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The Development of a Mobile Application to Capture Healthy Eating and Physical Activity Policies and Practices in Family Child Care Homes

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THE DEVELOPMENT OF A MOBILE APPLICATION TO CAPTURE HEALTHY EATING AND PHYSICAL

ACTIVITY POLICIES AND PRACTICES IN FAMILY CHILD CARE HOMES

by

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ABSTRACT

THE DEVELOPMENT OF A MOBILE APPPLICTION TO CAPTURE HEALTHY EATING AND PHYSICAL

ACTIVITY POLICIES AND PRACTICES IN FAMILY CHILD CARE HOMES

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Serving more than 1.7 million children under five years of age, family child care (FCC)

programs are an advantageous setting for early childhood obesity prevention efforts given that

attending children receive a large proportion of their nutrition and perform much of their

physical activity in this settings. FCC programs are subset of early care and education (ECE)

programs in which providers care for children in their own home rather than a commercial

facility (e.g., center-based programs) and tend to care for children living in low-income

households, rural communities, and or those who are of a racial or ethnic minority, which

amplifies their importance in public health efforts aimed at reducing health inequities in

children. Healthy eating and physical activity-based (HEPA) interventions have demonstrated

success in promoting best practices and policies that support healthy environments in ECE

settings. However, FCC providers care for children in their home, thus no two programs are

identical. Variability across FCC settings may impact the adoption and implementation of HEPA

practices and policies, which may not be captured by existing measurement tools.

This dissertation consisted of three studies that helped to develop a mobile application

that uses photos to capture HEPA best practices and policies in family child care settings. The

first study was a scoping review to identify existing measurement tools that capture policy,

systems, and environmental characteristics related to HEPA in FCC settings and to identify how

these measurement tools are employed in FCC settings. The second study explored how FCC

providers implement HEPA practices and policies within their programs. The final study

described the process and lessons learned of applying a user-centered framework to develop a

mobile app that uses photos to capture HEPA best practices and policies in FCC settings.

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LIST OF ABBREVIATIONS

App	Application
CACFP	Child and Adult Care Food Program
CHOICE	Creating Healthy Opportunities in Childcare Environments
DOCC	Dietary Observation for Child Care
ECE	Early Care and Education
EPAO	Environment and Policy Assessment Outcomes
EPAO-FCCH	Environment and Policy Assessment and Observation for Family Child Care Homes
EPAO-SR	Environment and Policy Assessment and Observation Self Report
FCC	Family Child Care
HEPA	Healthy Eating and Physical Activity
HEI	Healthy Eating Index
ISR	Information System Research
IRR	Inter-Rater Reliability
ICC	Intraclass Correlation
mHealth	Mobile Health
MVP	Minimal Viable Product
MVPA	Moderate to Vigorous Physical Activity
NAP SACC	Nutrition and Physical Activity Self-Assessment for Child Care
NAP SACC-FCCH	Nutrition and Physical Activity Self-Assessment for Child Care for Family Child Care Homes
PA	Physical Activity

PSE	Policy, Systems, and Environments
PMPP	Protocol for Mapping Policies and Practices
ORIS	Quality Improvement Rating System
U.S.	United States
α	Cronbach's Alpha
r	Correlation Coefficient

INTRODUCTION

Serving more than 1.7 million children under five years of age, family child care (FCC) programs are the second most utilized form of non-relative child care in the United States (U.S.).[1] FCC programs are subset of early care and education (ECE) programs in which providers care for children in their own home rather than a commercial facility (e.g., center-based programs).[2-4] Literature suggests that children attending FCC programs are at greater risk for childhood obesity, which is associated with an increased risk for obesity in adulthood, heart disease, diabetes, and other chronic conditions.[5,6] Obesity prevention efforts during early childhood are crucial in reducing the risk for childhood obesity.[7,8]

FCC programs are an advantageous setting for early childhood obesity prevention efforts given that attending children receive a large proportion of their nutrition and perform much of their physical activity in this settings.[8] Moreover, FCC programs tend to care for children living in low-income households, rural communities, and or those who are of a racial or ethnic minority, which amplifies their importance in public health efforts aimed at reducing health inequities in children.[5] The policy, systems and environments (PSE) of FCC programs help shape children's physical activity and dietary behaviors; therefore, fostering effective strategies to help FCC providers establish health promoting environments is key.[9-11]

Healthy eating physical activity (HEPA) based interventions have demonstrated success in promoting HEPA best practices and policies in ECE settings through delivering evidence-based materials, facilitating peer-to-peer learning, assisting with action planning, and providing training and technical assistance.[9,12] FCC providers care for children in their home, thus no two FCC programs are identical.[13] Variability across FCC settings may impact the adoption and implementation of HE

PA practices and policies, which may not be captured by existing measurement tools, such as the Nutrition and Physical Activity Self-Assessment for Child Care (NAP SACC) and Environment and Policy Assessment Outcomes (EPAO).

Additionally, FCC programs as compared to center-based ECEs are often staffed by one owner or operator, which makes them responsible for several roles, including being a small business owner, chef, teacher, and child care provider.[4] Ownership and decision-making responsibility give FCC providers the opportunity to promote HEPA policies and practices for children in their care. However, without infrastructure, training, and workplace benefits, FCC providers may need additional support in promoting HEPA practices and policies in their setting. A data collection tool that is participatory and captures unique contextual characteristics of FCC settings may help FCC providers participating in HEPA-based interventions receive more tailored support.[13]

Chiappone and colleagues conducted a pilot study to test the feasibility of using modified photovoice as a data collection method to explore and observe HEPA practices and policies in FCC settings.[13] Photovoice is a participatory method that uses photos taken by participant to illustrate their environment and is recommended for use in participatory evaluations and needs assessments.[14,15] Results from the pilot indicated that the modified photovoice approach provided a qualitative glimpse into the adoption and implementation of HEPA practices and policies in FCC programs.[13] However, FCC providers deviated from the protocol and a key recommendation from the pilot was to design a mobile application (app) that could streamline the protocol for efficiency and accuracy as well as improving its scalability.

Mobile health (mHealth), which is broadly defined as medical or public health practice supported by mobile devices, is growing in popularity in the public health landscape.[16,17] One

application of mHealth is utilizing mobile technology, particularly mobile apps, as a platform for data collection, which can increase efficacy of data collection and reduce participant and researcher burden. [16,18] However, challenges such as high-front costs, disconnect between researchers and the technology industry, and creating mobile apps that are grounded in evidence while also having consumer appeal exist.[16,19,20] The Information System Research (ISR) framework is a user-centered approach for development, implementation, evaluation, and adaptation of mobile apps. The ISR framework has emphasizes the end-user's involvement from initial concept formulation to implementation, which holds promise for the development of mHealth in the public health landscape.[21]

 Overall, this dissertation sought to address this gap by developing a mobile app that captures HEPA practices and policies in FCC settings. First, a scoping review was conducted to identify existing measurement tools that capture PSE characteristics related to HEPA in FCC settings and identify how these measurement tools are employed within the study. Second, this dissertation explored how FCC providers implement HEPA practices and policies within their programs. Finally, this dissertation described the process and lessons learned of applying a user-centered framework to develop a mobile app that uses photos to assess the adoption and implementation HEPA best practices and policies in FCC settings.

CHAPTER 1: POLICY, SYSTEMS, AND ENVIRONEMTAL TOOLS ASSESSING HEALTHY EATING AND

PHYICAL ACTIVITY IN FAMILY CHILD CARE SETTINGS: A SCOPING REVIEW

Introduction

Family childcare (FCC) programs are an important setting for obesity prevention

efforts.[22] FCC programs are a subset of early care and education (ECE) programs in which non-

relative providers care for children a home setting rather than a commercial facility.[2] They are

the second most utilized form of non-relative childcare in the United States (U.S.) and have the

potential to reach an estimated 1.7 million children aged five years and younger who spend time

in this setting.[1] Children attending FCC programs are more likely to live in poverty, belong to

ethnic/racial minority groups, and have higher risk for overweight and obesity, which amplifies

the role that FCC settings play in obesity prevention efforts.[5]

FCC programs as compared to center-based ECEs are often staffed by one owner or

operator, which makes them responsible for several roles, including being a small business

owner, chef, teacher, and childcare provider.[3,4,23] Ownership and decision-making

responsibilities give FCC providers the opportunity to promote obesity prevention efforts for

children in their care.[4,23] These efforts often encompass policies, systems, and environments

(PSEs) and help to shape the physical and social environment that support children's physical

activity and dietary behaviors.[9,11] PSE initiatives have received increased attention in recent

decades as they have demonstrated success in promoting healthy eating physical activity (HEPA)

best practices and policies in ECE settings.[9]

In response, tools designed to assess PSE characteristics related to HEPA have been

developed.[24] These tools are designed to capture information related to the alignment or

existence of HEPA characteristics of an ECE setting with existing state or national policies,

standards, or scientific position statements.[24] Two widely used and validated tools include the

Environment and Policy Assessment and Observation (EPAO) and the Nutrition and Physical

Activity Self-Assessment for Child Care (NAP SACC), which capture

PSE attributes of ECE settings that influence children's nutrition and physical activity.[24-26] The

EPAO and NAP SACC were originally developed as a part of an evidence-based intervention and

have since been utilized widely by researchers due to its comprehensive scope and link to

evidence-based practice.[24-26] Additionally, both tools were developed for use in center-based

settings and were later adapted for FCC settings.[27,28]

PSE interventions targeting HEPA in FCC settings have started to become more

ubiquitous.[22] However, the majority of research still focuses on center-based programs and FCC

programs are sometimes a smaller subset within the context of a larger study dominated by

center-based programs.[22,24] One of the challenges in studying FCC settings is that providers care

for children in their home; thus, no two FCC programs are identical. The implementation of

constructs captured by current PSE HEPA tools, such as outdoor play, physical activity, feeding

environment may differ between FCCs and center based programs, and also among FCC

programs. Chiappone and colleagues reported that physical attributes (e.g., layout, size) of a

program's indoor and outdoor area impacted how providers promoted physical activity. Tools

designed to assess PSE characteristics related to HEPA need to consider the nuances of FCC

programs unique from center-based programs.[29,30] Variability among FCC settings may impact

the adoption and implementation of HEPA practices and policies, which may not be captured by

existing measurement tools.

This represents a need to understand how these tools are being applied in FCC settings

to identify gaps and opportunities for improvement. Therefore, we conducted a scoping review

to identify tools that are currently being used to assess PSE characteristics related to HEPA in

FCC settings. More specifically, the review documents how [12]and also provides an overview of the identified tools.

Methods

A scoping review was used to map out how research is conducted in the field, provide a descriptive account of available research, and identify gaps in the field.[31] Scoping reviews are an approach to evidence synthesis and differs from systematic reviews in that they aim to provide an overview of the available research evidence without producing a summary answer to a discrete research question.[31] The results of the scoping review will provide recommendations for measurements and methods for future research in the ECE field.[31]

Search Strategy

The authors identified databases based on existing reviews in the literature[22,32] and the lead author, in consultation with a university librarian proceeded to create a list of search terms. The lead author with assistance from the librarian tested the comprehensiveness and sensitivity of various search terms with Boolean operators within in the databases to ensure the search yielded relevant results. The final search was conducted in the following databases: MEDLINE, CINAHL, Cochrane, PsycINFO, ERIC, EMBASE, Scopus, and PubMed with no publication data parameters. Searches were conducted using medical subject headings (in the case of PubMed) and synonyms for children ages zero to five, FCC, PSE, HEPA, and measurement tools. No filters were applied to searches and searches were performed on October 27, 2020. A full list of search terms is available upon request.

Study Selection

All study titles and abstracts identified in the database searches were uploaded into Microsoft Excel. The following processes were completed in Excel: title and abstract screening, full-text screening, and data extraction. Figure 1 outlines this process. The inclusion criteria for

articles was: 1) peer-reviewed journal articles, 2) published in English, 3) study conducted in U.S.

, 4) study was conducted in FCC settings; 5) study utilized a tool assessing PSE characteristics

related to HEPA (termed PSE HEPA tool in this review), and 6) the study reported quantitative,

qualitative or mixed methods results. Articles were excluded if they did not meet the inclusion

criteria and if the study design was a meta-analysis or systematic review or the study was

conducted only in a center-based setting.

Data Extraction

The lead author (AC) reviewed articles based on titles and abstracts identified in the

database searches. Titles and abstracts that met inclusion criteria were recorded for full text

review. Two authors (AC and MH) then independently reviewed full text of each recorded article

to determine inclusion and exclusion criteria. Disagreements (n=1) in the full text review were

resolved via discussion among AC and MH. For each article included in the review, one author

(AC) collected and entered data into two extraction table and MH reviewed data extraction

components for agreement. Information was recorded in two results tables. Table 1

summarized key characteristics of the studies in the review (e.g., location, study design,

methods, PSE HEPA tool used, and any additional measures). Table 2 was designed to complete

a detailed review of the PSE HEPA tools identified Table 1 and described these tools in detail

(e.g., tool description, effectiveness, strengths and limitations of the tools).

<div align="center">**Results**</div>

Study Selection

The initial search yielded 7,238 references and once duplicates (n=3,134) were removed, 4,104

references remained for title and abstract screen. Based on the title and abstract screen, a total

of 4,049 references were excluded for the following reasons: not conducted in FCC (n=1,658),

not related to HEPA (n=1,140), not based in the U.S. (n=865), not peer-reviewed (n=336), and

design was a meta-analysis or systematic review (n=50), resulting in 55 articles for full text

screen. Of the 55 articles, 19 were excluded for the following reasons: did not utilize a tool

assessing PSE related to HEPA (n=12), not conducted in FCC (n=2), not conducted in the U.S.

(n=2), duplicate reference (n=1), insufficient methodological information (n=1), and not peer

reviewed (n=1). The final sample of articles included in the review was 36.

Study Characteristics

A total of 36 articles across 18 studies were included (Table 1). The majority of articles

(n=26) were published in the last five years (i.e., 2016-2020),[7,27,33-56] with the earliest article

published in 2009.[57] Studies were conducted across North Carolina,[30,38,46,49,53] Rhode

Island,[10,49,51,52] Minnesota,[7,37,43,50,56] Wisconsin,[7,34,54,56] Oregon,[55,58,59] Nebraska,[39-41]

Washington,[45,60] California,[42,44] Kansas,[28,57] Mississippi,[47,48] Georgia,[36] Ohio,[33] New York,[61]

Florida,[60] Delaware,[62] Massachusetts,[60] Michigan,[60] and one undisclosed state in the Midwest.[63]

Half of the studies (n=9) used a sample that consisted only of FCC programs,[10,27,28,30,35,42,46-49,51-

53,55,57-59,61,62] and the other half (n=9) included samples of both FCC and center-based

programs.[7,33,34,36,37,39-41,43,45,50,54,56,60]

PSE HEPA Measurement Tools

Across the 18 studies, three existing measurement tools were used. These included the

Nutrition and Physical Activity Self-Assessment for Child Care (NAP SACC),[28,34,39-41,47,52,55,57-60]

Environment and Policy Assessment and Observation (EPAO),[27,30,34,35,38,46-49,51-53] and Child

Feeding Questionnaire.[61] The NAP SACC and EPAO are designed for use in center-based settings

and the Child Feeding Questionnaire is intended for use in home settings. Other studies

developed surveys[7,10,36,37,42-44,50,56,63] and observational tools[42,44,63] modified from existing

instruments (e.g., NAP SACC and EPAO).

Both the NAP SACC and EPAO have alternative versions that were developed and modified from the original tools (Table 2). These include the Nutrition and Physical Activity Self-Assessment for Child Care for Family Child Care Homes (NAP SACC-FCCH) and Environment and Policy Assessment and Observation for Family Child Care Homes (EPAO-FCCH) designed for use in FCC settings, and also the Environment and Policy Assessment and Observation Self Report (EPAO-SR) created as a self-report version for center-based settings. Of the six studies that used the NAP SACC, one reported using the NAP SACC-FCCH.[39-41,47] Of the five studies that used the EPAO, two used the EPAO-FCCH.[51,52] Moreover, six studies used the NAP SACC and/or EPAO versions intended for center-based settings.[34,47,48,51,52,54,55,58-60] Of these six, three had samples that consisted of both FCC and center-based providers.[34,54,60]

Validity and Reliability. Validity and reliability of the tools were presented or cited by nine studies. For the original EPAO, construct validity of physical activity scales was measured with comparisons to child moderate to vigorous physical activity (MVPA) (range: r=0.19 to 0.50).[64] Inter-rater reliability (IRR) was reported for child nutrition and physical activity scores (range: ICC=0.05 to 0.95).[65] The EPAO-FCCH was also tested for construct validity and IRR. Physical activity was compared against child MVPA (range: r=-0.21 to 0.18) and child nutrition to the Healthy Eating Index (HEI) (range: r=-0.05 to 0.28).[35]

IRR for nutrition and physical activity scales ranged from ICC=0.22 to 0.99, respectively.[35,38] Face and content validity, internal consistencies, and predictive validity was also presented or cited for the EPAO-FCCH.

For the original NAP SACC, criterion validity was assessed by comparing self-report to observations for nutrition (range: kappa=0.01 to 0.70) and physical activity scores (kappa = 0.07 to 0.79).[26] IRR (range: r=0.20 to 1.00), test-retest reliability (kappa=0.07 to 1.00), and internal consistencies (range α=0.75 to 0.76) were documented for nutrition and physical activity

scores.[26,28] No validity or reliability measures were presented or cited for the NAP SACC-FCCH.

Authors that used the Child Feeding Questionnaire reported on internal consistency for the five

subscales (range: α=0.70 to 0.83).[61] Lastly, studies that developed surveys or observational tools

measured internal consistency for nutrition and physical activity scores (range α=0.74 to

0.86).[7,37,50] Face and content validity via expert review, as well as criterion validity against the

NAP SACC were also reported.[33,63]

      Data Collection and Study Design. Provider self-report was the most common form of

data collection (n=15), [7,10,28,33,34,36,37,39-41,43,45,47,48,50-52,55-62] followed by observation with document

review (n=4),[27,30,34,35,38,46,49,51-54] and direct observations without document reviews (n=2).[42,44,63]

In direct observation with document review, observers assessed documents, such as written

policies and menus. Most studies employed only one type of data collection; however, three

reported using a combination of the methods listed above.[34,42,44,51,52] For studies that utilized

provider self-report, six used paper versions only, [28,33,35,36,47,48,57,60,61] two were phone only,[51,52,60]

two provided the option of online or paper,[7,37,43,45,50,56] and one used online, paper, or phone.[57]

Three did not report the mode of data collection.[34,42,44,55,58,59] With regard to study design, cross-

sectional (n=8)[10,33,45,47,48,55,58-62] and pre-post (n=5)[28,36,39-42,57,63] were the most common.

      Adaptations. Six studies reported adapting the tool for use in FCCH settings.[27,30,34,35,38,46-49,51-53,55,58,59,61] One study presented the development and validation of the EPAO-FCCH

[27,30,35,38,46,49,53] and described that modifications were made from the original EPAO and included

rephrasing items about staff behavior from "the provider" to "any staff" as well as adapting

questions on physical space. For example, in capturing the presence of TV during meals/snacks,

a response option was added to assess presence of a TV in a nearby space that could still be

heard.[30] Another study adapted the NAP SACC wording from "staff" to "I." A few studies

reported shortening the NAP SACC[34,51,52] and EPAO-SR,[47,48] either to fit the needs of the

study,[34,51,52] or to prevent providers from feeling overly burdened by the tool.[47,48] Adaptations to reflect cultural practices to the EPAO-FCCH were made in one study,[51,52] which included adding foods (e.g., plantains, yuca) to instrument items. This study also made adjustments to items related to child feeding practices in anticipation that FCC providers alter feeding practices to account for food insecurity experienced among children served. Another study used the Child Feeding Questionnaire originally designed to examine parental practices and modified the tool to reflect practices of FCC providers.[61]

Reported Limitations and Strengths. Authors described limitations and strengths of the PSE HEPA tools they employed. The self-report nature of the tools and/or social-desirability bias were mentioned as limitations for the NAP SACC,[2,41,55,59,60] Child Feeding Questionnaire,[61] surveys modified from existing validated instruments,[10,33,44,62] and also the EPAO (social desirability bias only).[34,46-48,52] Vaughn and colleagues[33] described efforts to reduce social desirability bias by using a mail-in self-administered survey and reminding providers that responses would not be shared with licensing agencies. Using validated questions when developing surveys and also the prior validation of the EPAO was described as a strength.[38,47] However, one article explained the physical environment captured by the EPAO is only one aspect of that environment and other elements like policies and provider practices exist.[25] The opportunity to triangulate the EPAO,[52] NAP SACC,[52] and surveys modified from existing instruments[62] with other measurement tools (e.g., different modes, constructs captured) were cited as strengths. Lastly, having surveys available in Spanish[10,44] and also using tools designed specifically for FCC settings, such as the EPAO-FCCH[38] were also reported strengths.

Additional Measures Collected

Of the 18 studies, all but two[28,39-41,57] reported collecting data in addition to the PSE

HEPA tool. Characteristics on the FCC program and provider were collected across half of the studies.[7,10,27,30,34,35,37,38,42-46,49-53,56,60,61] Participation in programs, such as Child and Adult Care Food Program (CACFP)[7,10,33,37,43,50,56] and/or state Quality Improvement Rating System (QRIS)[7,10,37,43,50] were also collected across three studies. Five studies collected child physical activity via accelerometers, [27,30,34,35,38,46,49,51-55,58,59] two collected child dietary intake via the Dietary Observation for Child Care (DOCC), [27,30,35,38,46,49,51-53] and three measured child anthropometrics (e.g., height, weight).[27,30,35,38,46,49,51-53,55,58,59] Two studies collected dietary intake and anthropometrics at the provider level, with one study collecting physical activity, [27,30,35,38,46,49,53] one collecting dietary intake, [27,30,35,38,46,49,53] and two measuring anthropometrics. [27,30,35,38,46,49,53] Eight studies included provider perceptions and/or knowledge of HEPA,[7,34,36,37,43,50-52,54,56,61-63] such as barriers to implementing HEPA,[7,34,36,37,43,50-52] training needs,[34,56] attitudes towards HEPA,[36,51,52,61,63] knowledge of PA regulations,[62,63] among others. Two of these reported using qualitative data collection techniques, which provided insight on successes, challenges, and program improvement recommendations,[36] as well as program effectiveness and implementation strategies.[54]

Discussion

The purpose of this scoping review was to identify tools that are currently being used to assess PSE characteristics related to HEPA in FCC settings, document how identified tools are implemented, and provide an overview of the tools identified in this review. This scoping review identified 36 articles across 18 studies that utilized tools assessing PSE characteristics related to HEPA in FCC settings. Several important findings were identified.

First, there was a high degree of homogeneity of tools employed in FCC settings. Most studies used versions of the EPAO, NAP SACC, and/or tools modified from existing validated

instruments. Moreover, studies that created tools modified from existing instruments often adapted items and/or used specific items from the EPAO and NAP SACC to fit the needs of their study. For example, tools were shortened to assess specific constructs based on study goals (e.g., only child nutrition) and modified to capture data requested by local or state agencies (e.g., child care resource and referral agencies).[7,10,33,36,37,42-45,50,6251] A reported strength of this approach was utilizing validated items when possible. This may signify that current PSE HEPA tools (e.g., NAP SACC, EPAO) capture valid and reliable data, but do not always fit the needs of studies examining HEPA practices and policies in FCC. However, additional reliability and validity testing of FCC-specific versions of the NAP SACC and EPAO is warranted. Studies cited or presented reliability or validity for the EPAO-FCCH, with results suggesting low to moderate construct validity for nutrition and physical activity scores.[35,66] No studies reported on reliability or validity for the NAP SACC-FCCH. More specification may be needed when applied to FCC.

Second, provider self-report was the most common mode in which tools were employed. Self-reported data was also described as a limitation across numerous studies.[2,10,33,41,44,55,59-62] A hypothesis for this finding is that using this mode reduces participant burden and is also tailored to fit the physical environment of FCC settings. FCC programs are hosted in the provider's home, meaning that many FCC programs have a shared space, and also vary in size and layout.[3,23] However, observational tools, which involve a data collector in the home may seem obtrusive. Photo-elicitation techniques may serve as a proxy for direct observation; however, this requires a foundation of trust between FCC providers and researchers. Prior research suggests that challenges exist in identifying and engaging FCC providers since providers may not initially trust researchers, underscoring the need for participatory research approaches.[67] Photovoice, which is a participatory methodology that

utilizes photos taken by research participants to portray an issue,[14,15] may fill this gap and warrants additional research.

Third, the NAP SACC and EPAO offer versions of the instrument specifically designed for FCC settings, yet the majority of studies that employed these tools did not use FCC-specific versions. This may be due in part to the inclusion of center-based settings in the sample, which occurred among half of the studies that used versions designed for center-based settings. Using the primary tool likely enhances the ability to test within study hypotheses, however key information specific to FCC settings is lost. Further, the FCC-specific versions of these tools were developed after the original versions, meaning that studies conducted prior to this did not have FCC specific versions available for use. The EPAO-SR is not yet tailored for FCC settings; however, one study used the EPAO-SR with a sample of FCC providers and made adaptations to the tool to reflect the context of FCC settings by replacing the word "classroom" with "home" and using "you" instead of "staff/director."[25,47,48] Similarly, the Child Feeding Questionnaire is intended for parental practices in the home environment and the authors of that study adapted the tool to reflect FCC settings; however, details on adaptations were not reported.[61]

Minor modifications to measurement tools were made in other studies. Some modifications included tailoring tools to FCC settings, such as changing the word "staff" to "I" and accounting for the physical space of FCC settings.[27,30,35,38,46,49,53 55,58,59] FCC differ from center-based programs, and how they are able to implement HEPA best practices and policies may also differ. In capturing the presence of TV during meals/snacks, one study added a response option was added to capture presence of a TV in a nearby space that could still be heard.[30] Additionally, no two FCC programs are the same since they are hosted in a provider's home.[3,23] One example is the indoor layout of a home. In one study, providers that lived in homes with a series of small rooms described making their space work by moving furniture for additional physical activity

space, initiating activities (e.g., yoga, obstacle course), and designating rooms for specific

activities (e.g., craft room, activity room), while providers with open-concept homes and/or

larger rooms valued the amount of space for children to be active.

It is crucial that future research utilizes evaluation methods and measurement tools that

capture nuances of FCC settings. Though validated instruments exist and are widely used,[22,24] it

is likely that a measurement gap exists to capture the variation across and nuances within FCC,

given reported adaptations and also the number of studies that developed or modified tools.

Qualitative data collection methods may help capture this variation and elucidate more of the

nuances otherwise not captured.[68] Qualitative data collection techniques also present an

opportunity to incorporate community engaged research principles, given that prior literature

cites that challenges exist in engaging FCC providers in research[67] and one study in this review

reported that FCC providers may fear consequences related to child care licensing based on how

they respond to survey questions.[45] Though limitations of qualitative methods such as

generalizability, scalability, social desirability exist, triangulation with others in this review may

not only provide a more comprehensive understanding of HEPA in FCC settings, but also uplift

the voice of FCC providers.[14,15,69,70]

Finally, almost all studies in this review triangulated the PSE HEPA tool with other

measures, such as child dietary intake,[5,18,19,23,28] CACFP participation,[7,10,33,37,43,50,56] provider

perceptions of HEPA,[7,34,36,37,43,50-52,54,56,61-63] barriers to implementing HEPA,[7,34,36,37,43,50-52] among

others. A few studies indicated that a strength of the PSE HEPA tool is the opportunity to

triangulate data.[52,62] As mentioned above, qualitative data collection methods may fill a

measurement gap in the field. An opportunity exists to triangulate qualitative data with PSE

HEPA tools, which was done in two studies in this review to objectively assess HEPA best

practices and policies while also elucidating provider's experiences in implementing HEPA best

practices and policies.[36,54] Further, it can compensate for method weaknesses, capitalize on

method strengths, potentially offset some biases, and enable a greater degree of understanding

than using one approach.[68]

This study has limitations to report. This study used scoping review methods, which

lends to a broader, less defined search.[31] In this study, the original database search resulted in

4,104 references included for title/abstract screen. Due to the relatively high number of

references, only one author conducted the initial title/abstract screen. Although including only

peer-reviewed papers is a strength, this also presents a limitation in that there may be other

existing literature not published in peer-reviewed journals. It is also likely that ongoing or

recently conducted studies were not included. Lastly, this study presented validity and reliability

of tools only if presented or cited in the articles included in this review, meaning that an

exhaustive review of this was not conducted and results for this section should be interpreted

with caution.

Conclusions

Despite these limitations, this scoping review is the first to summarize what PSE HEPA

tools are used in FCC settings as well as how they are employed. Research on HEPA in FCC

settings is growing and this scoping review serves as a tool for public health practitioners and

researchers in curating research and evaluation approaches. As previously mentioned, FCC differ

from center-based settings and variability among FCCs also exist. It is critical that PSE HEPA tools

account for this to help FCC programs make PSEs more supportive of healthy behaviors for the

children in their care. FCC providers have tremendous reach to vulnerable children, which

amplifies their importance in public health efforts aimed at reducing health inequities and

promoting health among children.

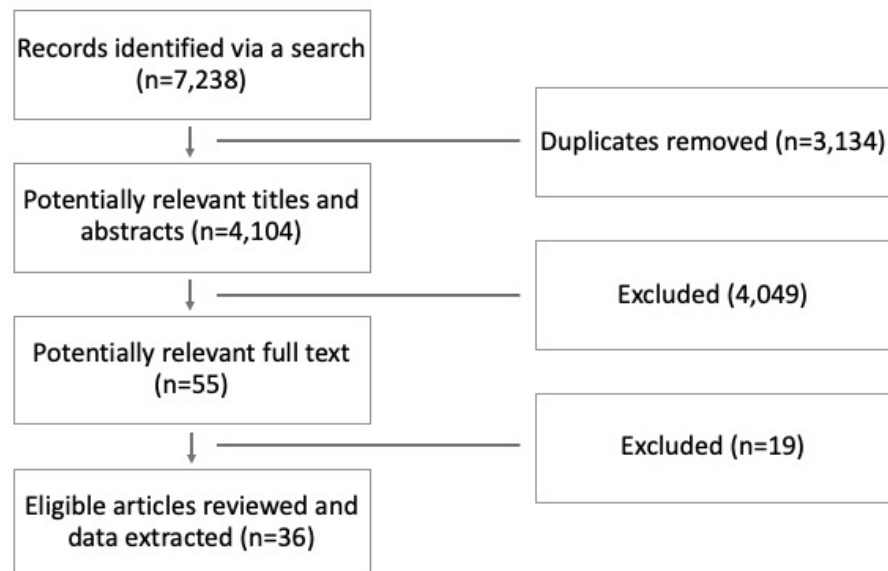Figure 1: Scoping Review Data Extraction

Table 1. Summary of Study Characteristics: Part 1

Frist Author & Year	Location	Study Design	Number of FCC in sample (% in article)
Vaughn, 2017;[35] Tovar, 2019;[49] Ward, 2020);[53] Neshteruk, 2018;[38] Benjamin-Neelon, 2018;[46] Mazzucca, 2018;[27] Østbye, 2015[30]	Not presented	Cluster-randomized trial	166 (100%)
	Rhode Island, North Carolina	Cross-sectional	131 (100%)
	North Carolina	Cluster-randomized trial	166 (100%)
	North Carolina	Cluster-randomized trial	166 (100%)
	North Carolina	Cross-sectional	166 (100%)
	North Carolina	Cross-sectional	166 (100%)
	North Carolina	Cluster-randomized trial	Desired sample: 150 (100%)
Tovar, 2015[10]	Rhode Island	Cross-sectional	105 (100%)
Cotwright, 2017[36]	Clarke County, Georgia	Pre-post	2 (25%)
Dev, 2018;[39] Dinkel, 2020;[41] Dinkel, 2018[40]	Nebraska	Pre-post	208 (100%)
		Cross-sectional	314 (61%)
		Pre-post	201 (100%)
Tomayko, 2020[54]	Wisconsin	Longitudinal	7 (47%)
Woodward-Lopez, 2018;[42] Kao, 2018[44]	Northern California	Pre-post	17 (100%)

Table 1. Summary of Study Characteristics: Part 1 (continued)

Frist Author & Year	Location	Study Design	Number of FCC in sample (% in article)
Pelletier, 2018;[43] Nanney, 2018;[37] Nanney, 2017;[7] Loth, 2019,[50] Arcan, 2020[56]	Minnesota	Cross-sectional	224 (36%)
	Minnesota	Longitudinal cohort comparison	87 (40%)
	Minnesota and Wisconsin	Cross-sectional	395 (48%)
	Minnesota	Cross-sectional	394 (64%)
	Minnesota and Wisconsin	Cross-sectional	395 (48%)
Lanigan, 2014[63]	Medium-sized suburban city in Northwest U.S.	Pre-post	Centers and FCC - % not reported
Gunter, 2012;[58] Gunter, 2012;[59] Chai, 2020[55]	Oregon	Cross-sectional	53 (100%)
			45 (100%)
			41 (100%)
Gans, 2019;[51] Risca, 2019[52]	Rhode Island	Cluster randomized trial	EPAO: 119 (100%) NAP SACC: 166 (100%)
Brann, 2010[61]	Onondaga County, New York	Cross-sectional	123 (100%)
Lazarus, 2018[45]	Washington	Cross-sectional	1260 (65%)
Tandon, 2012[60]	Florida, Massachusetts, Michigan, Washington	Cross-sectional	74 (44%)
Trost, 2009;[57] Trost, 2011[28]	Kansas	Cross-sectional	297 (100%)
		Pre-post	196 (100%)
Liu, 2016[33]	Ohio	Cross-sectional	81 (44%)
Leng, 2013[62]	Delaware	Cross-sectional	313 (100%)
Erinosho, 2018;[48] Erinosho, 2019[47]	Mississippi	Cross-sectional	134 (100%)
LaRowe, 2016[34]	Wisconsin	Quasi-experimental	7 (35%)

Table 1. Summary of Study Characteristics: Part 2

Frist Author & Year	PSE HEPA Tool	Adaptations	Methods	Additional measures
Vaughn, 2017;[35] Tovar, 2019;[49] Ward, 2020);[53] Neshteruk, 2018;[38] Benjamin-Neelon, 2018;[46] Mazzucca, 2018;[27] Østbye, 2015[30]	EPAO-FCCH	Study presents validation for the EPAO-FCCH. Modifications to the original EPAO included: rephrasing items about staff behaviors from "the provider" to "any staff" and also questions about the physical space were adjusted to account for the potential lack of a discrete classroom space.	Observation with document review	Child dietary intake (DOCC), PA (accelerometers)
				Child dietary intake (DOCC),
				Child dietary intake (DOCC), PA (accelerometers), anthropometrics, demographics; Provider diet quality, PA, anthropometrics, demographics, business practices
				Child PA (accelerometers), demographics; Provider anthropometrics, demographics
				Child dietary intake (DOCC), anthropometrics; Program/provider characteristics; Family demographics
				Child dietary intake (DOCC), PA (accelerometers), anthropometrics, demographics; Program/provider characteristic
				Child dietary intake (DOCC), PA (accelerometers), anthropometrics; Provider PA (accelerometers), diet, anthropometrics
Tovar, 2015[10]	Survey modified from existing validated instruments	None presented	Self-report via phone, online platform, or paper format	Program/provider characteristics; CACFP and Rhode Island QRIS participation
Cotwright, 2017[36]	Survey modified from existing validated instruments	None presented	Self-report via paper survey	Confidence about PA and nutrition; Interviews and focus groups exploring barriers to implementation

Table 1. Summary of Study Characteristics: Part 2 (continued)

Frist Author & Year	PSE HEPA Tool	Adaptations	Methods	Additional measures
Dev, 2018;[39] Dinkel, 2020;[41] Dinkel, 2018[40]	NAP SACC-FCCH	None presented	Self-report via online platform	None presented
Tomayko, 2020[54]	EPAO	None presented	Observation with document review	Child PA (accelerometers); Qualitative exit interviews exploring program implementation effectiveness
Woodward-Lopez, 2018;[42] Kao, 2018[44]	Survey and observational tool modified from existing validated instruments	None presented	Self-report, Observations	Program/provider characteristics; Plate waste observations; Lunch foods record; PA logs recorded by providers
Pelletier, 2018;[43] Nanney, 2018;[37] Nanney, 2017;[7] Loth, 2019,[50] Arcan, 2020[56]	Survey modified from existing validated instruments	None presented	Self-report via paper or online platform	Participation in Statewide Health Improvement Partnership; Program/provider characteristics; Child demographics
				Geographic location (census tract)
				Barriers to nutrition and PA best practices
				Participation in CACFP and state QRIS program
				Program/provider characteristics; Participation in CACFP; Provider training needs
Lanigan, 2014[63]	Observational tool modified from existing validated instruments	None presented	Observations	Provider's attitudes, beliefs, and knowledge related to eating, PA, and obesity prevention

Table 1. Summary of Study Characteristics: Part 2 (continued)

Frist Author & Year	PSE HEPA Tool	Adaptations	Methods	Additional measures
Gunter, 2012;[58] Gunter, 2012;[59] Chai, 2020[55]	NAP SACC	The word "staff" was replaced by the word "I"	Self-report (mode not presented)	Child anthropometrics
				Child PA (accelerometers)
				Child sedentary bouts (accelerometers)
Gans, 2019;[51] Risca, 2019[52]	EPAO-FCCH, NAP SACC	EPAO-FCCH adaptations made to reflect cultural practices (e.g., plantains, yautia, yucca added to the potatoes section); EPAO-FCCH was updated to include all possible food items at every meal/snack based on formative focus groups indicating providers may serve children a dinner style meal as a PM snack or breakfast as AM snack in concern that children not eating those meals at home; EPAO-FCCH response categories modified for certain variables from a numerical scale to: *never, a little, sometimes, a lot*; EPAO-SR and NAP SACC were shorted to create tailored intervention reports for FCCs in the Intervention group	EPAO-FCCH: Observation with document review; NAP SACC: Self-report via telephone	Program/provider characteristics
				Program/provider characteristics; Provider attitudes, self-efficacy, and barriers and facilitators related to nutrition, PA, and screen time in child care; Child PA (accelerometer), anthropometrics, dietary intake (DOCC)

Table 1. Summary of Study Characteristics: Part 2 (continued)

Frist Author & Year	PSE HEPA Tool	Adaptations	Methods	Additional measures
Brann, 2010[61]	Child Feeding Questionnaire	The tool was originally designed to examine parental practices with the preschool-aged children; Modifications to the wording of items reflected practices FCC providers	Self-report via paper survey	Provider anthropometrics, perceptions of childhood overweight, program/provider characteristics
Lazarus, 2018[45]	Survey modified from existing validated instruments	None presented	Self-report via paper or online platform	Program/provider characteristics, procurement practices
Tandon, 2012[60]	NAP SACC	None presented	Self-report via phone	Program/provider characteristics
Trost, 2009;[57] Trost, 2011[28]	NAP SACC	None presented	Self-report via paper	None presented
Liu, 2016[33]	Survey modified from existing validated instruments	None presented	Self-report via paper	CACFP Participation
Leng, 2013[62]	Survey modified from existing validated instruments	None presented	Self-report via paper	Knowledge of Delaware PA regulations for licensed FCC programs
Erinosho, 2018;[48] Erinosho, 2019[47]	EPAO-SR	Modified to reflect FCC context and consolidated so that providers would not be overwhelmed	Self-report via paper survey	Provider demographics

Table 1. Summary of Study Characteristics: Part 2 (continued)

Frist Author & Year	PSE HEPA Tool	Adaptations	Methods	Additional measures
LaRowe, 2016[34]	EPAO; NAP SACC	NAP SACC shortened to include: active/inactive play time, play environment, PA, and PA policy	EPAO: Observation with document review over one day; NAP SACC: self-report (mode not presented)	Child PA (accelerometers); Program/provider characteristics, perceived barriers to PA best practices, and training needs
Abbreviations: Environmental Policy Assessment and Observation (EPAO); Environmental Policy Assessment and Observation for Family Child Care (EPAO-FCCH); Nutrition and Physical Activity Self-Assessment for Child Care (NAP SACC); Nutrition and Physical Activity Self-Assessment for Child Care for Family Child Care (NAP SACC-FCCH); Environmental Policy Assessment and Observation Self Report (EPAO-SR); Diet Observation at Childcare (DOCC); Creating Healthy Opportunities in Childcare Environments (CHOICE); Protocol for Mapping Policies and Practices (PMPP); Body Mass Index (BMI); Child and Adult Care Food Program (CACFP); Family Child Care (FCC); Physical Activity (PA); Quality Improvement Rating System (QRIS), Family Child Care (FCC)				

Table 2. Summary of Policy Systems and Environmental Tools Assessing Healthy Eating and Physical Activity in this Review

Name of Tool, Number of Studies, and Citations	Description of Tool	Validity and/or Reliability Presented or cited in Articles	Strengths and Limitations Presented in Articles
Environment and Policy Assessment and Observation (EPAO) Number of Studies: 5 Study Citations:	**Overview:** The EPAO is designed to evaluate practices, environmental attributes, and policies of ECE settings that influence child nutrition, PA, and sedentary environments. Five content areas are assessed: child nutrition, infant and preschooler PA, outdoor play and learning, screen time, and breastfeeding and infant feeding.[25,65] **Versions:** EPAO, EPAO-FCCH, EPAO-SR **Development:** The EPAO was originally developed in 2006 to evaluate the Go NAP SACC intervention, an evidence-based program for improving the nutrition and PA environments in ECE settings. The EPAO has since been updated to align with updated standards and experience in the field. The EPAO-FCCH was adapted from the original EPAO and is designed for use in FCC settings. Changes included: restructuring data collection across the day, broadening its scope, and tailoring to FCC settings. The EPAO-SR was also adapted from the original EPAO. Primary modifications included adjusting items for provider self-report.[25,49,65] **Methods:** The EPAO and EPAO-FCCH include a combination of a day-long observation and review of program documents (policy and procedure manual, sample contract, parent communications, parent education materials, child curriculum materials, safety check documentation, menus, training materials and or certification documents). It requires data collectors undergo training and certification.[25,49,65]	**EPAO:** **Inter-rater reliability** for nutrition subscales ranged from ICC=0.05 to ICC=0.95 and for PA subscales ranged from ICC=-0.05 to ICC=0.88.[65] **Validity** by comparing child PA (MVPA) with EPAO PA environment subscales ranged from r=0.19 to r=0.50.[64] **EPAO-FCCH:** **Construct validity** via correlations of EPAO-FCCH nutrition scores and child HEI ranged from r=0.05 to r=0.28 and EPAO-FCCH PA scores and child MVPA ranged from r=-0.21 to r=0.18; **Inter-rater reliability** for nutrition score ranged from ICC=0.56 to ICC=0.96 and PA score ranged from ICC=0.22 to ICC=0.99.[35] **Face and content validity** by three topic area experts; **Internal consistency** for coercive control / indulgent practices α=0.96, autonomy support practices α=0.77, unhealthy role modeling α=0.86; **Predictive validity** via association of feeding practices and HEI, in which a 1-unit increase in the use of autonomy supportive practices was significantly associated with a 9.4-unit increase in child HEI score.[49] **Inter-rater reliability** for sub-scores ICC>0.80.[38]	**Strengths:** EPAO-FCCH is designed for FCC settings.[38] Objective and validated measure.[38,47] Opportunity to triangulate data with other measures, including self-report and observation.[52] **Limitations:** Social desirability bias could influence reporting.[34,46-48,52] The same children were not always present on observation days.[34] The physical environment is only one aspect of the PA environment.[38]

Table 2. Summary of Policy Systems and Environmental Tools Assessing Healthy Eating and Physical Activity in this Review (continued)

Name of Tool, Number of Studies, and Study Citations	Description of Tool	Validity and/or Reliability Presented or cited in Articles	Strengths and Limitations Presented in Articles
Nutrition and Physical Activity Self-Assessment for Child Care (NAP SACC) Number of Studies: 6 Study Citations:	**Overview:** The Go NAP SACC is designed to evaluate practices, environmental attributes, and policies of ECE settings that influence child nutrition, PA, and sedentary environments. Six content areas are assessed via separate instruments: breastfeeding and infant feeding, child nutrition, screen time, infant and child physical activity, outdoor play, and oral health.[26] **Versions:** NAP SACC, NAP SAC-FCCH **Development:** The NAP SACC was developed to evaluate the Go NAP SACC intervention and was tested against the EPAO. The NAP SACC-FCCH was later developed and modified from the original NAP SACC for use specifically in FCC settings.[26,28] **Methods:** The NAP SACC was developed as provider self-report.[26]	**NAP SACC:** **Inter-rater reliability** of nutrition scores ranged from kappa=0.20 to kappa=1.00 and PA scores ranged from kappa=0.44 to kappa=0.85; **Test-retest reliability** of nutrition scores ranged from kappa=0.07 to kappa=1.00 and PA scores ranged from kappa=0.17 to kappa=0.70; **Criterion validity** by comparing observations to self-assessments for nutrition scores ranged from kappa=-0.01 to kappa=0.70 and PA scores ranged from kappa=0.07 to kappa=0.79.[26] **Internal consistency** of nutrition scores α=0.76 and PA scores α=0.75.[28] **NAP SACC-FCCH:** None presented	**Strengths:** Opportunity to triangulate data with other measures, including self-report and observation.[52] **Limitations:** Data was self-reported.[41,55,59,60] Social desirability bias could influence reporting.[34,41,52,60] Not able to control for other contextual factors (e.g., location, season).[39] Several items may not be feasible to accomplish.[40,71]

Table 2. Summary of Policy Systems and Environmental Tools Assessing Healthy Eating and Physical Activity in this Review (continued)

Name of Tool, Number of Studies, and Study Citations	Description of Tool	Validity and/or Reliability Presented or cited in Articles	Strengths and Limitations Presented in Articles
Child Feeding Questionnaire (modified) Number of Studies: 1 Study Citations:	**Overview:** The Child Feeding Questionnaire is designed to assess parental beliefs, attitudes, and practices regarding child feeding, with a focus on obesity proneness in children (Birch et al., 2001). It is important to note that the article included in this review modified the Child Feeding Questionnaire for FCC settings.[61] The iteration Brann and colleagues[61] used included 21 items across five topic areas: perceived responsibility in child feeding (three items), concern about child weight (three items), restriction of child's food intake (eight items), pressure to eat (four items), and monitoring (three items). Response options include a 5-point Likert scale (ranging from 1 to 5), with higher scores representing a greater tendency toward feeding attitudes and practices. **Development:** The Child Feeding Questionnaire was originally developed by Johnson and Birch and colleagues (1985) and was developed to be appropriate for use in research settings with parents of normally developing children, ranging in age from the preschool period through middle childhood (Birch et al., 2010). **Methods:** As implemented by Brann and colleagues,[61] the survey was provider self-report via a paper survey.	**Internal consistency** for topic areas: perceived responsibility in child feeding $\alpha=0.83$, concern about child weight $\alpha=0.83$, restriction of child's food intake $\alpha=0.70$, pressure to eat $\alpha=0.70$, and monitoring $\alpha=0.77$.[61]	**Strengths:** None presented **Limitations:** Data collected were self-reported and not observational; Childcare providers were asked to respond to the questionnaire based on the preschool-aged children in their care. It is possible that different feeding attitudes and practices are used with different children.[61]

Table 2. Summary of Policy Systems and Environmental Tools Assessing Healthy Eating and Physical Activity in this Review (continued)

Name of Tool, Number of Studies, and Study Citations	Description of Tool	Validity and/or Reliability Presented or cited in Articles	Strengths and Limitations Presented in Articles
Survey modified from existing validated instruments Number of Studies: 7 Study Citations:	**Overview:** Surveys were based on the EPAO and Go NAP SACC. No authors indicate using the alternative versions of these tools (i.e., EPAO-SR, EPAO-FCCH, NAP SACC-FCCH) to develop the survey. In some surveys, response options were modified (e.g., yes/no, changes in Likert scales). **Development:** Modified surveys were developed to be used for: specific states or regions, to fit the needs of a study, and shortening the instruments (e.g., focusing on certain scales, shorting scales). In addition to the EPAO and Go NAP SACC, articles reported also conducting literature reviews, consulting with advisory boards, conducting key-informant interviews, pilot testing with ECE providers, and using state nutrition and PA standards to inform survey development. Some surveys reported on validity and reliability. **Methods:** All surveys are provider self-report. Modes varied, which included paper surveys, use of online platforms, and interviewer-administered via phone and in-person.	**Internal consistency** of nutrition best practices α=0.86 and PA best practices α=0.74.[50] **Internal consistency** of nutrition best practices and policy α=0.86 and PA best practices and policy α=0.82.[7] **Internal consistency** of nutrition best practices α=0.78 and PA best practices α=0.75.[37] **Face and content validity** by academic experts in survey design and local CACFP sponsoring organizations.[33]	**Strengths:** The survey was available in Spanish.[10,44] Previously validated questions were used wherever possible.[44] Efforts to reduce socially desirable responses were made by using a mail self-administered survey and reminding providers that responses would not be shared with licensing agencies.[33] **Limitations:** Data was self-reported.[10,33,44,62] Social desirability bias.[44] Used a proxy indicator (CACFP participation) for socioeconomic status of the provider and children.[10] Best practices in survey may not reflect national standards.[33] Validity of self-reported data could be increased by triangulating data measures.[62]

Table 2. Summary of Policy Systems and Environmental Tools Assessing Healthy Eating and Physical Activity in this Review (continued)

Name of Tool, Number of Studies, and Study Citations	Description of Tool	Validity and/or Reliability Presented or cited in Articles	Strengths and Limitations Presented in Articles
Observational tools modified from existing validated instruments Number of Studies: 2 Study Citations:	**Overview:** Observational tools were based on the EPAO and Go NAP SACC. Response options included yes/no for one study and a variety of Likert scale options as well as yes/no response options were used for another study. **Development:** Observational tools were developed to fit the needs of the study and were designed for use in FCC settings specifically. One study reported validity and reliability. **Methods:** In-person observations were used. One study indicated observations took place on one day. Another study included document reviews as part of the observations.	**Content validity** via expert review; **Criterion validity** via the Go NAP SACC; **Inter-rater reliability** Kappa=0.74.[63]	**Strengths:** Data was obtained via observation, minimizing reporting biases.[44] **Limitations:** Observations may introduce additional sources of measurement error (e.g., observations may have been under or overestimated due to a lack of precision in response categories).[44]

Abbreviations: Child and Adult Care Food Program (CACFP); Environment and Policy Assessment and Observation (EPAO); Environment and Policy Assessment and Observation for Family Child Care (EPAO-FCCH); Environment and Policy Assessment and Observation Self Report (EPAO-SR); family child care (FCC); intraclass correlation (ICC); Nutrition and Physical Activity Self-Assessment for Child Care (NAP SACC); Nutrition and Physical Activity Self-Assessment for Child Care Family Child Care (NAP SACC-FCCH); Quality Improvement Rating System (QRIS); Physical Activity (PA); moderate to vigorous physical activity (MVPA); Health Eating Index (HEI); Early Care and Education (ECE); Policy, Systems, Environment (PSE); Healthy Eating Physical Activity (HEPA)

CHAPTER 2: A GLIMPSE INSIDE FAMILY CHILD CARE PROGRAMS: A QUALITATIVE ANALYSIS OF

FACTORS THAT IMPACT THE PROMOTION OF HEALTHY EATING AND PHYSICAL ACTIVITY

Introduction

Studies indicate that promoting healthy eating and physical activity (HEPA) in early

childhood reduces the risk of obesity throughout the lifespan.[72,73] Several HEPA-based

interventions have demonstrated success in promoting best practices and policies in early care

and education (ECE) settings across the United States.[9,71] It has not been until recently that

HEPA-based interventions targeting family child care (FCC) programs have emerged in the

evidence-based scientific literature.[22,39,40] FCC programs are the second most utilized form of

childcare in the U.S. and a subset of ECE program in which providers care for children in their

own home rather than in a commercial facility.[2] Findings from HEPA-based interventions in FCC

settings suggest there is a need to consider the nuances of FCC programs unique from center-

based programs in order to broadly reach children.[13]

FCC programs are unique compared to center-based programs in a several ways. First,

are often staffed by one owner/operator, making the child care provider responsible for several

roles, including being a small business owner, chef, teacher, and provider.[3,4] This ownership and

decision-making responsibility gives FCC providers the opportunity to promote HEPA

interventions among children in their FCC program. FCC programs often serve children across

multiple age levels, have a higher proportion of low-income and minority children, are held in

smaller spaces, and have varying teacher-to-child ratios.[23] FCC providers themselves are more

likely to live in poverty, be women of color, or have low levels of education.[74]

Characteristics of the FCC environment (e.g., size of areas) and provider perceptions

may facilitate and or hinder the adoption and implementation of HEPA practices and policies.[13]

The adoption and implementation of HEPA practices and policies has the potential to reach

high-need populations (e.g., FCC providers and children in their care). To date, limited

research exists on HEPA in FCC settings and consequently, there is a gap in understanding

factors that influence FCC providers' adoption and implementation of HEPA practices and

policies. This information is critical in elucidating what types of approaches (e.g., trainings) may

be most relevant for FCC providers which can assist in developing appropriate and relevant

HEPA interventions.

The purpose of this study was to explore barriers and facilitators to promoting HEPA in

FCC programs from the perspective of FCC providers and describe how the identified barriers

and facilitators may differ from center-based programs. Results can help inform similar HEPA

interventions to help ensure tailored support is given to FCC providers, which may ultimately

impact health behaviors of children cared for in these settings.

Methods

Participants and Recruitment

Inclusion criteria included being 19 years or older, the owner and/or director of a FCC

program located in Nebraska, and English speaking. Participants were identified via a list of FCC

providers that had completed the *Nebraska Go NAP SACC*. An initial email (two follow-up

emails) with an online Qualtrics survey to indicate interest in participating was sent out to FCC

providers (n=76). Providers that indicated interest were recruited via email (2-3 attempts). Of

the 23 indicating interest, 21 accepted the interview invitation and two did not respond to

multiple contact attempts. Two that accepted the interview invitation later declined the

interview, and one interviewee was excluded from this analysis for being a subset of FCC

provider that does not operate out of their home, resulting in a final sample of 18. The study

was approved by the University of Nebraska Medical Center Institutional Review Board.

Data Collection

A semi-structured interview guide was developed to explore providers' perceptions of promoting HEPA in their program, barriers and facilitators to promoting HEPA, perceived differences between FCC and center-based programs related to HEPA. Each interview was conducted via phone by a trained interviewer and lasted approximately 40-60 minutes. Participants received a $25 check as compensation for their time.

Analysis

Participants provided consent to participate and be audio recorded. Interviews were transcribed verbatim. Coding and analysis was conducted using Dedoose™, a web-based qualitative analysis platform.[75] Two members of the research team independently reviewed five transcripts each and developed a list of codes using a Grounded Theory approach.[76] Codes were reviewed and discrepancies were discussed further until consensus was reached, resulting in a code list.

Two coders used the list to independently code all transcripts. During this process, the code list was discussed amongst the coders and refined as needed. Once coding was completed, codes were conceptually grouped into emergent themes through frequency of coding within similar context across interviews. The final coding scheme resulted in eight themes presented below.

Results

Providers had been in operation from 3 to 44 years (average 14 years). All but three providers operated Monday to Friday. The remaining operated: Monday to Saturday, Monday to Thursday, and 24/7. Hours that providers stayed open ranged from 9 to 12.5 hours per day. They typically served between four and twelve children at any given time. Most providers served infants, toddlers, and preschoolers, while a few also served school-aged children after

school and during summer break. Four providers described themselves as the primary provider, one had fulltime staff, and the remaining had a part-time, either a paid or unpaid sub/assistant, which was usually a family member. All but one provider participated in the Child and Adult Care Food Program (CACFP).

Age Groups of Children Served

Providers described that the age range of the children they serve impacted how they promote physical activity. Many indicated that engaging multiple age groups in physical activity is challenging and some described dividing time amongst children when caring for infants. One provider mentioned, "*When you have a wide range of ages to fulfill. All of their needs can be challenging because their needs are nowhere near the same and you can't be at two different places… at once.*" Several providers mentioned that having a second adult helped to engage children; however, the expense of hiring help was cited as a barrier. Many providers enlisted help from family members on occasion.

Serving children of multiple age groups was perceived as a unique challenge for FCC programs as compared to center-based settings. Providers described that center-based programs have multiple staff to engage specific age groups. However, some providers noted that serving various age groups encourages younger children to adopt gross motor skills from the older children. They felt the children they serve received more individualized and continued attention throughout the time a child was in their care as compared to center-based programs, citing that center-based programs have high staff turnover and rotate teachers.

Primary Provider

Providers discussed benefits and fallbacks of being the primary provider for their program. Providers indicated they are the primary decision makers for their program. Several highlighted the importance of staying educated to take the lead in promoting HEPA and all

providers had recently participated in some form of continuing education related to HEPA. As compared to a center-based setting, some providers described that if they did not take the initiative to promote HEPA, no one else would. For example, *"I'm in control here. Those little ones they're depending on me to make choices. They better be good choices."*

Some providers described that they valued the freedom of being the primary provider. More specifically, many providers emphasized that they are their own boss. They perceived that it was easier to adopt HEPA practices and policies in FCC than in a center-based setting because they do not have to get approval from higher-up staff, nor do they have to onboard staff on new practices and policies. Though many providers indicated that they value routine, they also felt that they can offer more flexibility in their daily routine as compared to center-based settings that might keep a stricter schedule.

Resources Available

Providers described resources, particularly money and time, as prominent barriers to promoting healthy eating. Though almost all providers participated in CACFP and utilized CACFP for guidance in what foods to serve, the high cost of healthy foods was cited as a barrier to healthy eating. One provider said that having a home vegetable garden reduced food costs.

Providers also described how time is a barrier to healthy eating. Many indicated that preparing healthful meals and/or snacks takes more time and indicated hiring an extra staff member would help keep children engaged in ways other than watching television. However, some providers indicated hiring an extra staff member would be helpful in these instances, though doing so can be expensive. As one provider described, *"It's helpful [to have an assistant]. But at the same time it cuts into my income because I have to pay her."* Additionally, some providers mentioned visiting the grocery store more frequently to purchase fresh foods and one provider cited that they do not have time "shop around for deals.

Role Modeling

Providers overwhelmingly viewed themselves as a role model for children in their care

and that role modeling helps promote healthy eating. They mentioned that children notice their

actions, especially what providers eat, underscoring the importance of consuming healthy foods

in front of children. They discussed role modeling during meal and/or snack time by sitting down

with children and eating family-style dining meals. Several providers emphasized the value of

children witnessing and assisting with meal and snack preparation. Providers described that

children in center-based programs are typically served meals and/or snacks without seeing what

is involved in preparation of what they are served. One provider also felt that it was important

for children to witness what food and beverages they have in their home for their personal lives.

They described, *"We don't have pop in our fridge and have kids go how come you don't have*

Gatorade we drink Gatorade in our house. We have discussions."

Program Priority Areas

All providers indicated that prioritizing HEPA helped them promote HEPA. Several

providers conveyed that if children did not eat well, then they would not learn well. Others

explained that getting adequate physical activity improves children's energy levels. HEPA was

not the only priority for providers, and cited other priorities: child development, social and

emotional skills, learning, maintaining a clean, conformable, safe, and secure environment,

routine and structure, hygiene, self-expression, and connection with nature. They described that

these priorities can be incorporated into HEPA and vice versa. For example, *"We're counting…*

everything that we do. We're at the playground and they're telling me what colors the slides

are."

Indoor Play Environment

Providers described that the physical attributes of their home impacted how they promoted physical activity. All providers lived in a house, though the size and layout of the house and how providers combined their home with their program varied. Providers that lived in open-concept homes and/or had larger rooms valued the amount of space for children to be active and indicated it was easier to keep children in eyesight. Others had a series of small rooms in their home and in most cases, providers used the multiple rooms for various purposes. Several providers described using larger rooms for active play and making their space work by initiating activities (e.g., yoga, obstacle courses). Lastly, providers who had a completely separate space for their FCC program in their home valued that separation of space, though it did not impact their ability to promote HEPA.

All providers described portable play equipment as a main way to promote physical activity indoors. Examples of cited equipment included: scarves, ride on toys, balls, parachutes, tunnels, and blocks. Several providers created designated areas for the age-groups they served, which included age-appropriate portable play equipment. Some mentioned that they rotated portable play equipment in and out throughout the year to keep the children interested in the toys.

Outdoor Play Environment

Providers perceived their outdoor spaces as a prominent way to promote physical activity and indicated that they try to spend as much time outside as possible. All providers had a fenced-in backyard and felt the size was large enough for children to be physically active. Fixed and portable play equipment were cited as factors that promoted physical activity. Fixed equipment included: slides, climbing structures, sandboxes, playgrounds, swings, and

trampolines. Cited portable play equipment included: sports equipment, chalk, ride on toys, hula hoops, jump ropes, bouncer seats, and Pack 'n Plays.

Providers described attributes of their outdoor space that helped promote physical activity, which included shade and soft ground. Providers described that soft ground (e.g., mulch and grass) created a safer environment for children to play. Further, some created dedicated spaces for the various age groups they served.

Providers relayed that they valued outdoor play time to promote physical activity; however, they described that inclement weather impacts how they promote it. Extreme hot or cold temperatures, rain, snow, and summer humidity were cited as weather events that hinder outdoor play time. They described going outside earlier in the day during hot weather, engaging with parents to pack appropriate clothing (e.g., rain boots, coats), and going outside for shorter periods of time during hot or cold temperature. Several providers noted that having shaded areas promoted increased outdoor physical activity time during warmer weather.

A few providers highlighted that compared to a center-based program, FCC programs do not have a gym as an alternative area for outdoor play time. Lastly, caring for younger children, especially infants, makes it challenging to go outside when weather conditions are not ideal. One provider explained how they dealt with the challenge, "*I care for infants and two-year-olds. It's hard to put them out there. If I have four or five year olds, yes, I will put the snow boots on and then go out. I stand by the door and watch.*"

Kitchen and Eating Environment

Many providers conveyed that the physical attributes of their kitchen and eating space did not impact the nutritional value of foods and beverages served; however, for some providers, it presented challenges in meal and snack preparation. Providers without an open concept layout often described keeping children in eyesight and engaged while preparing meals

and snacks was challenging. For example, *"The only thing could be better is if my kitchen and dining room were one open area. I could be at the stove and keep a closer eye on the kids."* To work around this challenge, several providers mentioned engaging children in meal and snack preparation and keeping infants in the same area. Lastly, a few providers mentioned that they did not have space for a large kitchen table, and instead had several smaller tables to fit their space, which they cited impacts their ability to sit down with all children during meal and snack times.

Discussion

The purpose of this study was to explore barriers and facilitators to promoting HEPA in FCC programs from the perspective of FCC providers, and identify how barriers and facilitators may differ from center-based programs. This study found that physical attributes (e.g., layout, size) of a program's indoor and outdoor area impacted how providers promoted physical activity. Other studies have reported lack of space for play as a prominent barrier to physical activity in FCC settings,[77,78] and one study found that FCC programs were less likely to have a variety of portable and fixed play equipment, as well as an adequate indoor play area as compared to center-based programs.[60] Regardless of the size and layout of their home, providers in this study used portable play equipment to promote indoor and outdoor physical activity. Several providers in this study reported rotating toys to keep children interested. FCC programs may benefit from innovative strategies to promote physical activity that consider the ecological aspects of a provider's home. However, this may require an in-depth understanding of contextual characteristics of the home.

Providers in this study described that the layout of their kitchen did not impact foods and beverages served. Literature indicates FCC, compared to center-based programs, reported serving more fresh fruits and vegetables, whole milk, and served less fried foods, bread, and 1%

milk.[33,79,80] Other studies indicate that FCC programs participating in CACFP reported serving healthier food and beverages and had more written nutritional policies compared to non-CACFP FCC programs.[48,80] Almost all providers in the current study participated in CACFP and many utilized CACFP as guidance on what to serve, also reported in another study.[77] However, providers in this study indicated the layout of their kitchen presented challenges in meal preparation, particularly keeping all children in eyesight and engaged. Being the primary provider of their FCC program may amplify these challenges.

The majority of providers in this study had a part-time assistants or aides, usually a family member. Providers described utilizing this help as needed (e.g., doctor's appointment) and a few providers noted they would like to hire an assistant, but doing so cuts into their salary. Literature indicates that FCC providers are likely to live in poverty,[74] which highlights a need for cost-effective strategies to promote HEPA. Conversely, providers in this study noted benefits of being the primary provider, in that they had freedom to implement HEPA practices without having to onboard staff or obtain approval from directors or owners, compared to center-based programs. Studies indicate that FCC programs have fewer written policies related to HEPA compared to center-based programs.[7,33] One hypothesis is that FCC providers, being the primary provider, do not feel the urgency or need to translate certain practices into written policies.

Providers in this study also explained that, as the primary provider, engaging children of multiple age groups was challenging, also reported by other studies.[10,78] Some providers in the current study indicated that this was especially challenging during times when the weather was not permitting to go outside. Several studies reported that a large portion of FCC providers did not have an indoor play space suitable for activities during inclement weather.[57,58] Providers in this study highlighted that portable and fixed play equipment was age appropriate and a few

providers described creating spaces designated for certain age groups. Encouraging FCC

providers to use their spaces appropriately and creatively can open up opportunity for motor

skill development and physical activity space.

In this study, physical attributes of providers' homes varied, and impacted how they

promoted HEPA. FCC providers care for children in their home, thus no two programs are

identical. This variability among FCC settings demonstrates a need to capture the nuances of FCC

settings more thoroughly than current HEPA environmental-level measurement tools, such as

the NAP SACC and Environment and Policy Assessment Outcomes (EPAO). A measurement tool

that can capture the nuances of FCC settings may be used as to supplement existing tools.

Photovoice, a participatory method that uses photos taken by participants to illustrate their

environment, may serve as a useful tool to capture the ecological aspects of HEPA in FCC

settings.[14] A new tool utilizing photovoice could potentially be used to provide tailored technical

assistance, which has been previously found to support the implementation of HEPA in ECE

settings (Chiappone et al., 2018). Photovoice can also help to elevate the voice of hard-to-reach

populations in research studies.[69] FCC providers themselves are more likely to live in poverty, be

women of color, or have low levels of education.[74] The use of photovoice in the FCC setting may

be advantageous given challenges in conducting research in FCC programs.

This study has limitations to note. First, because data were largely interpreted by the

authors of this study, caution was exercised by striving for objectivity and employing

independent coders to diminish potential interpretation bias. This practice reduces the potential

for authors to interpret findings in the context of their own personal attitudes. Second, this

study utilized participants who were willing to openly share information about their FCC

programs, suggesting this sample was comprised of individuals with relatively higher self-

efficacy as FCC providers. Third, FCC providers in this study were based only in Nebraska,

potentially limiting generalizability and warranting that further testing

Conclusion

Despite limitations, this study fills a gap in research by contributing to literature addressing

HEPA in FCC settings, identifying barriers and facilitators to promoting HEPA in FCC settings, and

providing recommendations to promote the adoption and implementation of HEPA practices

and policies in FCC settings. One key finding from this study is that the physical attributes (e.g.,

size, layout) impacted how providers promoted HEPA. The development of a new measurement

tool that captures the ecological characteristics of FCC programs utilizing participatory methods,

such as photovoice, may be integral in supporting the adoption and implementation of HEPA

practices and policies in this setting.

CHAPTER 3: A MOBILE APPLICATION TO CAPTURE HEALTHY EATING AND PHYSICAL ACTIVITY

BEST PRACTES IN FAMILY CHILD CARE HOMES: GENERAL METHODOLOGY AND LESSONS

LEARNED

Introduction

In the recent decade, smartphone usage has become ubiquitous in the United States.[17] It is estimated that nearly 77% of Americans and 67% of low-income Americans use smartphones.[17] Rapid advancements in the accessibility, convenience, quality, and user friendliness of mobile technology have been made in the past decade.[18] Given the widespread use of smartphones and growing technological capacities, mobile health (mHealth) interventions are growing in popularity across the public health landscape.[16] mHealth is broadly defined as medical or public health practice supported by mobile devices.[16]

One application of mHealth is utilizing mobile technology, particularly mobile applications (apps), as a platform for data collection.[18] Data collection supported by mobile apps can alleviate researcher burden by increasing the efficiency of data collection.[16] Mobile apps can gather large quantities of data and transform data into usable formats for data analysis in cost-effective and time-efficient ways.[16,18] Other advantages of mHealth include the potential for broad reach, accessibility, and ability to provide tailored and interactive support (e.g., push notification reminders) to participants.[16]

One area for exploration of mHealth as a platform for data collection is within the area of healthy eating physical activity (HEPA) based interventions in early care and education (ECE) settings. These multi-component HEPA-based interventions support ECE providers in adopting HEPA best practices and policies through delivering evidence-based materials, peer-to-peer learning, action planning, and technical assistance.[9,12] Although several HEPA-based interventions have demonstrated success in promoting best practices and policies in ECE

settings, these interventions tend to be resource intensive and also entail a high level of engagement from participants.[12] Utilizing mHealth to capture the adoption and implementation of HEPA best practices and policies in ECE settings may further support intervention activities by providing timely and actionable data. Family child care (FCC) programs, which are a subset of early care and education programs in which providers care for children in their own home rather than a commercial facility (e.g., center-based programs), are a subset participants in HEPA-based interventions.[2-4] FCC programs are often staffed by one owner/operator, which makes them responsible for a multitude of roles.[3,4] Without the workplace infrastructure and benefits, FCC providers may experience exacerbated challenges in participating in HEPA-based interventions due to competing priorities.[3,4] mHealth may support FCC providers interested in engaging in HEPA-based interventions by minimalizing the burden of data collection and engagement.

Additionally, FCC providers care for children in their home, thus no two FCC programs are identical. This variability across FCC settings may impact the adoption and implementation of HEPA best practices and policies; perhaps also making measurement more difficult. mHealth that utilizes photos to assess adoption and implementation of HEPA best practices and policies in FCC settings may capture ecological aspects and nuances of FCC settings and assess real-world implementation. In turn, data collected via this application of mHealth could be used to provided tailored technical assistance, which is sometimes a component of HEPA-based interventions.[29]

However, utilizing mobile apps in public health research comes with challenges.[16,19,20] Often, high upfront cost for developing a mobile app may limit the use of this platform in the public health landscape.[16] A disconnect between researchers and the technology industry also exist (e.g., terminology, project or research goals, research methods).[20] Technology industries

and/or app developers have created most apps, however, these app developer often lack the expertise to base features on the evidence-base.[16] Conversely, apps have also been developed by researchers and are found to lack consumer appeal and have a disjointed "user experience".[19] Thus, interdisciplinary alliances and collaborative strategies are vital to meet the needs of participants.[16] Using a framework that supports the needs of mobile app users may increase feasibility in utilizing mobile apps for data collection in public health settings.[19,21,81]

The purpose of this study is twofold. First, this study describes the process of applying a user-centered framework to develop a mobile app that utilizes photos to assess the adoption and implementation HEPA best practices and policies in FCC settings. Second, this study presents lessons learned from developing the mobile app to inform future public health efforts.

Methods

Project Background

In 2018, a pilot study was conducted to test feasibility of using a modified photovoice approach (termed Photo Story) as a data collection method to explore and observe HEPA best practices and policies in FCC settings. Photovoice is a participatory method that utilizes photos to illustrate the reality of environments or situations communicated by participants (e.g., FCC providers).[14] In the pilot study, 15 FCC providers participating in a HEPA-based intervention took photos of HEPA-related practices and policies in their program.

HEPA-related photo categories were developed and included: breakfast, morning snack, lunch, afternoon snack, drinking water, indoor space, outdoor space, eating space, option photo 1, optional photo 2, and optional photo 3 (Table 3). Photo categories were developed based on the HEPA intervention, expert advice, and guidance from the funder of the pilot study. Participants were provided with a Photo Story handbook that outlined the requested photo

categories with space to provide a written narrative for each photo category. Completed

handbooks and photos were emailed to the research team. Further detail on these processes

can be found elsewhere.[13]

Results from the pilot study indicated that the Photo Story method provided a

qualitative glimpse into the adoption and implementation of HEPA best practices and policies in

FCC settings. However, participants deviated from the protocol. Of the submitted photos, 46%

were considered duplicate. Moreover, 47% of providers did not label their photos according to

protocol, suggesting room for improvement on instruction and participant fidelity. These

deviations from the protocol increased researcher burden, potentially introduced researcher

bias, and limited the scalability. Recommendations suggested that the Photo Story method be

translated into a mobile app to address these issues.

The lead author used the Photo Story handbook to develop a prototype of a mobile app

interface in JPEG format utilizing a free online software (Figure 2). The lead author then

collaborated with a group of undergraduate students at a state institution, enrolled in an

Undergraduate Senior Design Lab course (referred to as developers) to develop the mobile app

based on the initial protype.[82] Throughout the course of one academic year (i.e., fall and spring

semester), the lead author met weekly with the developers to discuss needs for the mobile app

frontend (i.e., graphical interface) and backend (i.e., responsible for storing data and is not

accessed by the user), and to monitor the mobile app development process. At the end of the

academic year, a minimal viable product (MVP) of the mobile app was completed and published

to the Google Play Store and Apple Store; however, the lead author later collaborated with

another developer to make additional changes and re-publish the app. This study was approved

by the University of Nebraska Medical Center Institutional Review Board.

Theoretical Framework

The Information System Research (ISR) framework guided the development of the mobile app (Figure 3).[83] ISR is a user-centered framework for development, implementation, evaluation, and adaptation of artifacts (i.e., a mobile app). ISR, which has previously been used by public health researchers, emphasizes the end-user's involvement from initial concept formulation to implementation and consists of three iterative research cycles: relevance, design, and rigor cycle.[21] The relevance cycle seeks to understand the end-user and their environment, including reasons for developing the mobile app. The rigor cycle examines scientific evidence and theory to support and inform the mobile app. The design cycle includes building and designing the mobile app, which also involves evaluating the mobile app to improve the design and increase the likelihood of uptake, acceptance, and sustained use.[83] These cycles were iteratively applied to develop the mobile app.

Data Collection and Analysis

Data collection and analysis methods outlined by ISR cycle included the relevance, rigor, and design cycle (Figure 4).

Relevance Cycle. To meet the need of the relevance cycle, semi-structured interviews were conducted with 19 Nebraska-based FCC providers who had previously participated in a HEPA-based intervention. An interview guide was developed to explore FCC providers' perceptions and use of mobile apps and to gather feedback on the proposed mobile app. Interviews were conducted via phone and lasted approximately 30-45 minutes. Participants provided consent to participate and interviews were audio recorded and transcribed verbatim.

Rigor Cycle. To meet the goals of the rigor cycle, two authors (AC and TG) conducted a document review of HEPA best practices to further refine and ground the photo categories used in the pilot study. The Nutrition and Physical Activity Self-Assessment for Child Care for Family

Child Care Homes (NAP SACC FCCH) was used for the document review of HEPA best practices.

The NAP SACC FCCH consists of 113 items that assess best practices in five topic areas:

breastfeeding and infant feeding (22 items), child nutrition (44 items), infant and child physical

activity (20 items), screen time (12 items), and outdoor play and learning (13 items).[53] The NAP

SACC FCCH has established validity and reliability and is widely used in FCC settings.[46,53,67] AC and

TG independently coded each item using the following question: Can this item be reasonably

observed in a photo? Authors responded yes or no for all 113 items. If there was disagreement,

the authors discussed their responses and came to a final conclusion.

Design Cycle. To meet the needs of the design cycle, user testing with the research team

was conducted and user testing with FCC providers was conducted.

User Testing with Research Team. Iterative rounds of user testing were conducted with

the research team. These rounds were conducted until results reached consensus, which was

three rounds. User testing with the research team occurred when the app was in its final stages

of development within the Expo app, which is an open-source platform for developing Android

and iOS apps that simulates changes made to the app. The Expo app allows for user testing prior

to the mobile app going live, meaning the mobile app is published in the Google Play Store and

Apple Store.

In each round, four members of the research team completed a series of pre-outlined

tasks. For each task completed, users were asked to: describe if and how they encountered

issues completing tasks, provide feedback on interface, likes, and dislikes, propose changes,

offer additional feedback, and "play around" with the app as they saw fit. Users were provided

with a user testing guide that included written prompts and recorded their experiences on the

document. In-between each round of usability testing, the lead author compiled proposed

changes, determined which changes to incorporate, discussed proposed changes with

developers, and suggested changes were incorporated. The mobile app, which was named

Photo Story FCC, was published to the Google Play Store and Apple Store at the end of user

testing with the research team.

       User Testing with FCC Providers. User testing with FCC providers was conducted after

user testing with the research team to ensure that FCC providers experienced *Photo Story FCC*

with limited technological issues. Testing was conducted on the live version of the mobile app.

Figure 5 displays images of the mobile app that was initially published to the app stores. The

images also include annotated instructions. It is important to note that there was a change in

developers at the start of this usability testing with FCC providers. This was due to the

completion of the Undergraduates Senior Design Lab course. Iterative rounds of user testing

were conducted until consensus was reached, which resulted in two rounds. FCC providers that

participated in the relevance cycle interviews were eligible to participate in user testing.

       In the first round, 11 FCC providers were invited to participate via email, eight agreed to

participate, and three did not respond to multiple contact attempts. One FCC provider did not

complete the user testing process, resulting in a final sample of seven. In the second round, the

13 FCC providers that were not contacted or did not participate in the first round were invited to

participate via email. Five agreed to participate and of those, one did not complete user testing,

resulting in a final sample of four FCC providers. Participants were offered a $50 incentive (check

in round 1 and a gift card in round 2) for participation.

       Users were provided with instructions for downloading the app and a user guide. Users

were instructed to complete all tasks within the mobile app and advised to refrain from taking

photos with children's faces to promote anonymity. Once complete, semi-structured interviews

were conducted via phone to explore perceptions about the interface layout and photo

categories, experiences in completing tasks within the mobile app, utility of user guide,

additional feedback, and relevance to their participation in a HEPA-based intervention.

Interviews were conducted via phone, lasted approximately 15 to 30 minutes, and notes were

taken by the interviewer. Participants who were not able to participate in a phone interview

(n=3) were provided with the opportunity to provide feedback via written documentation.

Specifically, they were provided with a user testing guide that included written prompts and

recorded their experiences on the document. Feedback was summarized and discussed with the

developer. Changes to the mobile app were made iteratively in between rounds.

Results

Relevance Cycle

Results from the interviews with FCC providers indicated that all participants utilized

mobile apps, with 18 accessing mobile apps via a smartphone and one via an iPad because they

did not own a smartphone. Of the 19 participants, 12 utilized Apple and 7 Android operating

systems. Due to this, the mobile app interface was tested in tablet view and various layouts of

Apple and Android mobile devices. When prompted, participants reported that they did not

view privacy concerns as a barrier to utilizing mobile apps in general and did not anticipate

privacy concerns in sharing photos of their FCC program via a mobile app. Some participants

indicated that they only used mobile app for clerical functions (e.g., email, text messages), while

other participants used a variety of mobile apps (e.g., social media).

Participants discussed attributes they desired in a mobile app: a user-friendly interface,

the ability to stop and start tasks within the app at any time, and relatively low time

commitment. Several participants described using a mobile app in their FCC program for the

Child and Adult Care Food Program. However, participants described that the app interface is

not user-friendly and data input requirements were tedious and time consuming. All

participants indicated that data-usage was not a barrier to using mobile apps because they

always connected to Wi-Fi in their home. A few participants noted that the reliability of their Wi-

Fi and/or cellular service was sometimes an issue. Results varied for how participants preferred

to learn how to use a new mobile app. Learning mechanisms included: learning by experience,

getting assistance from friends and families, and online step-by-step tutorials. Based on this

feedback, the lead author developed a user guide for assistance in the first round of user testing

with FCC providers.

Rigor Cycle

In coding the NAP SACC-FCCH for observable items, two authors reached 81%

agreement. After discussion of items authors disagreed on, authors came to 100% agreement.

Overall, 50% of items were coded as observable and 50% not observable. Observable items

were then thematically grouped into categories (Table 1), which were used as requested photo

categories for the initial user testing with the research team.

Design Cycle

User Testing with Research Team. Results from the three iterative phases of user

testing with the research team are presented in aggregate. Users reported that the layout and

design was straightforward and easy to use. Users suggested several changes, which included

resizing the logo and improving text that ran off the screen. They also noted that the photos

were not sized proportionally on their screen when uploaded. One user suggested providing

examples for future users and/or instructions on how to use the application. Overall, the

majority of feedback reported was related to "glitches" users experienced. For example, users

experienced slow upload times, photos in certain categories did not upload, and in some

instances the application did not mark the photo upload as complete even when users

completed the task.

In addition to the app functionality, a handful of users testing the app were experts in

HPRA in FCC settings and provided feedback on the language for labeling photos. First, the

category names were revised to be more specific and align with HEPA elements. For example,

indoor space was renamed to *indoor activity space*. Second, two categories (*morning snack* and

afternoon snack) were condensed into one category (*snacks served*). This change was made

because not all FCC providers serve a morning snack. Similarly, *breastfeeding space* was noted

as optional to submit because not all FCC providers serve infants and/or have a space available

for breastfeeding.

Another suggestion was the option to submit more than one photo per category,

because one photo may not sufficiently capture a photo category. For example, one FCC

program that has a large and/or segmented backyard may need to submit multiple photos to

capture their program's outdoor activity space. All suggested changes were made to the mobile

app throughout the three rounds of user testing except for the suggestion to allow for multiple

photos within photo categories and also the issue of slow photo upload times. These changes

were not initially made due to the timeline of the Undergraduate Senior Design Lab course;

however, they were later made when the second developer was brought in.

User Testing with FCC Providers. Results from the two iterative phases of user testing

with FCC providers are presented in aggregate. Users felt the interface was easy to use, did not

experience challenges in not including children's faces, and indicated the tasks (i.e., submitting

and describing photos) were not time consuming. Users were not able to provide an accurate

estimate of time spent on the app because they used it in multiple sittings. Only a few users

utilized the user guide in the first round and indicated that new users would be able to learn and

use the app without the user guide. As a result, a user guide was not developed in the second

round to assess if the app could be used successfully without that support. Users in the second round indicated they were able to easily learn and use the app.

Users appreciated that they did not have to complete all tasks in one sitting. They explained that in FCC settings this is critical since they are the sole provider and have to navigate handling competing demands (e.g., caring for children's needs, cooking) often arise. Participants also discussed the utility of the mobile app. Users had previously participated in the Go NAP SACC intervention and the majority of users expressed that using this mobile app would have improved the quality of technical assistance they received while participating the NAP SACC intervention. Several providers in rural locations indicated that they rarely received onsite technical assistance and that this app could function as a proxy for onsite technical assistance when applicable. Several users also reporting liking the ability to submit optional photos that may not fit the defined photo categories and noted that it was an opportunity to showcase innovative HEPA strategies.

Users noted several logistical issues. First, users were not able to change their password once it was initially set. Subsequently, an option was added to change passwords within the app. Several users indicated that they disliked having to log into the app. However, a log-in was required in order to control who can use the app and the data reported. In addition, some users experienced slow photo upload times. In response, a maximum photo size for uploads was set to improve upload speeds. Users suggested that the app allowed for the submission of more than one photo in each category. For example, one user indicated they had multiple rooms for indoor physical activity. This resulted in changes to the interface that allowed for users to submit multiple photos. When asked about photo categories, the majority of users felt the photo categories represented HEPA but advised that a *physical activity* photo category be added to the list. This change was also incorporated.

Users had several suggestions that were not able to be made in the scope of this study due to time and financial limitations. The first was allowing videos to be uploaded in addition to photos. The second was allowing for photos to be annotated (e.g., draw an arrow to highlight an aspect of the photo, ability to cover children's faces with shape) within the mobile app. Finally, some users thought it would be useful to share their photos with other providers to garner more insight on how other FCC providers are implementing HEPA best practices and policies. The final version of Photo Story FCC published to the App Store is located in Figure 6.

Lessons Learned

The following section synthesizes lessons learned from the mobile app development process. First, the authors initially planned to conduct user testing with FCC providers earlier in the mobile app development process. However, in earlier stages, a working version of the app only existed within the Expo app, which was used to make changes to the app and simulate those changes. In the first round of user testing with the research team, there were high levels of confusion in using the *Photo Story FCC* app within the Expo app. Therefore, a decision was made to delay user testing with FCC providers until the app went live. This decision had benefits and drawbacks. Pushing back user testing with FCC providers allowed for technical issues and glitches to be fixed, leaving FCC providers with a more seamless experience in using the app. However, FCC providers made several suggestions that would have taken fewer resources to change earlier in the app development process.

Second, authors partnered with undergraduate students over one academic year to develop the mobile app. The majority of the academic year was spent creating an MVP and less time was available for user testing on a live version of the app. Towards the end of the academic year, some suggested changes were not able to be incorporated due to the rigid timeline of the academic year. Additionally, an MVP is useful for concept testing; however, MVPs lack consumer

appeal and features that are intuitive to users. After the academic year was complete, the

author partnered with a different developer to transform the MVP into a more user-friendly

product and make suggested changes that were not able to be completed in the academic year.

To prioritize changes to the app, the lead author and developer created a list, separating

changes into two categories: "*need to have*" and "*nice to have*."

Third, timelines for suggested changes to the app varied. Changes that seemed simple

took more time than expected, especially when making changes across Apple and Android

operating systems. Even though React Native, a software package designed to develop apps in

both Apple and Android operating systems was used, sometimes changes were not successful in

both operating systems. Further, changes may unexpectedly alter other aspects of the app and

thus the app in its entirety should be tested when changes are made. Apps also require

continuous updating of software packages written into the code. Plans to sustain the mobile app

after it is live need to be considered during the planning stages. Given a limited budget and or

lack of access to a developer long-term, a web-based app, which is accessed via an internet

browser, may be more feasible and require less maintenance.

Discussion

This paper described the development of a mobile app, *Photo Story FCC*, that uses

photos to assess the adoption and implementation of HEPA best practices and policies in FCC

settings utilizing the ISR framework. Although the methods outlined in the paper are ubiquitous

and broadly utilized in the informatics field, this user-centered approach to developing a mobile

app in the public health landscape is novel.[21] A current criticism of mHealth, specifically

delivered via mobile apps, in the public health landscape is that mobile apps are either

developed with limited evidence-based features incorporated or developed with a lack of

consumer appeal.[16] ISR framework is a major strength of this study and was selected for its

ability to bridge the gap between evidence-based and user-interface.

In our application of the ISR framework, each stage resulted in important changes made

to the end product, demonstrating that each iteration provided meaningful improvements.

Results from the relevance cycle established parameters for the app from the perspective of FCC

providers. In *Photo Story FCC,* providers take photos within their own home. Authors had

anticipated privacy concerns because prior research suggests FCC providers may be

apprehensive about participating in research.[67] Providers in this study did not express concern in

submitting photos taken within their homes, which suggests privacy concerns will not be a

major roadblock to uptake of *Photo Story FCC*. However, given these conflicting findings and

that providers in this study were highly motivated, this should be explored in a broader

audience. Additional efforts targeted in the relevance cycle may help ensure resources allocated

to mobile app development are used efficiently.

Another key finding from the relevance cycle is that tasks in *Photo Story FCC* could be

optimized if users could complete the app's tasks in more than one sitting and in minimal time.

FCC providers are typically the sole provider, meaning they do not have additional staff or aides,

making time efficiency of high importance.[3] Competing priorities may make it extremely difficult

to complete the app's task in one sitting. A systematic review recommends that mHealth should

be able to be accessed within the shortest time possible.[19] As a result, the app was designed to

save information as users interact with it to reduce participant burden and increase likelihood of

continued use. Also due to these findings, authors monitored time spent using the app during

the design cycle. Though a study protocol was developed prior to the start of this project, the

ISR framework is iterative. Thus, mHealth interventions using similar frameworks may benefit in

flexibility of study protocols via building on results garnered from the iterative cycles.

Outcomes of the rigor cycle helped parallel photo categories with the NAP SACC FCC, which grounded *Photo Story FCC* in scientific evidence. These outcomes also bolstered relevance of *Photo Story FCC* within the NAP SACC intervention. In user testing, providers indicated that if they had access to *Photo Story FCC* while participating in the NAP SACC intervention they would have received more tailored technical assistance. They mentioned that technical assistance providers would have been able to visualize what their space looked like and provide better suggestions on incorporating HEPA. One study suggests that tailored technical assistance within the NAP SACC intervention is associated with improved programmatic outcomes,[29] warranting further testing of *Photo Story FCC* within the NAP SACC intervention. Additionally, *Photo Story FCC* could serve as a proxy for onsite technical assistance, reducing costs associated with time and travel. This could also increase the feasibility of providing tailored technical assistance to rural providers, which should be explored further.

In the design cycle, an MVP of *Photo Story FCC* was developed and then later transformed from an MVP into a user-friendly product. However, the design cycle was met with an array of challenges and lessons learned. Initially, user testing with the research team helped in identifying and fixing technological issues in the app prior to user testing with FCC providers. A systematic review developed criteria related to the design, development, and analysis of mHealth-related apps.[19] A key criteria was technology, in that the app works smoothly and does not fail or "crash".[19] In this project, the majority of changes and time spent were related to this criteria.

The MVP produced at the end of the academic year functioned in theory but did not fully meet this criteria and lacked consumer appeal. A second developer was brought in to make these changes, which extended the timeline of the project. MVPs are important in that the minimum functions needed for the app to work are established and this allows researchers to

test the concept prior to going full scale.[84] However, consumer appeal is also critical to cultivate

a positive user experience and wider dissemination of mHealth needs to go beyond MVP.[19,84]

Given budgetary constraints, creating a list of what is nice to have versus what is needed helps

prioritize changes.

Additional concept testing prior to the development of a MVP may streamline user

testing while reducing the likelihood of large, structural, and resource intensive changes later in

the process. In this project, user testing with FCC providers was delayed. While most

recommended changes were related to consumer appeal, users suggested several structural

changes (e.g., ability to submit more than one photo per topic area) that would have been

easier to address in earlier stages. Further, addressing structural changes resulted in new

technological issues and building in additional time for unexpected errors is crucial.

In the current project, user testing resulted in meaningful changes and is a critical part

of mHealth development. However, future mHealth efforts need to understand what user

testing entails throughout various phases of mobile app development. For example, in this

project, user testing towards the beginning was conducted in the Expo app, while user testing

that occurred later was with the live app. This can impact what user testing looks like and the

level of involvement that is required by participants testing the app. Strong multidisciplinary

alliances are critical in developing research protocols. Though the lead author sought to

understand the mobile app development process, there was a gap in understanding what initial

stages of user testing looked like, which resulted in changes to the project timeline and

adaptations made throughout.

This paper has limitations to note. First, the sample size was small and study participants

were only located in Nebraska, limiting the study's generalizability. Second, this study was

mainly qualitative, and results should be interpreted with caution. Third, *Photo Story FCC* was

not tested with current HEPA intervention participants, warranting additional testing. Fourth,

the ISR framework was presented sequentially in this paper. The cycles were iterative, both

across and within the relevance, rigor, and design cycle. Fifth, the focus of this paper was on the

frontend development of the app, and more literature needs to explore the development of the

backend of mHealth.

Conclusion

Despite these limitations, the use of the ISR framework is a major strength of this study

in that it engages all users and bridges the gap between public health and the informatics field.

Photo Story FCC demonstrates promise in capturing HEPA best practices and policies in FCC

settings and also as a tool to provide tailored technical assistance within HEPA-based

interventions. This study also reflected on valuable lessons learned in mHealth development,

with a focus on technological aspects. Researchers and public health can draw on the methods

and lessons learned in this paper to improve efficiency and resource allocation of mHealth

projects.

Table 3. Requested Photo Categories

Photo Story Pilot Photo Categories	Initial Mobile App Photo Categories	Final Mobile App Photo Categories
- Breakfast - Morning snack - Lunch - Afternoon snack - Drinking water available - Indoor space - Outdoor space - Where children eat - Optional photo #1 - Optional photo #2 - Optional photo #3 - Optional photo #4 - Optional photo #5	- Breakfast - Morning snack - Lunch - Afternoon snack - Drinking water - Indoor space - Outdoor space - Eating space - Breastfeeding space - Family engagement - Optional photo #1 - Optional photo #2 - Optional photo #3	- Breakfast served - Lunch served - Snack served - Drinking water available - Indoor activity space - Outdoor activity space - Eating space - Physical activity opportunities - Family engagement - Written policies & menus - Breastfeeding space - Additonal photos

Figure 2. Initial Prototype of *Photo Story FCC*

Sign-in Page:

Home Page:

22:08

Requestd Photos

- ✓ Breakfast
- ✓ Morning Snack
- ✓ Lunch
- ✓ Afternoon Snack
- ✓ Drinking Water
- ✓ Indoor Space
- ✓ Outdoor Space
- ✓ Eating Space
- ✓ Optional Photo #1
- ✓ Optional Photo #2
- ✓ Optional Photo #3

‹ Back   Proceed ›

Taking Photo:

22:08

Breakfast

A weekday breakfast served to children

Click to take photo

Delete

Save

‹ Back   Photo Log ›

Photo Description:

22:08

Breakfast

A weekday breakfast served to children

Briefly describe your photo:

‹ Back   Topic Area ›

Submission:

22:08

Thank you!

Placeholder

SUBMIT

Figure 3. The Information System Research Framework

Citation: Hevner AR, March ST, Park J, Ram S. Design science in information systems research. Management Information Systems Quarterly. 2008;28(1):6.

Figure 4. Application of the Information System Research Framework

Relevance Cycle	Design Cycle	Rigor Cycle
(1) Interviews with FCC providers (~n=19) to explore perceptions and use of mobile apps and to gather feedback on the proposed mobile app	(1) Three iterative round of user testing with the research team

(2) Two iterative rounds of user testing with FCC providers | (1) Document review of HEPA best practices using the NAP SACC-FCCH |

Figure 4. Initial Version of *Photo Story FCC* Published to the App Store

Note: Photos displyaed portray the Android version of Photo Story FCC. Example photos do not protray the actual photo category as photos were taken during stay at home orders during the

Figure 5. Initial Version of *Photo Story FCC* Published to the App Store (continued)

Photo Description:

Editing Photos & Descriptions:

Note: Photos displyaed portray the Android version of Photo Story FCC. Example photos do not protray the actual photo category as photos were taken during stay at home orders during the COVID-19 pandemic

Figure 6. Final Version of *Photo Story FCC* Published to the App Store

App Download:

Sign-in Page:

Initial Password Reset:

Home Page:

Taking Photo:

Photo Description:

Note: Photos displyaed portray the Android version of Photo Story FCC.

Figure 6. Final Version of *Photo Story FCC* Published to the App Store (continued)

Editing Photos & Descriptions:

Adding Additional Photos:

Note: Photos displyaed portray the Android version of Photo Story FCC.

CHAPTER 4: DISCUSSION

Discussion

Obesity prevention interventions during early childhood are crucial in reducing the risk for childhood obesity.[8] Implementing strategies that shape policy, systems, and environments (PSE) to promote nutrition and physical activity in early care and education (ECE) settings can help create healthy environments for young children. [9-11] Healthy eating and physical activity (HEPA) based interventions, which focus on shaping PSE in ECE settings have demonstrated success in improving HEPA best practices and policies.[9,12] Family child care (FCC) providers, which are a smaller subset of ECE program, may experience additional challenges in participating in HEPA-based interventions.[4,45,46] Current tools that assess HEPA in FCC settings may not capture the nuances and contextual factors. Additionally, FCC providers may need additional support and technical assistance in adopting HEPA best practices and policies in their settings.[4,45]

Prior to this dissertation, a pilot study was conducted to test feasibility of using a modified photovoice approach as a data collection method to capture HEPA best practices and policies in FCC settings.[13] Results from the pilot study indicated that the method provided a qualitative glimpse into the adoption and implementation of HEPA best practices and policies in FCC settings and recommended that the method be translated into a mobile app to improve scalability and reduce researcher bias. Applications of mobile health (mHealth) as a platform for data collection can increase the efficiency of data collection and are growing in popularity.[16] The overall goal of this dissertation was to develop a mobile app (named *Photo Story FCC*) that uses photos and written photo descriptions to capture HEPA best practices and policies in FCC settings. The mobile app development process was guided by the Information System Research (ISR) framework, a user centered and iterative framework for developing mobile apps.

To achieve the development of *Photo Story FCC*, three studies were conceptualized, which focused on the following aims: (1) to identify tools that are currently being used to assess PSE characteristics related to HEPA in FCC settings via a scoping review, (2) to explore barriers and facilitators to promoting HEPA in FCC programs from the perspective of FCC providers, and identify how barriers and facilitators may differ from center-based programs, and (3) to describe the process and lessons learned of applying a user-centered framework to develop the *Photo Story FCC* mobile app that uses photos to assess the adoption and implementation HEPA best practices and policies in FCC settings.

Findings from the first study indicated that 36 articles across 18 studies used measurement tools that assessed PSE characteristics related to HEPA in FCC settings. Low variability of these tools existed among studies, in that most studies used the Environment and Policy Assessment and Observation (EPAO), Nutrition and Physical Activity Self-Assessment for Child Care (NAP SACC), and or adapted versions of the EPAO and NAP SACC to meet the needs of the study. The EPAO and NAP SACC have versions of the tools that are tailored for FCC settings. However, only six studies used the FCC specific versions, which suggests that current research may be examining FCC settings using a center-based setting lens. This finding is concerning given that results from the second study imply that FCC settings are unique from center-based settings, largely due to their setting and staffing.

The second study articulated that physical attributes (e.g., size, layout) of FCC programs impact how FCC providers adopt and implement HEPA practices and policies in their setting. The physical attributes of FCC providers' homes also varied across FCC programs. For example, some providers had open-concept homes, while others had a series of smaller rooms. This variability is not captured in the EPAO or NAP SACC. *Photo Story FCC* can fill this measurement gap by capturing the adoption and implementation of HEPA best practices and policies in FCC settings

via photos and corresponding photo descriptions. The use of photos is a novel approach to capture contextual factors that may influence the adoption and implementation of HEPA practices and policies in these settings.

With further exploration and testing, *Photo Story FCC* may serve as a proxy to direct observation data collection methods used to capture HEPA practices and policies. Photos have been previously used to analyze environments, while also providing a naturalistic and rich data.[85] Opportunity exists to transform qualitative data collected by *Photo Story FCC* into quantitative data by creating a coding scheme or checklist.[85] In the first study, provider self-report was the most common mode in which tools were employed in FCC settings, which may have been used over other methods (e.g., direct observation) to reduce participant burden. Direct observational methods are resource intensive and may be particularly intrusive in FCC settings because observations occur in the provider's home rather than a commercial facility as it would in a center-based setting.[86] As previously mentioned, the second study revealed that some providers have smaller rooms and direct observations conducted in those types of settings may impact the validity of data due to the observer being overly present.

However, the use of photos as an observational method has limitations in the context of this dissertation. Photos cannot capture certain HEPA practices employed by FCC providers, which is a limitation of Photo Story FCC. In the third study, a document review of the NAP SACC-FCCH indicated 50% items could not be reasonably observed via a photo. Depending on research goals, *Photo Story FCC* may be best employed via triangulation with other with PSE tools that capture HEPA best practices and policies. Results from the first study indicated that the majority of studies included in the scoping review triangulated data, with some studies using qualitative methods to triangulate data. Qualitative data triangulated with quantitative data can provide

context to and interpretation of quantitative data, ultimately providing an in depth perspective

of an issue.[87,88]

The triangulation of data collected via *Photo Story FCC* with other quantitative PSE tools

examining HEPA (e.g., NAP SACC) can identify the extent to which FCC providers adopt and

implement HEPA best practices and policies and shed light on how they accomplish it in their

settings. However, the triangulation of tools may place additional research burden on

participants. In describing a desired mobile app, participants in the third study expressed that

the app needs to take minimal time. In user testing, FCC providers did not find using *Photo Story*

FCC burdensome and appreciated being able to start and stop using the mobile app on their

own time. This is supported by findings in the second study in that FCC providers are typically

the sole provider (i.e., do not have assistants or aides) and strategically care for children while

managing their program.

FCC providers also experience unique challenges in implementing HEPA best practices

and policies in their settings. In the second study, FCC providers with smaller rooms found it

more challenging to implement best practices related to indoor physical activity and described

using creative strategies, such as moving furniture to create space for physical activity and

rotating toys to keep children interested. Other studies have also reported lack of space for play

as a prominent barrier to physical activity in FCC settings.[77,78] Working with FCC providers and

supporting staff (e.g., aides, assistants) to maximize their space for the promotion of HEPA best

practices and policies needs to be prioritized in HEPA-based interventions.

Technical assistance is a key component of HEPA-based interventions and is an area of

opportunity to help FCC providers implement unique HEPA promoting strategies specific to their

home.[9,12,29] A previous study reported that tailored technical assistance within the NAP SACC

intervention is associated with improved programmatic outcomes, which further highlights its

critical role.[29] User testing with FCC providers in the third study suggested that *Photo Story FCC* can also serve as a tool to assist with the provision of tailored technical assistance. More specifically, FCC providers indicated that intervention staff would be able to easily access photos and corresponding written photo descriptions of their home and in turn provide technical assistance that is unique to the physical environment of their home. *Photo Story FCC* has not been tested as a technical assistance tool, warranting further exploration.

One FCC provider in the third study indicated that in participating in the NAP SACC intervention, their technical assistance provider never completed an onsite visit, potentially due to the FCC provider's rural location. *Photo Story FCC* could potentially serve as a proxy for onsite technical assistance visits when applicable (e.g., budgetary constraints, rural providers). This could improve the feasibility of providing tailored technical assistance while also reducing the costs associated with it (e.g., travel time, staff time). Additionally, due to the COVID-19 pandemic, FCC providers may not feel comfortable with hosting outside individuals in their home. COVID-19 restrictions may also prevent and or reduce the feasibility of onsite technical assistance. Therefore, the concept of using photos as a tool to provide tailored technical assistance may translate to other PSE interventions, including center-based ECEs in HEPA-based interventions.

Recommended uses of *Photo Story FCC* have been presented in this discussion and warrant additional attention for future research. However, pervious literature indicates challenges exist in engaging FCC providers in research.[67] This raises concerns regarding the adoption and implementation of *Photo Story FCC* among FCC providers participating in HEPA-based interventions. The use of Photovoice was advantageous in that the method is participatory and useful to engage hard-to-reach populations.[15,69,70] This dissertation also

utilized the ISR framework, which is a user-centered framework for developing mobile apps that

incorporates iterative user feedback throughout the entire development process.

The ISR framework was employed via three iterative cycles, which were the relevance,

rigor, and design cycles.[83] A current criticism of mHealth, specifically delivered via mobile apps,

in the public health landscape is that mobile apps are either developed with limited evidence-

based feature or developed with a lack of consumer appeal.[16,19] Important changes were made

to *Photo Story FCC* throughout the iterative cycles, which ultimately helped ground the mobile

app in evidence and support a user friendly interface, with a perspective from FCC providers.

Major findings from the relevance cycle included allowing users to take more than one photo

per category and being able to start and stop using the app on users own time. The rigor cycle

informed the requested photo categories. The design cycle mainly focused on fixing

technological issues and ensuring features were intuitive (e.g., ability to take landscape and

portrait aligned photos).

In this application of the ISR framework, specifically the design cycle, developing a user-

friendly interface was the most resource and time intensive aspect of developing *Photo Story

FCC*. Guidance from a systematic review identified that a key criteria of mHealth, which is that

the product works smoothly and does not fail.[19] The design cycle also impacted the timeline and

application of study protocols, gleaning an array of lessons learned. A major takeaway was that

user testing occurring while the mobile app was in development was conducted within the Expo

app, which was cited as tedious and confusing. Therefore, user testing with FCC providers was

delayed until *Photo Story FCC* went live. Suggested changes during user testing with FCC

providers were made later in the mobile app development process and were more resource

intensive than if they were completed in earlier stages. The second takeaway was that changes

that may seem simple can take longer than expected and impact other aspects of the mobile

app. For example, allowing photos to be taken and uploaded in landscape alignment resulted in unintended changes to the photo description interface.

This dissertation has limitations to note. Data collection in the second and third study were conducted with FCC providers located in Nebraska. FCC providers were also former participants of a HEPA-based intervention and highly motivated, limiting the generalizability of findings. Methods employed throughout this dissertation were qualitative and results should be interpreted with caution. Though this dissertation conducted user testing with former participants of a HEPA-based intervention, *Photo Story FCC* was not used within a HEPA-based intervention. This warrants additional research and testing in HEPA-based interventions, especially related to how *Photo Story FCC* can impact technical assistance. *Photo Story FCC* has not undergone psychometric testing and is not a validated tool. For this to be possible, future research first needs to develop a coding scheme to analyze photos. Once this occurs, Photo Story FCC can be tested against other PSE tools that assess HEPA, such as the EPAO and NAP SACC.

As a result of this dissertation, the mobile app *Photo Story FCC* was published to the Apple Store and Google Play Store. The three studies informed the development of *Photo Story FCC* and the role it may serve within HEPA-based interventions. *Photo Story FCC* holds promise as a tool to capture the adoption and implementation of HEPA best practices and policies in FCC settings. The mobile app may also serve as a tool within HEPA-based interventions to provide tailored technical assistance to FCC providers, a group that tends to serve a higher proportion of low-income and minority children and is underrepresented in scientific literature and in the public health landscape. The use of *Photo Story FCC* offers opportunity to elevate the voice of FCC providers, support the implementation of HEPA practices and policies in these settings, and ultimately, create healthier environments for children receiving care in FCC settings.

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APPENDICES

Appendix A: Semi-Structured Interview Guide for FCC Providers – Study 2 and Study 3

<u>**Section 1: Introduction**</u>

Hi. My name is *(interviewer's name)* and I'm part of a team from the Gretchen Swanson Center for Nutrition. Thank you for agreeing to participate in an interview. We are working with Children's Hospital and Medical Center as well as the University of Nebraska-Lincoln to develop a mobile application that would serve as a tool to examine healthy eating and active living policies and practices in Family Child Care settings. The purpose of this interview is to better understand characteristics of your family child care home, how you use and perceive technology, and lastly your perceptions of research.

This interview should take no more than 60 minutes of your time. Participation in this interview is completely voluntary. Your responses will be kept confidential within the evaluation team, and will not be attributed directly to you. We may use quotes in reporting, but would not provide any names for the quotes in reports. There are no right or wrong answers, and you may choose to end the interview at any time or not answer a question, for whatever reason. You will receive a $25 incentive for your participation. Do you have any questions before we begin?

With your permission, this interview will be audio-taped in order to produce an accurate transcript of our discussion. Notes will also be taken. Is it OK if we audio-tape this interview? *Note to interviewer: If received approval, begin audio recorder now.*

This is an interview for the Relevance Cycle FCC Interviews. Today's date is _____. And I am with participant #_____.

<u>**Section 2: Information about the FCC Provider/Program**</u>

First, I have a few questions about your FCC Program.

1. About how long have you been in operation?

2. Do you have any employees and/or subs?

   ↪ If yes: About how many do you have at a given time? What are their roles?

3. What are your normal hours of operation?

   ↪ What days is your FCC program open?

   ↪ Do you offer any flexibility in terms of hours and/or days you are open?

4. How would you describe the geographical location of your FCC program?

   ↪ PROBE: Rural, urban

5. What do you like most about being an FCC provider?

   ↪ How about your least favorite thing?

The next few questions will explore the characteristics of the children and families you serve.

6. Approximately how many children do you serve at a given time?

7. Approximately what are the ages of the children you typically serve?

   ↪ PROBE: Number of infants, toddlers, preschoolers

8. Does your FCC program participate in the Child and Adult Care Food Program, or in other words CACFP?

   ↪ If yes: Of the children you serve, about how many receive reimbursable meals?

   ↪ If no: What are reasons you don't participate in CACFP?

9. There are many terms used to describe a person's race/ethnicity – in general, how would you describe the racial/ethnic characteristics of the children you serve?

   ↪ PROBE: African American, Latino, Asian, White, etc.

10. Generally speaking, how would you describe the income of the families you serve? For example, lower-income families, middle income families, high income families, a mix of incomes.

The next few questions are going to ask about the physical characteristics of your FCC home. In other words, we are trying to get a snapshot of FCC settings.

11. Can you describe the indoor areas available in your FCC program? For example, you can mention things like size, location within your home, objects located in the room like furniture and/or play equipment, and anything else you might think is important for us to know.

   ↳ PROBE (on each, if not mentioned): Kitchen; Eating area; Spaces for playtime, physical activity, learning; Area for sleeping and naps; Area for breastfeeding

12. Now, tell me about the outdoor areas in your FCC program.

   ↳ PROBE (on each, if not mentioned): Space for physical activity; Play equipment; Outdoor eating area;

   ↳ What months are you typically outside?

   ↳ In cold weather, do you go outside with the children? For about how long?

13. Of the areas you described, where would you say children spend the most time? Why is that?

   ↳ Are there any areas that are less used? Why is that?

14. Thinking about the physical characteristics of the indoor and outdoor areas you described, how would you say these characteristics affect your ability to promote healthy eating and active living in your FCC program? Specifically, think about the five NAP SACC topic areas which include: Breastfeeding & Infant Feeding, Child Nutrition, Infant & Child Physical Activity, Outdoor Play & Learning, and Screen Time.

↳ Are there physical characteristics that make it easier or more difficult to promote healthy eating and active living? Again, think about the five NAP SACC topic areas. PROBE: Breastfeeding & Infant Feeding, Child Nutrition, Infant & Child Physical Activity, Outdoor Play & Learning, and Screen Time

15. Can you describe how you combine your home living area with your FCC program?

↳ How do you think that having child care in your home differs from a center setting and more specifically with regard to promotion of healthy eating and active living in the five NAP SACC topic areas? PROBE: Breastfeeding & Infant Feeding, Child Nutrition, Infant & Child Physical Activity, Outdoor Play & Learning, and Screen Time

↳ What are some misconceptions about family child care homes that outsiders might have? For example, think about the general public, parents, researchers, organizations that you have worked with, and or governing entities (e.g., Office of Early Childhood Nebraska Department of Education).

Section 3: Provider Perceptions of Child Nutrition and Physical Activity

Now that we have discussed characteristics of your FCC program, the next section will explore your perceptions of healthy eating and active living with regard to the five NAP SACC topic areas. Again, this includes Breastfeeding & Infant Feeding, Child Nutrition, Infant & Child Physical Activity, Outdoor Play & Learning, and Screen Time.

16. What trainings/programs, if any, have you participated in with regard to healthy eating and active living?

↳ What type of topics were covered in the training/program?

↳ What are some reasons you decided to participate? PROBE: accreditation, Step Up to Quality, professional development, children's health, overall well being

↳ How was the training/program delivered? PROBE: In-person, online, or a combination? How many sessions/how long? What time of day/week? What did you like about this format? What did you dislike about this format?

↳ What recommendations do you have for ways that trainings/programs can be best delivered to FCC providers? PROBE: In-person, online, or a combination? How many sessions/how long? What time of day/week?

17. As a FCC provider, how do you view your role in promoting healthy eating and active living?

   o How do these views affect how you promote healthy eating and active living?

18. How do you think parents/guardians view your role in promoting healthy eating and active living?

   ↳ How would you say this impacts your ability to promote healthy eating and active living?

19. As a FCC provider you may have a lot of hats you have to wear, meaning many roles and responsibilities – where does healthy eating and active living rank when compared to other activities in your FCC program?

   o What are things that take priority over healthy eating and active living?

   o What are barriers that may prevent healthy eating and active living?

Section 4: Access, Use, and Perceptions of Technology

Part of this study involves the development of a mobile app. Questions in this next section will explore your access to, use of, and perceptions of various forms of technology.

20. What type of smartphone do you have (for instance, Apple or Android)?

21. What are the main things you use your smartphone for?

   ↳ PROBE: **Camera,** phone calls, text messages, **mobile apps**, browsing internet

   ↳ In general, how confident do you feel in using your smartphone?

   ↳ Is there anything you feel less confident in using your smartphone for? How so?

   ↳ In using your smartphone, what type of privacy concerns do you have?

NOTE: ASK MOBLE APP QUESTIONS ONLY IF THEY INIDICATE THAT THEY USE MOBILE APPS. IF NO, SKIP CORRESPONDING QUESTIONS.

22. What types of mobile apps do you use?

   ↳ PROBE: Social media apps (e.g., Facebook, Instagram, Snapchat); Utility apps (e.g., calculator, weather, reminders); Lifestyle apps (e.g., music, travel, fitness); Productivity apps (e.g., documents, wallet/pay); News/information apps (e.g., news apps, Buzzfeed, Reddit)

23. What type of privacy concerns do you have when using mobile apps?

   ↳ Is there anything that would help to reduce privacy concerns?

24. What type(s) of challenges do you experience in using mobile apps?

   ↳ PROBE: Downloading apps; Using or navigating apps; Updating app software

IF THEY INIDICATE THAT THEY DO NOT USE MOBILE APPS

25. What are reasons you do not use mobile apps?

   ↳ PROBE: privacy concerns, do not know how to use them, difficult to use, there is not a need

26. What sorts of things would change your opinion and make you more likely to use mobile apps?

RESUME QUESTIONS HERE:

27. Can you describe your cellular data plan? For example, some plans include unlimited data, while others have a predetermined amount of data or involve paying for the amount of data used.

   ▪ If no data: Are there any reasons you do not have a cellular plan that includes data? How do you access the internet on your smartphone?

   ↳ Are you ever concerned about going over your data plan? (If they have a pay as you go data plan – Are you concerned about the amount of data that you use?

28. Do you have access to Wi-Fi in your home?

   ↳ If yes: How easy is your Wi-Fi to access?

   ↳ If no: What are your reasons for not having Wi-Fi?

29. What type(s) of challenges do you experience in getting on the internet on your smartphone? How so?

   PROBE: Slow/interrupted connection; Limited or no cellular data; Limited or no Wi-Fi

Section 5: Perceptions of Research

This last set of questions about your perceptions of being a part of this study. As a reminder, the purpose of this study is to develop a mobile app that will allow family child care providers to showcase healthy eating and active living practices and policies in this setting. In using the app, children's faces will not be displayed. It is important to note that we will ask that pictures of children's faces are not submitted.

30. Thinking about this study, why did you decide to participate?

↪ What hesitations did you have in joining this study? PROBE: Time; privacy; commitment to study activities

↪ How did incentives influence your decision to participate?

↪ For what reasons would you consider dropping out of the study?

↪ What type of things can be done to promote a positive experience? PROBE: Close relationship with research staff; remaining updated of the status of the study; Feeling valued

↪ Do you have any recommendations on how to better engage FCC providers in research?

31. Thinking about the mobile app that will be developed as part of this study, what are your initial reactions?

↪ Is there anything you are particularly excited about?

↪ Do you have any concerns? PROBE: **Privacy (taking pictures of your family child care home)**; limited time; complexity of using the app; data or Wi-Fi access; does not seem relevant

↪ Do you have any overall recommendations for the mobile app?

Appendix B: User Testing Documentation Guide for User Testing with the Research Team

Directions: Follow the steps for set up then complete the three tasks listed below. Listed below

each task is the solution, please refrain from looking at the solution unless you are stuck. Once

you are done, please complete the questions at the bottom of this document.

Set up:

1. Download the Expo app from the app store: https://apps.apple.com/us/app/expo-

   client/id982107779

   https://play.google.com/store/apps/details?id=host.exp.exponent

2. Login to Expo using the provided credentials:

   a. Username: devHealthyEatingApp

   b. Password: userTestingHealthyApp19

3. Click on the 'Profile' tab at the bottom right corner of the Expo app

4. Click on 'Healthy Eating App'' listed under projects on the profile page

5. Once the login page loads, login to the Healthy Eating app using the provided

   credentials:

   a. Username: demo@demo.com

   b. Password: r2demo

Task 1:

Select a category that still needs a submission. Upload a photo of your choice (by taking a new

one). Add a description and tags of your choice. Then view the image in the selected category.

Solution to task:

1. Now you are on the 'requested photos' page, the photos that still need to be taken have

   a red camera icon, after a photo is submitted for a category, the icon will change to a

   green checkmark

2. Choose one of the requested photos that have not been taken yet (red icon)

3. Use the phone's camera to take a photo

4. Enter a description for the photo and choose any tags you wish

5. Click 'submit'

6. When prompted with 'submit another photo', click on the button and it will take you back to the requested photos

Task 2:

Select a category that still needs a submission. Upload a photo of your choice (from photo gallery). Add a description and tags of your choice. Then view the image in the selected category.

Solution to task:

1. Now you are on the 'requested photos' page, the photos that still need to be taken have a red camera icon, after a photo is submitted for a category, the icon will change to a green checkmark.

2. Choose one of the requested photos that have not been taken yet (red icon)

3. Upload a photo from your phone's photo gallery

4. Enter a description for the photo and choose any tags you wish

5. Click 'submit'

6. When prompted with 'submit another photo', click on the button and it will take you back to the requested photos

Task 3:

Select a category that already has a submission. Upload a new photo of your choice (from photo gallery or camera). Add a description and tags of your choice. Then view the image in the selected category.

Solution to task:

1. Now you are on the 'requested photos' page, the photos that still need to be taken have a red camera icon, after a photo is submitted for a category, the icon will change to a green checkmark.

2. Choose one of the requested photos that has already been taken (green icon)

3. Upload a photo from your phone's photo gallery or camera

4. Enter a description for the photo and choose any tags you wish

5. Click 'submit'

6. When prompted with 'submit another photo', click on the button and it will take you back to the requested photos

Questions:

1. Did you struggle to complete any of the tasks?

    a. If so, please explain where you got stuck and why?

2. Did you think the design and layout of the application was intuitive?

3. Was there anything that you did not like about the application?

4. Anything you would like to change about the application?

5. General opinion of the application?

6. Other Comments?

Feel free to play around with the app as you see fit. If you have any questions or concerns about the application, please email: [redacted]

Thank You!

Appendix C: User Testing Interview Guide for User Testing with FCC Providers

Introduction

Hi. My name is *(interviewer's name)* and I'm part of a team from the Gretchen Swanson Center for Nutrition. Thank you for agreeing to participate testing the app! As a reminder, We are working with Children's Hospital and Medical Center as well as the University of Nebraska-Lincoln to develop a mobile application that would serve as a tool to examine healthy eating and active living policies and practices in Family Child Care settings. The purpose of this interview is to gather feedback on your experience using the app.

This interview should take 20 to 40 minutes and participation in this interview is completely voluntary. Your responses will be kept confidential within the evaluation team, and will not be attributed directly to you. There are no right or wrong answers, and you may choose to end the interview at any time or not answer a question, for whatever reason. You will receive a $60 incentive for your participation in this, which also includes testing and the survey. Do you have any questions before we begin?

Interview

We are going to start by discussing the layout design, then completion of the tasks, the picture categories, and then additional and general feedback. Let's start with the design and layout of the app.

1. Did you think the layout and progression through the tasks was intuitive?

   o What did you like? What did you dislike?

   o What changes would you make?

   o Approximately how long did it take you to complete the app's tasks?

     ▪ What did you think about the length of time it took you? PROBE: too long, just right, short amount of time

2. Starting with the log-in page, what did you like or dislike about the design?

   o How about the design of the picture categories page?

   o How about the design of the page where you take or up load pictures?

   o How about the design of the page where you describe the picture?

Now we are going to talk about the completion of the tasks - in other words going through the picture categories, taking the photos, describing them, and submitting them.

3. Did you struggle to complete any of the tasks?

   o IF YES - please explain where you got stuck and why? Are there any changes you would recommend to help resolve this?

   o Did you utilize the user guide sent via email? How so?

Now let's walk through the requested picture categories. As a reminder, those included:

Breakfast served; Lunch served; Snack served; Drinking water available; Indoor activity space; Outdoor activity space; Eating space; Breastfeeding space; Optional photos #1-5.

4. Were there any categories that were confusing or didn't make sense?

5. Were there any categories that you think need to be rephrased?

6. Were there any categories that did not seem applicable?

7. Are there any categories that you think are missing – specifically thinking about healthy eating and active living in your FCC program?

Now let's talk about any other feedback you have.

8. Was there anything that you did not like about the application?

9. Anything you would like to change about the application?

10. Is there anything else you would like to share?

Appendix D: User Testing Documentation Guide for User Testing with FCC Providers

1. Did you think the layout and progression through the tasks was intuitive?

   o   What did you like? What did you dislike?

   o   What changes would you make?

   o   Approximately how long did it take you to complete the app's tasks?

2. Starting with the log-in page, what did you like or dislike about the design?

   o   What did you like or dislike about the design of the picture categories page?

   o   What did you like or dislike about the page where you take or up load pictures?

   o   What did you like or dislike about the page where you describe the picture?

3. Did you struggle to complete any of the tasks? Please explain.

   o   Did you utilize the user guide sent via email? How so?

4. Were there any photo categories that were confusing or didn't make sense?

5. Were there any photo categories that you think need to be rephrased?

6. Were there any photo categories that did not seem applicable?

7. Are there any photo categories that you think are missing with regards to healthy eating and active living in your program?

8. Was there anything that you did not like about the application?

9. Was there anything you would like to change about the application?

10. Is there anything else you would like to share?

Installing the PhotoStory FCC App

1. Open Google Play app

2. Search for "PhotoStory FCC" and click the PhotoStory FCC icon

3. Click the "Install" button

4. Click the "Open" button –
   the app icon will now be
   on your phone!

←   🔍 ⋮

PhotoStory FCC
Photo Voice

| Uninstall | Open |

What's new •
Last updated Apr 18, 2020

CLICK →

Updated App Icon

Creating a Password for the PhotoStory FCC App

1. Open the PhotoStory FCC app

2. Enter in your email and temporary password: 123456

   Email

   Password

   ☐ Stay Signed In

   Sign In

3. You will be prompted to change your password. Open up your email and use link to reset password. You will only have to do this once!

   Requested Photos   Logout

   Breakfast   〉

   Lunch   〉

   Snack   〉

   Update password

   For security purposes, a link to reset your password will be sent to the email associated with this account. Please logout to receive the reset email.

   LOGOUT

   Outdoor Space   〉

Using the the PhotoStory FCC App

1. Open the PhotoStory FCC app

2. Enter your email and new password. Click "Stay Signed In" if you do not want to enter your email and password again!

GRETCHEN SWANSON
CENTER FOR
NUTRITION
RESEARCH ★ PARTNERSHIP ★ EVALUATION

Email

Password

☐ Stay Signed In

Sign In

3. You will see a list of requested photo topic areas. Scroll down to see all requested photos. Some optional photos are listed as well.

   The red icon means the task is not complete and green means the task is complete (you can edit completed tasks as needed). *These tasks do not have to be completed at once. You can come back to the app on your own schedule.*

   Click on a category you want to start on!

4. The app will ask you for permission to use the camera function.

   Click "OK" – you will only have to do this once!

5. You have the option to take a picture *OR* upload an existing picture from your camera gallery

6. Press the green check mark icon if you want to use the photo.

   Press the red X icon if you want to retake the photo or upload a different photo.

RETAKE OR UPLOAD A DIFFERENT PHOTO

PROCEED TO NEXT STEP IF YOU ARE OKAY WITH THE PHOTO

7. Click on the text box to provide a description of your photo. When you are done, press "Submit"

   You will be taken back to the home page after you submit. You can go back and edit the text at any time!

CLICK ON THE TEXT BOX TO DESCRIBE YOUR PHOTO

Briefly describe your photo:

Submit

WHEN YOU ARE DONE - PRESS "SUBMIT"

THANK YOU!

- If you have questions, please email Alethea Chiappone: achiappone@centerfornutrition.org
- Please refrain from taking pictures with children's faces!
- faces!

Editing Photos and Photo Descriptions

1. On the home page, select a photo category you have already submitted by clicking the box.

   Submitted photo categories will appear in green.

Requested Photos	Logout
Breakfast Served	›
Lunch Served	›
Snack Served	›
Drinking Water Available	›
Indoor Activity Space	›
Outdoor Activity Space	›

   CLICK ON A PHOTO CATEGORY YOU ALREADY SUBMITTED

2. To edit your photo description, press the blue pencil icon.

   To retake a photo or upload a new photo, press the green "Retake Photo" button. You will be prompted to add a new description.

   You will be taken back to the home screen once you are complete.

   Back Indoor Activity Space Logout

   CLICK THE PENCIL ICON TO EDIT PHOTO DESCRIPTION

   Description

   TO RETAKE PHOTO OR UPLOAD A NEW PHOTO PRESS "RETAKE PHOTO" My dog Gus!

   Retake Photo

Appendix F: Photo Story FCC User Guide – Apple

Installing the PhotoStory FCC App

5. Open Apple Store app

6. Search for "PhotoStory
   FCC" and click "GET"
   button

7. Click the "Open" button
    – the app icon will now
    be on your phone!

Creating a Password for the PhotoStory FCC App

4. Open the PhotoStory FCC app

5. Enter in your email and temporary password: 123456

Email

Password

☐ Stay Signed In

Sign In

Using the the PhotoStory FCC App

8. Open the PhotoStory FCC app

9. Enter your email and new password. Click "Stay Signed In" if you do not want to enter your email and password again!

Email

Password

☐ Stay Signed In

Sign In

10. You will see a list of requested photo topic areas. Scroll down to see all requested photos. Some optional photos are listed as well.

The red icon means the task is not complete and green means the task is complete (you can edit completed tasks as needed). *These tasks do not have to be completed at once. You can come*
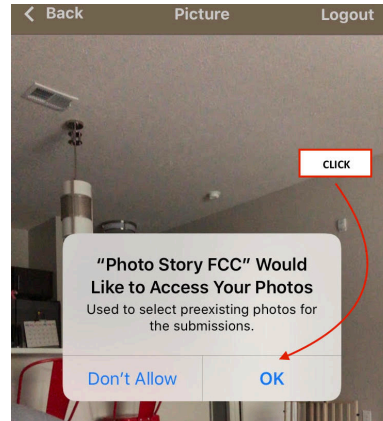
Requested Photos	Logout
Breakfast Served	›
Lunch Served	›
Snack Served	›
Drinking Water Available	›
Indoor Activity Space	›
Outdoor Activity Space	›

*back to the app on your
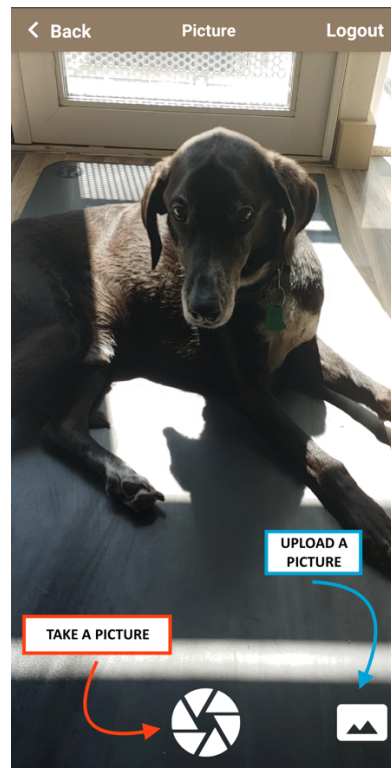own schedule.*

Click on a category you
want to start on!

11. The app will ask you for
    permission to use the
    camera function.

    Click "OK" – you will only
    have to do this once!

12. You have the option to
    take a picture *OR* upload
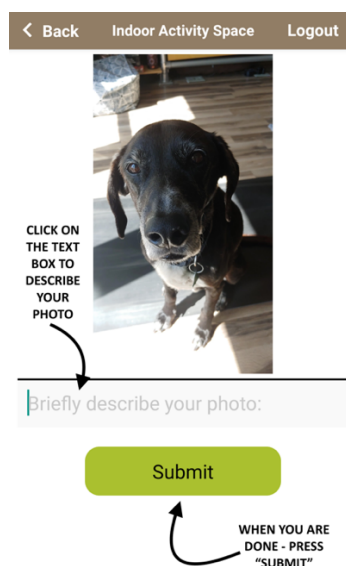   an existing picture from
    your camera gallery

13. Press the green check mark icon if you want to use the photo.

Press the red X icon if you want to retake the photo or upload a different photo.

14. Click on the text box to provide a description of your photo. When you are done, press "Submit"

You will be taken back to the home page after you submit. You can go back and edit the text at any time!
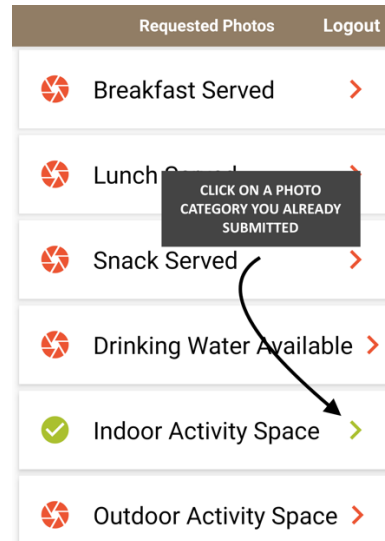

THANK YOU!

- If you have questions, please email Alethea Chiappone: achiappone@centerfornutrition.org
- Please refrain from taking pictures with children's faces!

Editing Photos and Photo Descriptions

3. On the home page, select a photo category you have already submitted by clicking the box.

   Submitted photo categories will appear in green.

4. To edit your photo description, press the blue pencil icon.

   To retake a photo or upload a new photo, press the green "Retake Photo" button. You will be prompted to add a new description.

   You will be taken back to the home screen once you are complete.

Appendix F: Institutional Review Board Exemption Letter

University of Nebraska Medical Center

NEBRASKA'S HEALTH SCIENCE CENTER

Office of Regulatory Affairs (ORA)
Institutional Review Board (IRB)

July 22, 2019

Alethea Chiappone, MPH, MSW
COPH Health Promotion
UNMC - 68114

IRB # 506-19-EX

TITLE OF PROPOSAL: The Development of a Mobile App to Measure the Adoption and Implementation of Healthy Eating and Active Living Policies and Practices in Family Child Care Homes

The Office of Regulatory Affairs (ORA) has reviewed your application for *Exempt Educational, Behavioral, and Social Science Research* on the above-titled research project. According to the information provided, this project is exempt under 45 CFR 46:104(d), category 2. You are therefore authorized to begin the research.

It is understood this project will be conducted in full accordance with all applicable HRPP Policies. It is also understood that the ORA will be immediately notified of any proposed changes for your research project that
A. affect the risk-benefit relationship of the research
B. pose new risks which are greater than minimal
C. constitute a new risk to privacy or confidentiality
D. involve sensitive topics (including but not limited to personal aspects of the subject s behavior, life experiences or attitudes)
E. involve deception
F. target a vulnerable population
G. include prisoners or children
H. otherwise suggest loss of the exempt status of the research.

You are encouraged to contact the ORA to discuss whether changes to exempt research requires review by ORA.

Please be advised you will be asked to update the status of your research yearly by responding to an email from the Office of Regulatory Affairs. If you do not respond, your project will be considered completed.

Sincerely,

Signed on: 2019-07-22 10:31:00.000

Gail Kotulak, BS, CIP
IRB Administrator III
Office of Regulatory Affairs