hunt, and use a magnifying glass to make up-close observations. *Full S.T.E.A.M. Ahead* focused on science, technology, engineering, art, and mathematics experiments. *Camp Cloverbud* was a literacy-based kit for younger ages (5 to 8 years old) that covered all the 4-H program areas.

Down on the Farm consisted of activities and lessons about animals, farm safety, gardening, pollinators, and farm commodities.

Research Objective 2: Establish the Demographics (i.e., Age, State of Residence) of the Youth Participating in the Virtual 4-H Opportunities

As previously noted, the survey data were existing, designed and collected by different agents from different regions, so all the surveys did not ask the same questions. Privitera (2020) discusses *nonresponse bias*, which occurs when participants choose not to complete a survey, to respond to specific survey items, or not to respond at all. The survey data presented below display nonresponse bias.

According to its civil rights statement, "Clemson Cooperative Extension Service offers its programs to people of all ages, regardless of race, color, gender, religion, national origin, disability, political beliefs, sexual orientation, gender identity, or marital or family status and is an equal opportunity employer" (Clemson Cooperative Extension, n.d.). South Carolina 4-H offers programs to youth ages 5 through 18 years old. The age group of 5 to 8 years old is called *Cloverbud*. Youth ages 9 to 13 are considered *juniors*. The older youth, 14 to 18 years old, are considered *senior* members. A plurality of respondents was of the *junior* member age group (48%), followed by *Cloverbud* age group (42%) (see Table 2).

Table 2. Age of Youth Participating in Virtual 4-H Opportunities (n = 205)

4-H Group/Age (years)	***f***	***%***
Cloverbud/5–8	87	42
Junior/9–13	98	48
Senior/14–18	20	10

All but one of the identified virtual 4-H opportunities offered in South Carolina were specifically for in-state residents. *South Carolina 4-H@Home* was offered nationwide, with participants registering from 46 of the 50 United States, plus Mexico, Japan, Canada, Scotland, Germany, South Africa, and the U.S. Virgin Islands. Almost 41% of the participants were from South Carolina. While it could be assumed that the 74 unknown responses are South Carolina residents, it is not confirmed in the other surveys that do not specifically ask for state of residence (see Table 3).

Table 3. State of Residence of Youth Participating in Virtual 4-H Opportunities (n = 240)

State of Residence	***f***	***Response Rate %***
South Carolina	98	41
Other	26	11
Unknown	74	31
Did not respond	42	17

Research Objective 3: Determine Participants' Self-Perceived Change in Knowledge After Participation in 4-H Virtual Opportunities

At the conclusion of the virtual 4-H opportunities, participants and their parents were encouraged to answer questions relating to the knowledge gained from the activities. Those questions were asked in a format that allowed participants to answer using a Likert-type scale (strongly agree, agree, neither agree nor disagree, disagree, strongly disagree). Some of the questions were written as statements like "Due to my participation in … My knowledge of … increased," while others were written as "Participation in … contributed to my child's education during COVID-19 school closures." Based on a five-point scale of agreement, the mean was 4.06 and the standard deviation 0.33. The participants (88%) who completed the surveys and answered these particular questions (n = 196) agreed with the statement that there was a change in knowledge after participating in virtual 4-H opportunities. No survey answers indicated disagreeing with a self-perceived change in knowledge after participating (see Table 4).

Table 4. Participants' Self-Perceived Change in Knowledge After Participating in Virtual 4-H Opportunities (n = 196)

Level of Agreement	***f***	***%***
Strongly agree	17	9
Agree	174	88
Neither agree nor disagree	5	3
Disagree	0	0
Strongly disagree	0	0

Research Objective 4: Identify Participants' Future Interest in 4-H and 4-H Opportunities

The researchers postulated that, based on their participation in the virtual 4-H opportunities, participants could gauge their future interest in 4-H and 4-H opportunities after the COVID-19 pandemic restrictions are lifted. Not all the surveys asked this specific question, but most asked something aligning with a measurement of participants' future interest. Of those who were asked the question, 49.3% of virtual 4-H participants agreed they would "absolutely" be involved in the future and 46.5% indicated they would "possibly" be involved, while 4.2% indicated "at this time" they would not be involved. Based on a three-point scale of agreement, the mean was 2.45, and the standard deviation 0.58 (see Table 5).

Table 5. Participants' Future Interest in 4-H and 4-H Opportunities (n = 71)

Interest in Future 4-H Opportunities	***f***	***%***
Absolutely	35	49.3
Possibly in the future	33	46.5
Not at this time	3	4.2

Conclusions, Discussion, and Recommendations

Based on the program evaluations conducted about 4-H participation during the COVID-19 pandemic, the results demonstrate that a virtual and kit-based delivery mode was positive, as perceived by survey respondents. Most, if not all, county Extension offices worked with participants to ship kits for an extra fee if they were not from the offering county, which could have added to the registration totals. Gould et al. (2014) noted that "in our rapidly changing environment, Cooperative Extension has to maintain contemporary relevance and documented impact across the broad spectrum of our programming efforts" (para. 11), and this idea held true with the efforts made by South Carolina 4-H agents, specialists, and volunteers. Gathering more input from 4-H youth and their families is recommended to understand needs and ensure programs are relevant and appealing to all eligible persons.

The survey data indicated that there was a change in knowledge, as 97% of respondents strongly agreed or agreed that knowledge had improved. Only 3% indicated they did not have a strong opinion of a change in knowledge, and no one indicated they disagreed or strongly disagreed. Each 4-H activity or opportunity was intended to create a change in knowledge or behavior, and the data reflect that the activities and opportunities served their purpose as perceived by survey respondents. In addition, 49% of the participants would "absolutely" get involved as soon as possible, and 47% said they would "possibly" get involved in the future. This indicates the strength of virtual 4-H activities and opportunities for recruiting future participants.

From the surveys, the Essential Element of *independence* was highlighted by participants who indicated they would participate in future 4-H opportunities. *Mastery* was also highlighted, as participants indicated they had a change in knowledge and learned something new from participating in the virtual 4-H programs. McClelland's (1987) Need for Affiliation was underscored, as participants indicated they would be involved in future 4-H opportunities. Some of the open-ended questions on the *South Carolina 4-H@Home* surveys indicated the Essential Element of *belonging,* as participants indicated they enjoyed working with family members on the activities. A future recommendation is to align programs that are appealing and relevant to participants with the Essential Elements of 4-H.

Upon interpreting the existing data regarding demographics, it became evident that not all the surveys asked age, gender, residence (state or local), ethnicity, or 4-H membership status. Due to the variations in structure and types of survey data collected from South Carolina 4-H agents, it is recommended that instruction be delivered to Extension professionals to guide them in creating consistent surveys using the 4-H Common Measures. Further, "the 4-H Common Measures Reference Table identifies the outcomes addressed, the indicators for each outcome, the items that answer to each outcome, where the items were originally sourced, and alpha scores if available" (National 4-H Council, n.d., para. 1). If 4-H agents are not comfortable using the 4-H Common Measures, then a survey question bank should be developed and made available on

the state level. This bank of questions would allow for consistency among surveys and make examples available for Extension agents who have no experience with creating surveys.

Regarding future research, more studies are recommended to gather feedback from parents and members on their perceptions of their own states' programming efforts during the COVID-19 pandemic. Each state's land grant university operated differently, and it would be interesting to see the efforts that were made according to the varying operation requirements. Another topic to explore is related to 4-H program operations during the pandemic reopening stages. What were the rules on masks, group sizes, social distancing, or meeting location? How were these program operations perceived by youth, parents, volunteers, and other stakeholders? Future research should consider the multiple interfaces of public health and 4-H programming, as this topic area is so new.

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Preservice Agriscience Teachers' Perception of Inquiry-Based Learning

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The process of inquiry-based learning allows learners to identify a problem or develop a hypothesis, develop a process of inquiry, and report their findings (Keselman, 2003). Twenty-six preservice agriscience teachers at the University of Nebraska-Lincoln participated in focus groups to explore preservice agriscience teachers' perceptions of developing and using science-based learning activities that use inquiry-based teaching methods. Qualitative data analysis allowed the following six themes to emerge: a) inquiry-based learning is a process, b) trainings and pre-made lessons, c) student- vs teacher-led, d) critical thinking and problem solving, e) age, skill, & prior knowledge of students, and f) time-consuming to design. These findings hold importance for adoption of inquiry-based learning not only at the instructor level, but also system-wide.

Keywords: inquiry-based learning, agriscience, preservice teachers

Inquiry-based learning has emerged as a major educational strategy used to engage students in the process of scientific inquiry (Keselman, 2003). The process of inquiry-based learning allows learners to identify a problem or develop a hypothesis, develop a process of inquiry, and report their findings (Keselman, 2003). Since the release of the National Research Council (1988) report promoting the inclusion of science in secondary agriculture curricula, momentum for teaching science through agriculture has grown significantly. Thoron and Myers (2011, 2012) found that agriscience students receiving inquiry-based instruction scored significantly higher on scientific subject-matter achievement tests and tests for scientific reasoning than did students instructed through subject-matter knowledge techniques.

This study included 26 preservice agriscience teachers at the University of Nebraska-Lincoln. They participated in focus groups to explore preservice agriscience teachers' perceptions of developing and using science-based learning activities that use inquiry-based teaching methods. Participant responses were analyzed using thematic analysis and six themes emerged. The following themes centered around inquiry-based learning: a) inquiry-based learning is a process, b) trainings and pre-made lessons, c) student- vs teacher-led, d) critical thinking and problem solving, e) age, skill, and prior knowledge of students, and f) time consuming to design.

Participants recognized the importance of learning science as a process through inquiry-based learning. The inquiry-based learning process was perceived as a critical component in the development and facilitation of inquiry-based learning activities. Additionally, participants perceived that there would be increased critical thinking and problem-solving skills in students who are exposed to inquiry-based learning. The participants indicated that developing inquiry-based learning activities is time-consuming and that is beneficial to have access to premade inquiry-based learning activities. These findings hold importance for adoption of inquiry-based learning not only at the instructor level, but also system-wide. Understanding the scientific process, critical thinking, and how problem-solving skills are impacted by the inquiry-based learning method is important when designing curricula. This observation aligns with previous findings indicating higher critical thinking and science achievement among students engaged in inquiry-based learning in agriscience courses (Thoron & Myers, 2011; Thoron & Myers, 2012) and general science courses (Gormally et al., 2009).

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