

# **The Ecology of Physical Activity in Family Childcare Environments: A GIS-Supported Qualitative Study**

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Citation: Figueroa, R., Jarrett, R., Kwan, M-P., McBride, B. & Wiley, A. R. (2019). The ecology of physical activity in family childcare environments: A GIS-supported qualitative study. *Children, Youth and Environments*, 29(1), 57-83. Retrieved from <http://www.jstor.org/action/showPublication?journalCode=chilyoutenvi>

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## **Abstract**

*Most preschoolers cared for by family childcare providers (FCCPs) fail to meet physical activity guidelines. This study examines how FCCPs in Illinois shape opportunities for preschoolers' physical activity. Researchers used geospatial data from 342 family childcare homes, as well as semi-structured interviews at two time points with a subset of 21 FCCPs. The study analyzed all sources of data using sociospatial grounded theory and analytic induction approaches. Findings suggest that key contextual factors at the policy-, environmental-, program- and FCCP-levels lead to flexible physical activity programming that shapes physical activity opportunities for the developmentally diverse children attending family childcare.*

**Keywords:** family childcare, physical activity, preschoolers, qualitative, GIS

## **Introduction**

Physical activity is defined as any bodily movement produced by skeletal muscles that require energy expenditure (World Health Organization, 2013), whereas physical inactivity is defined as insufficient participation in physical activity (e.g., sedentary behavior, the use of "passive" modes of transportation) (WHO, 2016). The global prevalence of physical inactivity as of 2009 was 17 percent (Kohl et al., 2012). Being physically inactive is the fourth-leading risk factor for global mortality, contributing to an estimated 3.2 million fatal outcomes (Kohl et al., 2012; WHO, 2016). Young children need between two and three hours of structured and unstructured physical activity each day (National Association for Sport and Physical Education, 2002; 2009; Pate & O'Neill, 2012), yet most preschoolers fail to meet this guideline (Beets, Bornstein, Dowda, & Pate, 2011). The World Health Organization has an initiative to reduce existing physical inactivity by 10 percent on or before 2025 (WHO, 2016), and more research is needed to identify strategies for early intervention through which young children increase their engagement in physical activity.

A supportive environment is critical for promoting physical activity among preschoolers (Davison & Lawson, 2006). With increased urbanization worldwide, there are several environmental factors (i.e., indoor space, play equipment, park access) that influence participation in physical activity (WHO, 2016). Furthermore, there are multiple contexts (e.g., home, school, childcare) that greatly influence the amount of daily physical activity in which a child participates (Østbye et al., 2013; Smith et al., 2016). Recent national recommendations strongly encourage adults in these environments to promote childhood physical activity by providing activity-promoting resources, programming by education and care providers, and adopting other physical activity-promoting practices and policies (United States National Physical Activity Plan, 2016; Ward, Bélanger, Donovan, & Carrier, 2015).

The childcare environment is of particular importance for shaping many preschoolers' physical activity participation in the U.S. (Cosco, 2006; Finn, Johannsen, & Specker, 2002; Kaphingst, French, & Story 2006; Neshteruk, Mazzucca, Østbye, & Ward, 2018). Studies consistently show that time spent in childcare environments is associated with physical activity in early childhood (Finn, Johannsen, & Specker, 2002; Pate, Pfeiffer, Trost, Ziegler, & Dowda, 2004), and these settings and their providers play a critical role in influencing children's health behaviors (Gubbels, Kremers, & Stafleu, 2010; Tovar et al., 2017).

Family childcare (also known as in-home or home-based childcare) is the label given to the work of providing childcare in a professional caregiver's home (National Association for Family Child Care, 2017). These early care and education sites are owned and/or operated by individuals in a private home context. Licensing enables family childcare providers to care for children of mixed-age groups for a portion of the day in a private family home for compensation. The home is oftentimes inhabited by the family/individual who is providing care (Child Care Resource Center West Virginia, 2012).

This common but understudied childcare environment faces unique challenges in promoting preschoolers' physical activity, because their programs serve smaller groups of mixed-age children compared to center-based childcare (Office of Personnel Management, 2016). Family childcare is the second-largest source of non-relative care for preschoolers in the U.S. (Forum on Child and Family Statistics, 2009; Morrissey & Banghart, 2007; U.S. Census Bureau, 2013). Family childcare settings are a vital context for health promotion (Kim, Shim, Wiley, Kim, & McBride, 2012) and for promotion of preschoolers' physical activity (Delaney, Monsivais, & Johnson, 2014; Tandon, Walters, Igoe, Payne, & Johnson, 2016). With many preschoolers in the U.S. spending a substantial portion of their week in family childcare homes (U.S. Census Bureau, 2013), any or all opportunities provided to preschoolers for engaging in a variety of activities require providers' capacity to arrange these as part of their daily programs.

Family childcare providers (FCCPs) are important gatekeepers in an ideal position to facilitate physical activity in the available physical environment of the childcare setting (Rosenthal, Crowley, & Curry, 2013). The practices and attitudes of FCCPs are thus key drivers of preschoolers' physical activity in this context (Brennan, Castro, & Brownson, 2011). Among the multiple environmental factors in the childcare context that may impact preschoolers' physical activity, the organization of the physical environment (i.e., indoor space, play equipment, neighborhoods) and FCCPs' physical activity programming practices are known correlates that require further examination (Delaney, Monsivais, & Johnson, 2014; Figueroa & Wiley, 2016; Tandon et al., 2014; 2016). The family childcare environment and FCCPs shape physical activity opportunities for preschoolers in this setting (Rosenthal, Crowley, & Curry, 2013), although the exact relationship remains unclear. Involving FCCPs is critical for examining how the contextual features within family childcare homes shape preschoolers' physical activity opportunities.

Recent research has argued that it is unclear how factors in home and neighborhood settings influence physical activity (Martin-Biggers, Cheng, Spaccarotella, & Byrd-Bredbenner, 2016). Further, although instruments have been developed, there are no gold standards for assessing these factors, particularly in the family childcare context (Martin-Biggers et al., 2016). The promotion of physical activity in this context is part of a complex system interwoven with socioecological components (i.e., physical activity-promoting resources, FCCPs' practices), providers' relevant professional training, and other key environmental factors across the different levels of the system in which children are situated (Gubbels, Van Kann, de Vries, Thijs, & Kremers, 2014; Jess, Keay, & Carse, 2014). Therefore, multidimensional approaches are warranted to examine the intertwined relationships among these multiple socioecological components that shape preschoolers' opportunities for physical activity.

The purpose of this study is to address the following question: How do FCCPs and their settings shape the context by which opportunities are provided for preschoolers' physical activity in family childcare? To explore this question, an ample understanding of the sociospatial context (i.e., environmental features and FCCPs' perceptions of these) is warranted. Sociospatial is defined as an integrated

examination of space, place, and social indicators in a holistic fashion (Steinberg & Steinberg, 2015); thus, this study explored the spatial and social processes by which FCCPs (and their homes) shape physical activity opportunities for preschoolers. The overarching goal is to advance a common theoretical framework to underpin better understanding of this public health issue in future research and practical pursuits.

## **Methods**

### **Research Design**

For the purposes of this study, mixed-method is defined as the use of more than one method, methodology, approach, theoretical or paradigmatic framework, or the integration of results from those different components (Bowleg, Fielding, Maxwell, & Molina-Azorin, 2016). Specifically, we adopted a version of the partially mixed convergent parallel design based on Leech and Onwuegbuzie's typology (2009) for mixed-method research design. This study combined Geographic Information System (GIS) and qualitative methods to provide multiple views of the phenomenon being studied to develop a broader picture. More specifically, GIS supported qualitative methodology throughout the study by measuring overlapping but also different aspects of the phenomenon, yielding an enriched, detailed understanding of physical activity opportunities for preschoolers attending family childcare in our study (Greene, Caracelli, & Graham, 1989).

### **Research Setting**

The family childcare settings in this study were all licensed to practice. The researchers recruited FCCPs in two service districts in a mid-sized U.S. Midwestern city. The Institutional Review Board (IRB) at the home institution approved this study (IRB #14146).

### **Sampling Strategy**

The study recruited participants using a purposive sampling approach (Patton, 1990). Under the purposive sampling assumptions, participants were screened to reflect characteristics of interest to the study. The researchers recruited participants via e-mail notifications, phone calls, and face-to-face visits. As recruitment of participants was initiated, the study also used snowball sampling as a purposive sub-strategy, using recommendations from already recruited participants to identify more participants with similar characteristics and rich information to contribute to this study (Patton, 1990). Upon indicated interest, the researchers invited the FCCPs to participate in the study and provided them with a consent form that outlined details regarding the collection of data, benefits and risks, as well as remuneration and contact information.

### **Participants**

A convenience sample of 342 licensed FCCPs were included in the GIS portion of our study to support qualitative analyses. In collaboration with staff at the two service districts in our study, we recruited participants through flyers and emails. Participants were re-contacted again for the qualitative portion of this study, and those who agreed to partake were included in this study. Throughout the data

collection process, approximately 70 potential FCCPs were invited to participate in the qualitative portion of the study, and 21 of them (30 percent) agreed.

All interviewed participants were female. The average age of participants was 45 years old, and participants had been providing childcare services in their homes for an average of 12.8 years. The average FCCP provided care services for three or more preschoolers. Out of 21 participants, 16 (71 percent) were Caucasian, four (23.8 percent) were African-American, and one participant identified as multi-racial. The majority of FCCPs identified as married. Additional demographics are included in Table 1.

**Table 1. Participant demographics**

<b>Age (M, SD)</b>	45.00 ( $\pm$ 8.91)
<b>Years as FCCP (M, SD)</b>	13.60 ( $\pm$ 6.82)
<b>Children in program (M, SD)</b>	10.00 ( $\pm$ 1.53)
<b>Preschoolers in program (M, SD)</b>	3.35 ( $\pm$ 1.43)
<b>Sex (n, %)</b>	
Female	21 (100%)
<b>Education (n, %)</b>	
High School degree	1 (4.76%)
Some college/Associate's degree	11 (52.38%)
4-year college degree and above	7 (33.33%)
<b>Household Income (n, %)</b>	
\$35,000 or less	4 (19.04%)
\$35,000 to \$75,000	11 (52.38%)
\$75,000 or more	4 (19.04%)
<b>Race</b>	
Black	5 (23.80%)
White/Caucasian	15 (71.42%)
Multi-racial	1 (4.76%)
<b>Marital Status</b>	
Single	4 (19.04%)
Married	14 (66.66%)
Divorced/Separated	3 (14.28%)
<b>Assistant on staff</b>	
Yes	8 (34.1%)
No	13 (65.9%)

### Procedure and Measures

Trained staff collected multiple sources of data as part of a larger study. For this examination, researchers gathered demographic data of participants through a demographic questionnaire, coded in GIS software the geospatial information of each setting reported by FCCPs, and conducted two in-depth interviews.

Throughout the data collection phase, participants were contacted regularly to make sure any questions that they might have had were being addressed. FCCPs were able to choose whether they preferred to do the interview portion of the study via phone or face-to-face interview. Only one participant chose to give handwritten responses and opted out of the audio recording. Upon completion of the larger

study, participants were asked for permission to make notes and take photographs around their homes, including surroundings. Every attempt to reach out to participants at every stage of the data collection was made carefully and respectfully. Lastly, participants received a remuneration token valued at \$20 USD. Participants were assured that they were volunteering to participate, and were given the choice to stop participating at any point throughout the study. The following measures were used to contextualize the key findings in this study:

### ***Demographics***

Researchers collected demographic characteristics of FCCPs using a demographic questionnaire assessing a range of characteristics from validated sources, including age, race, marital status, household income, education, years as an FCCP, whether or not they have assistants on their staff, and number of children in their programs.

### ***External Sociospatial Context***

Researchers measured external sociospatial context through geospatial information about family childcare home geographical locations. These were gathered using their complete addresses, unstructured observations, and photographs of neighborhood surroundings to identify specific features of their surrounding areas.

Data were geocoded and inserted as a compiled dataset and web-based framework in ArcGIS software (<http://www.arcgis.com/features/index.html>) for further analyses (i.e., cartographic categorization of low-income status and buffer analyses in relation to specific environmental features). Each home was given its own descriptive set of attributes based on existing information from secondary datasets (i.e., Champaign Park District public data, American Community Survey (2011-2015) five-year estimates from the Public Use Microdata Series; U.S. Census Bureau, 2016), which were used for subsequent analysis in combination with qualitative data.

### ***Perceptions of External and Internal Sociospatial Context***

The study measured participants' perceptions of external and internal sociospatial context through in-depth interviews. Researchers conducted two face-to-face interviews per participant (an initial interview and an exit interview), using two interview facilitation guides to semi-structure interviews with questions by topic (Patton, 1990). Each interview facilitation guide was built to address different concepts through sets of questions (Ward et al., 2014) and ensure all topics of interest were covered while allowing flexibility of discussion during the interview. As interviews were underway, researchers approached participants with probes and follow-up questions to ensure rich data during the interview and to reflect the nature of the grounded theory method.

The initial interview protocol included questions on the exploration of physical activity and play (i.e., context, equipment, programming, time provided, involvement, training, and policies of both indoor and outdoor activities), whereas the exit interview protocol included questions to recall daily activities in the past week in contrast to the initial responses). The initial interviews ranged from approximately 30 minutes to an hour in total, while the exit interviews ranged from

approximately 15 to 45 minutes in total. Researchers piloted both of these protocols with an FCCP who had been an informant in past studies. This pilot approach was performed to ensure fidelity of the instruments in relation to the overarching goal (i.e., open-ended, but ensuring the questions accounted for processes by which family childcare providers and settings shape preschoolers' physical activity opportunities based on a priori sensitizing concepts). Only a small number of questions were edited for clarity as a result of the pilot. The exit interview also served as a member-checking technique; the researchers used the interview as an opportunity to confirm their interpretations with some or all of the study participants (Roller & Lavrakas, 2015; Taylor & Bogdan, 1998). Interviews were audio recorded (except for one interview) after consent by the participants, and ultimately transcribed verbatim for subsequent data analyses.

### ***Complementary Data Sources***

Throughout the study, other types of data (e.g., diaries, photographs, field notes, memo notes, researcher debriefings) were collected and integrated into the analysis to give a more nuanced contextual picture of FCCPs' program and sociospatial contexts. These were key elements in the triangulation of the primary data sources and emerging findings, and are reflected to some extent in the findings of this study.

### ***Data Analyses***

All sources of data were analyzed through the lens of our overarching study aim, and coded in accordance with two analytical approaches: (1) Sociospatial Grounded Theory (Steinberg & Steinberg, 2015); (2) Analytic Induction (Bernard & Ryan, 2010).

### ***Sociospatial Grounded Theory***

In sociospatial grounded theory, the researcher begins collecting data and then seeks to develop an understanding of patterns observed therein, which ultimately leads to theory building based on those observed patterns. In this approach, GIS provides an important additional component to inductively develop a grounded theory distinct from the traditional approach. A series of steps are followed using this approach: 1) determine a topic of interest; 2) determine a geographic location of interest; 3) collect the data (qualitative, spatially linked social data); 4) geocode the data; 5) ground truth in the GIS data; 6) analyze the data and look for spatial and social patterns; 7) generate theory (spatial and social) (Steinberg & Steinberg, 2015).

### ***Analytic Induction***

This study incorporated analytic induction to add rigor to the grounded theory method. Analytic induction focuses on building "causal" explanations of phenomena from a close examination of small number of cases (Bernard & Ryan, 2010). Inductive reasoning is used in the early stages of the research question to explore ideas of what "causes" or predicts the phenomenon in which we are interested. This method is also known as the "method of difference." It starts with a single case and the development of a theory to account for that one case. Then, the researcher looks at subsequent cases to see if they fit the previously developed theory; if not,

the theory is adapted to continue accounting for more cases. Throughout the process the researcher basically reformulates hypotheses that were grounded in the first case (Bernard & Ryan, 2010).

Overall, in this study, data was coded from the open coding stage (i.e., line-by-line coding) through the advanced coding stage (i.e., connecting participants' narratives from earlier categories that emerged from data until theoretical saturation is reached) (Corbin & Strauss, 1990). Key sociospatial themes and concepts that emerged from the data were organized into categories and sub-categories to better understand the underlying processes in the developing conceptual model. This conceptual framework evolved as the primary researcher gained a deeper understanding of the data and how its sociospatial themes and concepts were related to each other. The primary researcher initially examined the data in relation to the overarching research questions by identifying excerpts that contained content meaningful to these major themes. A second coder aided throughout the analysis process to compare points of convergence and areas of divergence, and together the researchers came to a consensus around an accurate representation of participants' narratives in the final theoretical output. The final stage of the analysis concluded by analyzing how patterns from all coded data (including GIS and qualitative data) expose the deeper and more complex meaning of the phenomenon as voiced by the participants.

The two primary analytic approaches used in this study, sociospatial grounded theory (Steinberg & Steinberg, 2015) and analytic induction (Bernard & Ryan, 2010), are flexible and iterative processes (Creswell, 2007; 2013) of theory building and refinement using qualitative data (Bernard & Ryan, 2010). Qualitative analyses using these approaches are inductive, meaning the researcher understands that the research topic and potential hypotheses emerge from the data (Steinberg & Steinberg, 2015). While sociospatial grounded theory technique was used to generate theory, it was complemented by analytical induction, which developed the theoretical framework into a more robust version.

## Findings

Overall, theoretical categories at varying levels emerged from participants' accounts. FCCPs were knowledgeable and aware of a wide range of key factors shaping the physical activity context for children in their care. These factors emerged in relation to the following contextual domains: (1) policy-level; (2) environmental-level; (3) program-level; and (4) FCCP-level.

### Policy-Level Factors

In general, participants provided a variety of responses with regard to policies that shape preschoolers' participation in physical activity opportunities. However, a majority of FCCPs were unaware of how the structure of these policy components facilitated or inhibited physical activity promotion in their daily programs. For example, some FCCPs cited:

*I wouldn't say that I have any specific policy. Yeah, just – I do – and this is through their preschool program. There's a monthly newsletter that the*

*parents get. Usually there are some little tips in there about physical activity either indoor or outdoor, but I wouldn't say policy. I don't really have.*

*No, I don't know. All parents have to sign a thing telling you that you have permission to take them on field trips or for a walk or swim in the pool. That's basically all of the policy parts there.*

Nevertheless, some FCCPs were very specific about how these types of policies influence their provision of opportunities for preschoolers' physical activity. State-level policies emphasize the various requirements and practice guidelines that are part of FCCP licensure credentialing in the state of Illinois. Program-level policies were rules or communication standards (e.g., contractual agreements) that FCCPs have integrated in their daily programs to ensure that activities run smoothly and parents are kept abreast of relevant information. One participant described in some depth the state- and site-level policies in her daily program. She perceived the state-level required professional development opportunities as a need for more professionalism that may enhance daily physical activity promotion. At the same time, however, she recognized that even the basic opportunities are jeopardized due to state-level budget cuts. This FCCP also referenced ExceleRate (<http://www.exceleRateillinois.com>)—a quality recognition and improvement system for licensed FCCPs at the state level, and Gateways (<https://www.ilgateways.com>)—a training and professional development system complementary to ExceleRate. This FCCP was worried about losing access to these programs due to budgetary cuts at the state level and hoped for them to become a federal-level affordance in the future, given Illinois' non-sustainable efforts to provide FCCPs with assistance to address their policy-level needs:

*Well, you know DCFS [the Illinois Department of Child and Family Services] requires us to take training. I think the training needs to be more professional, but unfortunately I don't – you know that's another thing the governor wants to cut out, right? Yeah, he's cutting the budget for the training. I mean it's in jeopardy of being cut. I mean, right now they don't have no budget for Gateways, they have no money coming in from the state. It's up in the air if they're going to be able to offer any kind of free training online. I'm in ExceleRate, and this is going on my third year, and in order to participate and get the grant, there is proper training I should say for quality care. It's offered through the state. Hopefully, it becomes federal pretty soon because that might be cut, you never know.*

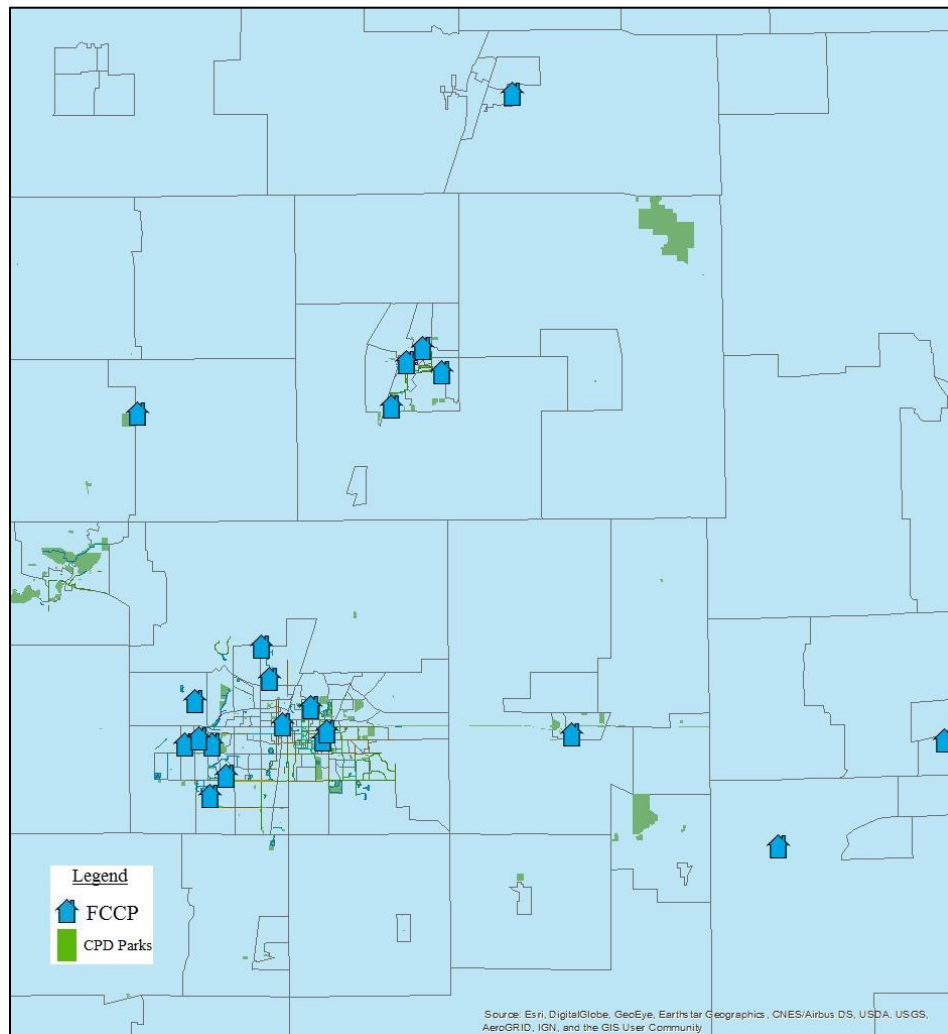
At the site level, this FCCP refers to her policies as “common sense” and ensures that these adhere to policies from the state licensing entity, DCFS (<https://www.illinois.gov/dcfs/Pages/default.aspx>), as well as capturing some of her site-specific needs. These site-specific policies seem to be more flexible than those at the state level, and implementation varies widely across FCCPs in this sample. Enforcement of site-level policies does not become part of the process by which FCCPs meet a prescribed standard or set of standards to reach licensure.

*I have a contract that parents sign with me. It kind of describes my policies. Well, behold, that contract seems to slip their minds, but no smoking policy, of course, my DCFS mentioned that to me, and she even mentioned she walks up, sees a cigarette butt, you know, there's no smoking on my property, and yeah, you always have parents that... yeah. I mean, it's only common sense for a lot of the policies, I mean don't bring your kids sick, you know you're just [going to] cause other kids to get sick. Well, the policies for, of course, the proper attire and shoes.*

**Environmental-Level Factors**

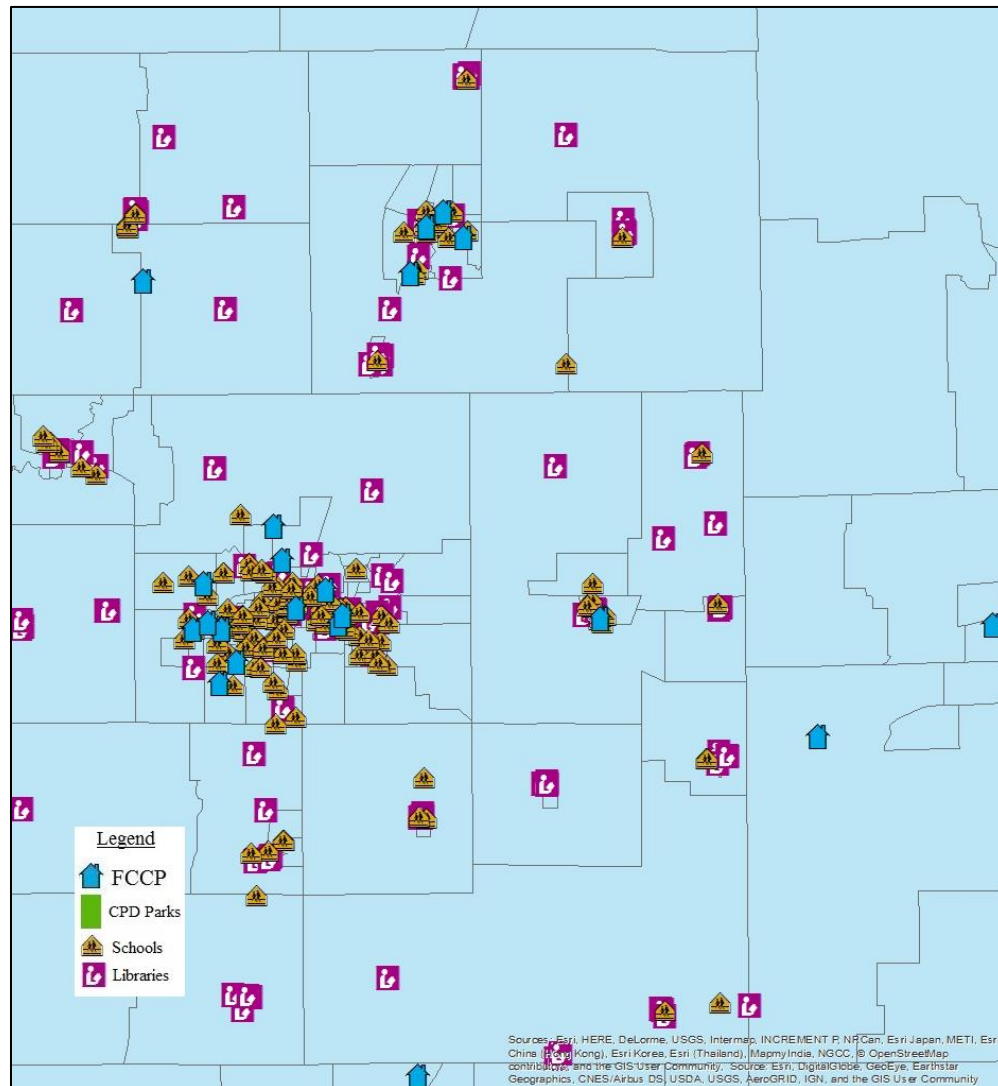
While each FCCP’s site is diverse in its features, Figures 1 and 2 offer examples of the general environmental-level features in this sample that are embedded in their neighborhood contexts (i.e., libraries, school facilities, parks). These maps highlight how FCCPs who are established closer to more populated towns in the county have greater access to these features as well as to other FCCPs.

**Figure 1. Map Indicating FCCPs relative proximity to parks (n=21)**



source: CPD public geospatial data

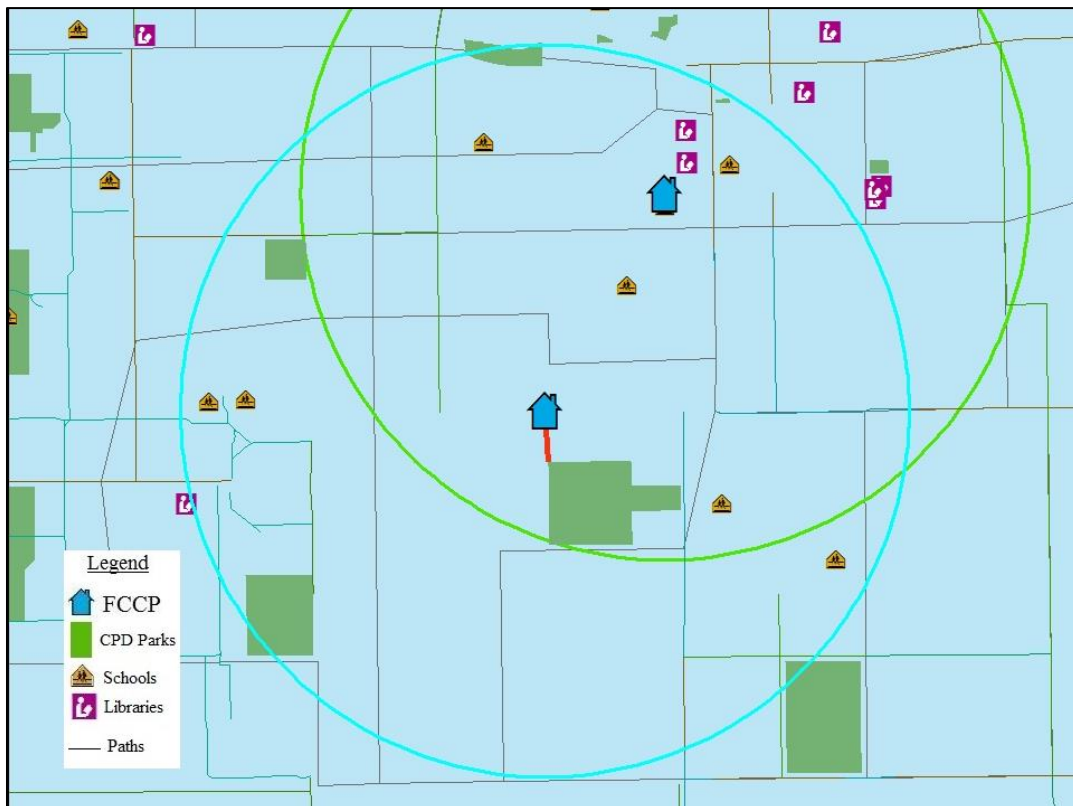
**Figure 2. Map Indicating FCCPs' relative proximity to schools and libraries (n=21)**



source: CPD public geospatial data

Figure 3 is an example of the various iterations of these features unique to each participant. This map is provided as it demonstrates some of the geospatial evidence that supported qualitative data analyses, and then introduces the final theoretical output. Researchers used ArcGIS buffer techniques to denote the context surrounding each family childcare home (within a 0.5 mile radius range). Figure 3 highlights two prevalent themes in the qualitative data: (1) access/proximity to and availability of park settings, schools and libraries in the neighborhood, which FCCPs note to be places utilized in their daily program for various reasons (i.e., visit a playground, walk to library for story time); (2) proximity to other FCCPs in their network, which could lead to partnerships or opportunities to collaborate.

**Figure 3. Map indicating environmental features near Maria (pseudonym), an FCCP**



Note: Blue and green circles denote .5-mile radius from FCCP homes.

Transitioning from the depictions of FCCPs' external sociospatial context to their perceptions of such, FCCPs alluded to several spaces within and outside of their immediate home setting that facilitated or inhibited their promotion of preschoolers' physical activity. Some FCCPs identified proximity to parks and the size of their childcare program as key factors in allocating time and resources to program activities, either indoors or outdoors. For example, a participant explained how convenient it is to arrange a visit to the park when there are fewer children in her program, and also the convenience of being "half a block from the park":

*Our thing is, because we've got such a young group of kids, we don't go too far. We don't do field trips because we don't have a vehicle big enough with all the car seats we would need.*

*...[yesterday] we were half a block from the park and so we spent a lot of time at the park.*

*There are mornings I don't have a lot of kids, so I might only have one kid. Yesterday I only had one kid, so we did. We went on a half an hour walk around the block and then we stopped at the park and played there for a half an hour and then we went home and played outside some more. It's just, I*

*do try to get out, even if it's too hard for me to go the park. If the park is big enough, sometimes I'll take a ball or something and I can handle them better if they aren't on the play equipment, so we'll go into the grassy area and let them run around. They sleep better; take better naps if they are worn out.*

FCCPs also expanded on the fact that indoor space is fairly limited, and the confined space of their home business may somewhat inhibit preschoolers' engagement in physical activity, noting, for example, "I would say we don't have enough space in the house." "I mean, it can be done, it's just it's not fun when you have too many kids that are walkers because it's just dangerous." Figure 4 provides an example of this prevalent theme. Given the pervasive but varied nature of these logistical barriers, the challenge of promoting physical activity indoors may not have an easy solution. One participant provides insights about her difficulties in dealing with an inhibiting indoor space, as well as managing competing activities that limit programming activities outside of the home:

*My house definitely inhibits it. It's only 1300 square feet, but I can't utilize the full 1300 square feet for it, the daycare. The nice thing is, like I said, it's kind of like a circle, so at some points I let them, during the winter, run around the circle. The back yard's not huge. I don't go out front too often because we have the bus that goes by. I don't trust, necessarily, the kids and I have a fenced-in back yard, so we try to stay in the back yard.*

**Figure 4. Indoor space in main room for children at an FCCP's site**



FCCPs also explained that neighborhood access was an important component of planning activities outdoors. One participant explained how being aware of her neighborhood's safety helped her plan outdoor activities:

*This is [kind of] a unique neighborhood... We have our own park and we have our own basketball court and it's fenced in now so the kids can really go to town back there and saves us time chasing all the balls all over the neighborhood too. The car port and then the backyard, just our own backyard are all the major, major daily utilized spaces. I also take them to the park just because they don't always want to just play where they played further every day. Usually we walk to the [park]. That's usually when we want to – occasionally we'll drive to the soccer field and that's a big huge space.*

Lastly, a couple of participants spoke of integrating a set of nature-based features into their daily programs to enrich the outdoor activity opportunities for children in their care. Participants noted the following:

*I think our outdoor environment is very extensive and amazing. Because we love to garden... we also grow some of our own vegetables and the children have that experience of learning about nutrition and learning about how plants grow and pollination.*

*...just positive play, safe play. Just giving children a time to enjoy the nature and being outside, but also utilizing that water on our garden, too. So, a lot of times we'll set up their water play and sprinklers near our garden.*

### **Program-Level Factors**

At the program level, FCCPs' programmatic support systems such as resources and social support, as well as their own characteristics, seem to be the drivers of FCCPs' strategies to mitigate contextual challenges to promote preschoolers' physical activity. FCCPs noted that these support systems, as well as assistants, parents, and other professionals who serve as logistical support in their daily programs were sources of ideas for later strategizing what would work with their childcare populations:

*Just those little ideas that you're not necessarily gonna come up with on your own. Pinterest is great, and you can cruise that for an hour; but, to be in a classroom with other providers, and to say, "What have you done that worked?" Like, "The teacher says this is a fun idea, but that's never [going to] work with the kids." And to play off each other, and see what they do, and that's always really nice to have.*

*We started a few years back—one of our dads does a boot camp exercise program for the [local] park district. He used to come in and he would march kids around the table and that so we started a baby boot camp here. It's just as fun thing. We would start the kids marching around the table ourselves and then we would do little exercises, too. It was a fun thing for his son and*

*we've carried it on, ever since. We've been doing that for about six years, now.*

*I have a grandma that might stop to pick up kids, she will let them play on the playground at school a little extra. So, you have to be creative; but you have to also, like I said – when you've got an infant, all the way up to nine-years-old – you've got to meet everybody's needs.*

FCCPs are supported by individuals or entities that provide content or logistical support to facilitate activities for children at FCCP sites. One participant saw the business side of family childcare as an important factor influencing her daily practices and status as a licensed FCCP because, as she puts it, "I have employees to pay and expenses [to pay] out." Another FCCP referred to seeking external sources of support to address the lack of resources in this professional field. These include affordable logistical and learning supports to enhance their daily programs. Logistical sources of support include mostly assistant FCCPs that cannot be afforded by many licensed family childcare programs, but who provide essential aid in the daily activities for children in these sites. One participant points out that she has "two high-school assistants that come in the afternoon, that do more of the 'get rough-type' play, and do the more physical stuff. So, it's integrated more in the afternoon." But another FCCP emphasizes that help comes at a price: "everything is a cost, so my assistants have to have – I require them to have as much training as I do. I want the parents to feel like they don't have to worry about their child, they're [going to] have the same training as I do, and unfortunately with the state, the training needs to be up, but I don't know who will get it." These are common themes within the data that reflect the general but costly support that FCCPs receive from their assistants for children's physical activity.

FCCPs also mentioned training for professional development on general and specific topics related to physical activity, as well as planning activities, whether through utilizing a curriculum, following a theme, or planning "on the fly."

*So, my background is in education. So, that's really, I guess laid the foundation for what we do. Whether it's socially based, academically based. Whether the physical activity. But, some of the training that I attend [is] because we have to do like this 15 hours [of training].*

*I mean it just all depends on whether we're inside or outside and depending on how many children are present and that kind of thing. We just make up our own. I try to come up with a theme for – sometimes, it's for the month or sometimes it's for the week, depending on if it's keeping their interest or not.*

### **FCCP-Level Factors**

FCCPs discussed their role as caregivers for developmentally diverse children—children who are at various developmental stages in their lives when attending family childcare. This finding emerged from FCCPs caregiving responsibilities that must account for the diverse developmental stages of children and how these shape

interactions among the diverse childhood populations attending family childcare. While some FCCPs cited advantages to having mixed-age groups in their programs, others highlighted the struggles of accommodating activities that fit everyone's interest. In order to keep a more cohesive socialization experience among children, being flexible allowed the experience to let everyone participate at their own pace.

*So, that's been my experience. I would just like more tools to use and more help with equipment to accommodate these special needs, since we're inclusive and we do welcome every child. I want to have physical activity for every child. Hearing impaired, visually impaired, ADHD, autistic children, sensory disorders. I want to be able to give them something.*

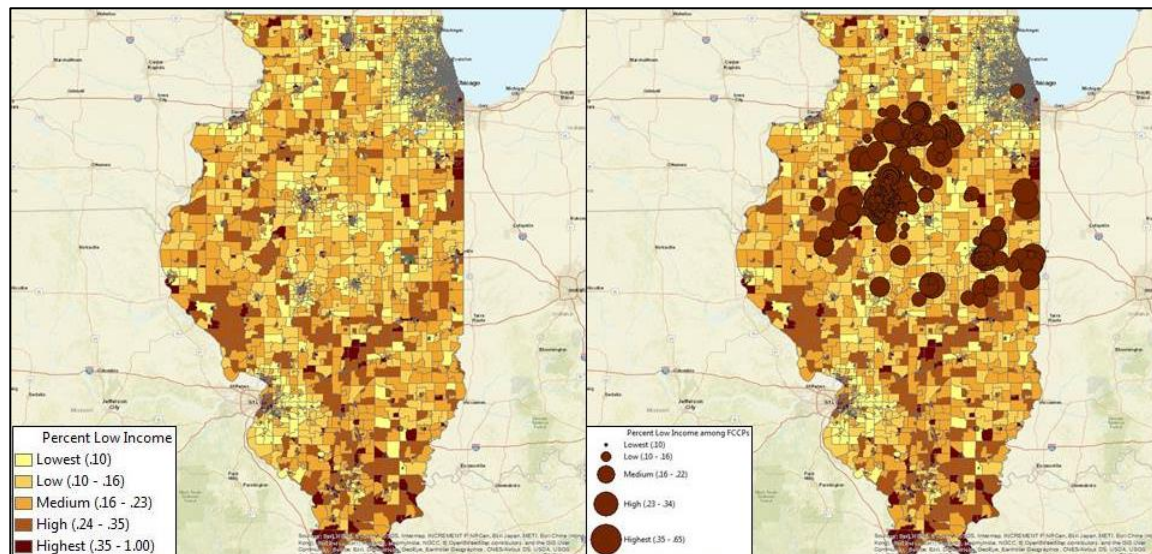
*Especially in family childcare, you've got mixed ages. You're trying to do cut-and-glue and all of this stuff with a 4-year-old, but your toddler is standing over there putting the glue in their mouth. It's hard to incorporate things like that.*

In addition, FCCPs' professional identity emerged as a prevalent FCCP-level feature when they are forming the context to provide the best caregiving experience to children in their care. They are highly aware of their own professional expectations of their daily programs, which motivates them to gain new competencies and keep improving their practice:

*Even though it's 'a home-based daycare' or whatever, this is my 27<sup>th</sup> year doing it and people know this is my business. I don't sit home and babysit. It's pretty much a structured learning environment.*

Lastly, the researchers produced an additional map to depict socio-economic status among FCCPs in our sample. We analyzed geospatial data from FCCPs in our network (n=342) in contrast to Illinois resident American Community Survey (2011-2015) five-year estimates in the Public Use Microdata Series (PUMS) (U.S. Census Bureau, 2016). These were coded and entered into ArcGIS to map participants' low-income status in comparison with their Illinois census block counterparts (Figure 5). This information is important given that FCCPs provide critical caregiving support to low-income families (Forry & Hofferth, 2011), while often being low-income themselves.

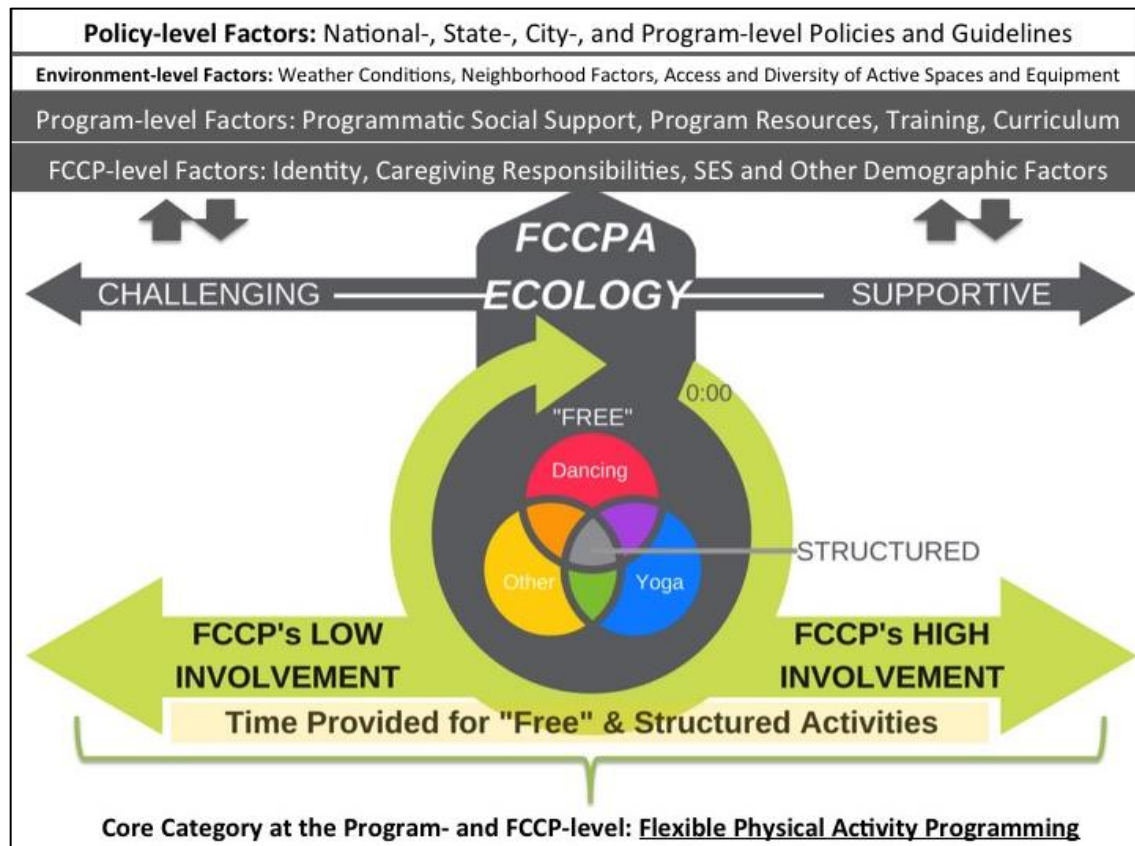
**Figure 5. Map indicating above-average low-income status among FCCPs (n=342)**



We found that FCCPs are more likely to be in low-income households compared to counterparts in their census block, meaning their socio-economic status (SES) may represent a challenge to their programs. This pattern is also supported in our participants' narratives. FCCPs in their interviews named a few economic aspects pertinent to their practice, including generating income and incentivizing sources of external support for their daily programs. These accounts highlight the financial circumstances that may hinder FCCPs ability to provide high-quality opportunities for the children in their care (Tovar et al., 2017).

### **Core Construct: Flexible Physical Activity Programming**

The sociospatial process through which FCCPs and their settings shape opportunities for preschoolers' physical activity is represented in our final theoretical output: Family Childcare Physical Activity Ecology Model (Figure 6). "Flexible physical activity programming" emerged as the core construct with the greatest explanatory power because: (a) it encompasses particular structural categories (i.e., "program-level factors" and "FCCP-level factors"), and (b) it links other sub-processes (i.e., "time provided for free and structured physical activity," and "FCCP's involvement") identified in the data to create a coherent story (LaRossa, 2005).

**Figure 6. FCCPA ecology: A sociospatial grounded theory**

This construct serves as the core category in our final sociospatial grounded theory. This new theoretical lens argues that the physical activity context in family childcare settings is shaped by factors across multiple levels (from policy- to FCCP-level) through our core category: flexible physical activity programming. This core construct includes two sub-processes that impact FCCPs' ability to provide active opportunities to preschoolers and other children: (a) time provided for both free play as well as structured activities; (b) the degree to which FCCPs are involved in programmed activities. Along this spectrum, as positive contributions towards these two sub-processes increase, family childcare environments become increasingly supportive physical activity contexts.

### ***Time Provided for Free and Structured Play Activities***

In the Family Childcare Physical Activity Ecology Model, the distinction between structured and free play activities is blurred as it pertains to physical activity promotion. This means that although FCCPs may structure an activity that is expected to engage children in physical activity, if the children do not engage in it as anticipated, the FCCP has to be flexible and provide diverse and inclusive opportunities for physical activity, both "free" and "structured," for children at all stages. Free play can be defined as a leisurely time for children to choose their own play activities, with a minimum of adult direction (Research Connections, 2016). One study participant also gave a definition of "free play" as "where [children] get

to choose whatever activity outside they [want to] do, whether it's just running back and forth, which they love to go back and forth across the yard and play." Free play may be indoors or outdoors (Research Connections, 2016). Free play was the most prevalent theme across the majority of FCCPs interviewed. FCCPs provided examples of various types of activities in which children were allowed to play freely. FCCPs report being generally encouraging of children's free play and are therefore willing to adapt the activity to support children's energy expenditure within the context of the family childcare setting.

### ***FCCPs Involvement***

While FCCPs provide time for both free and structured activities, they may observe, intervene, join and/or lead an activity. A higher degree of FCCP involvement may ensure that each activity accomplishes what they intend for the children. For the most part, FCCPs have a similar daily routine, though they incorporate a wide range of different resources and practices. It is important to note that each FCCP's flexible programming is coupled with varying levels of involvement and planning, as well as varied knowledge bases that influence what is being offered to children in their care and in what amounts, and ultimately shaping the context for physical activity promotion in family childcare.

### **Discussion**

The purpose of this study was to better understand the ways that FCCPs and their childcare settings shape the context by which opportunities are provided for preschoolers' physical activity. The final theoretical output that emerged from the data demonstrates that the context for preschoolers' physical activity is determined by each FCCP's goals regarding children's physical activity, which informs their flexible physical activity programming. Nevertheless, physical activity is just one piece of the puzzle in this equation. FCCPs seem by and large to perceive physical activity as a broader concept than just energy expenditure, noting its value for "gross motor skills," "everyday play," and "us[ing] their imagination." FCCPs thus view physical activity as play more broadly, including learning activities, engagement with peers, enjoyment, and fun. FCCPs additionally alluded to motor skills as an important construct of interest for children to develop and learn while attending their sites. This finding sheds light on the multidimensional understanding of what preschoolers' physical activity should entail, a far more complex phenomenon to address in family childcare contexts than may have been expected in the past. It also illuminates the need to ensure that FCCPs recognize that energy expenditure is as important as other critical components for preschoolers' health and developmental outcomes.

Physical activity is recognized as a complex human behavior comprising a range of activities, and varied intensity, frequency, duration, and location (domain) (Hansen & Ekelund, 2017). In the physical activity literature, energy expenditure has been given particular emphasis due to its role in reversing the childhood obesity epidemic (Janssen, 2014; Treuth & Bandini, 2016) and in the promotion of health more generally (Timmons et al., 2012). Despite the various shortcomings (in terms of energy expenditure) of FCCPs' flexible programs, this flexibility may offer more diverse and developmentally appropriate opportunities for physical activity, focusing

on milestones beyond meeting guideline-recommended physical activity. Ultimately, physical activity may be a portion of the multidimensional play activities within this early childhood education context. In fact, recent guidelines for physical activity focusing on their effects on other health and developmental domains (United States Department of Health and Human Services, 2018).

FCCPs in our study noted that children's socio-emotional development and motor skill competence were among their motivations to promote physical activity as part of their programs. These outcomes would depend on the type of activities offered at their facility. For example, some FCCPs programmed passive activities such as gardening to promote learning through engagement with nature, while others highly encouraged dancing as the top activity to get children moving. Physical activity in this context may simply be an exploratory experience in which children are exposed to various activities while their imagination and exploration traits feed their motivation to engage in specific activities. This suggests that the role of enjoyment on physical activity may also be critical in the early childhood population. It is also important to know that within the preschool stage (i.e., 3-5 years of age), there are also developmental diversities based on age and gender. This adds to the complexity of studying physical activity among this age group.

There is a need for more sensitive activity-programming practices tailored to developmentally diverse childhood populations. This study's findings shed light on FCCPs' awareness of the various learning capabilities that can occur through preschoolers' physical activity. Developmental domains can be defined as areas of a child's development, including: gross and fine motor skill development; speech and language/communication; a child's relationship to toys and other objects, to people and to the larger world around them; and a child's emotions and feeling states, coping behavior, and self-help skills (Research Connections, 2016). As noted by Lu and Montague (2016), this level of awareness may lead FCCPs to prioritize physical activity in their programming.

## **Conclusion**

Through the core category of flexible physical activity programming, a theoretical framework emerged from the data that explains the sociospatial process by which developmentally diverse children engage in various forms of play and physical activity in family childcare settings. The larger context for physical activity promotion in family childcare includes the interplay of contextual factors including policy-, environmental-, program-, and FCCP-level, which shape physical activity through flexible physical activity programming. This model may now serve as a secondary tool of thought in examining opportunities for preschoolers' physical activity. FCCPs indicated that physical activity promotion in family childcare is influenced by many factors, such as policies, neighborhood factors and home factors, the number of children participating in their program, demographics, and other variables. These findings are consistent with recent studies using survey (Temple & Naylor, 2010), qualitative interviewing (Sisson, Smith, & Cheney, 2017; Wilke, Opdenakker, Kremers, & Gubbels, 2013) and other novel approaches (Weinberger, Butler, & Schumacher, 2014), which emphasize the role of specific

features across multiple levels from policy to care providers in promoting physical activity for young children.

### **Implications**

Further analysis of the Family Childcare Physical Activity Ecology Model may lead to the predictive pursuits of these hypothesized interconnections and/or pathways to children's physical activity outcomes in family childcare. This framework could also impact FCCPs' decision-making by educating them to adopt practices that support greater time offerings for play and physical activity during day care operating hours while being involved to the best of their ability. However, such efforts would not be enough for young children to meet physical activity recommendations. FCCPs need sustained support systems from policy- to FCCP-level in order for children attending family childcare environments to maximize their opportunities for physical activity. Lastly, there is a translation potential stemming from this work that would enable policymakers, researchers, and practitioners—who tend to work in silos—to collaborate in support of physical activity opportunities among children within family childcare.

### **Limitations**

This study has limitations worth noting. The Family Childcare Physical Activity Ecology Model in this study refers to interconnected factors that emerged in our data, not accounting for additional unseen interconnections with other factors that may also be important. There may have been other categories present in our data that were not prevalent enough across multiple cases in comparison to those in the final model; nevertheless, those other categories may still be relevant factors to eventually supplement the FCCPA ecology as a theoretical context for promoting childhood physical activity in family childcare in future research.

As the first study of its kind in family childcare, there were several components in this study that were meticulously structured, but due to time and/or budget constraints, not every component planned for this study went as originally intended. To buffer these significant setbacks, external funding resources and personnel assisted throughout the study. It is also important to note that as a novel methodological approach, the study is exploratory and serves as a baseline model to address further questions about the FCCPA ecology and opportunities for preschoolers' physical activity as my systematic program of research further develops.

### **Acknowledgements**

Many thanks to all family child care professionals in this study. Roger Figueroa would like to acknowledge the NIH Training Grant that supports him, under award no. T32DK007703. The authors would also like to acknowledge the Illinois Transdisciplinary Obesity Prevention Program (I-TOPP) as portions of this research were supported by the training grant "I-TOPP," funded by the National Institute of Food and Agriculture (NIFA), United States Department of Agriculture (USDA), under Award no. 2011-67001-30101.

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**Dr. Mei-Po Kwan's** research addresses health, transport, environmental, and social issues in urban areas through the application of innovative geographic information system (GIS) methods. She is interested in understanding how social differences (e.g., gender, race, ethnicity, and religion) shape urban residents' everyday experiences and perceptions/use of the built environment. She is also interested in studying how specific characteristics of the social and physical environment affect the well-being and behavior of different social groups (e.g., health behaviors and outcomes, access to jobs, social isolation, residential segregation, and spatial mobility).

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**Dr. Angela R. Wiley's** research focuses on family and child care contexts for promoting health and preventing obesity with a special interest in immigrant and low-income families.

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