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Overview

With the expansion of NYC’s universal pre-K in 2014 in Pre-K for All (PKA), the NYC Department of Education tackled the challenge of supporting classroom quality through professional development (PD) across 2,500 classrooms and a large, rapidly expanding workforce. We conducted analysis with administrative data and newly collected surveys and interviews to understand mechanisms for strengthening classroom quality via the distribution of ECE teachers across the city and support of teachers’ professional learning through district-led workforce development and site-level advice networks. Overarching research aims were to:

1. Describe how “teacher quality” is distributed across different neighborhoods and programs.
2. Describe the site-level advice networks among early childhood professionals and examine the extent that advice-seeking relates to ECE teachers’ experiences and beliefs over time.
3. Explore ECE professionals’ perceptions of district-led training initiatives and the nature of knowledge dissemination via network channels.

Aim 1 Key Findings

Finding 1.1: In 2015-2016, teachers report high levels of education, with nearly all lead teachers and over half of assistant teachers holding a BA degree or higher.

Finding 1.2: Overall, teachers with varying levels of teaching experience and education are distributed relatively similarly across sites in the 2015-2016 school year.

Finding 1.3: During the 2015-2016 school year, lead teachers with higher levels of education are less likely to teach in the Bronx and/or in mid-high or high poverty programs. Lead teachers with more experience or higher levels of education are somewhat more likely to teach on Staten Island.

Aim 2 Key Findings

Finding 2.1: On average, lead teachers seek advice from one-third of their school colleagues, and assistant teachers seek advice from one-quarter of their colleagues.

Finding 2.2: On average, about one-half of staff seek advice from early childhood administrators across all advice areas.

Finding 2.3: Specialized staff, such as family/social workers, are advice sources in content areas aligned with their role.

Finding 2.4: On average, early childhood teachers who seek advice from a higher proportion of people at their schools have higher levels of job satisfaction, more confidence in their teaching, and a stronger belief that colleagues can effectively work together to support children and families.

Finding 2.5: Assistant teachers’ racial/ethnic demographics and immigration status closely match those of children in the district — more closely than lead teachers.

Finding 2.6: Coaching that assistant teachers receive appears to be the most important contributor to high job satisfaction — compared to other forms of support that we measured.

Finding 2.7: Coaching and advice-seeking around classroom/behavior management

(compared to support around family engagement, assessment and data use, or instructional method) appears to be the most important contributor to lower stress and higher job satisfaction among assistant teachers.

Finding 2.8: On average, about 10 percent of staff seek advice from assistant teachers. In comparison, three times as many staff seek advice from lead teachers.

Aim 3 Key Findings

Finding 3.1: ECE workforce members reported three main benefits about their professional development (PD) experiences. Effective delivery, with interactive discussions and hands-on activities, was the most reported benefit of a PD section. The second most reported benefit was the ease of implementation of the information learned in PDs, ECE workforce members reported getting support regarding how to strategically implement PD activities to their daily schedules. Lastly, participants reported benefiting more from PDs when they had a personal connection to the information being learned. Personal connection included participants' needs being addressed (e.g. managing behavioral issues) or their established interests.

Finding 3.2: ECE workforce members reported two counterproductive issues with their PD experiences. First, they reported irrelevance of information, explaining that they found PD irrelevant when the content addressed education practices more broadly rather than focusing on the specific child population/communities they serve. Second, they reported over-repetition between sessions, and perceived PDs to recycle topics and not cover new material or content that they do not already know.

Finding 3.3: ECE workforce members reported sharing information with other ECE workforce members through formal channels (e.g., scheduled staff meetings) and informal channels (e.g., extemporaneous meetings, advice-seeking).

Finding 3.4: Nearly half of participants reported sharing information they received from a PD with colleagues at their ECE center. ECE professionals reported disseminating PD relatively equally across formal and informal channels (45% and 55%, respectively).

Finding 3.5: ECE workforce members reported sharing the information learned in PDs during formal meetings. Some ECE workforce members reported sharing information with their immediate co-workers in small meeting settings, while other ECE workforce members reported being asked by their directors or principals to share the information learned during larger meetings (e.g. turn-keying).

Finding 3.6: Information learned in PDs was shared among ECE workforce members during informal meetings and advice-seeking interactions.

Finding 3.7: ECE workforce members reported three main reasons why they seek specific members of the ECE workforce for advice and why they believe others seek them for advice. The most common response was professional expertise; ECE workforce members explained that they sought others because of their specific content knowledge or general knowledge across ECE topics. ECE professionals also reached out to others based on their job title – because it covered the area in which they needed help (e.g., a family worker was sought for family engagement advice because her job title implied knowledge on that topic). Lastly, ECE workforce members referred to their familiarity with colleagues when explaining why they sought them for advice; themes of trust, support, and friendship were often reported.

Professional Presentations:

SREE 2016

Improving the effectiveness of collaboration between practitioners and researchers
Morris, P., Pappas, S., & Raver, C.

SRCD 2017

Implementation of Pre-K for All: The Role of Teachers' Social and Professional Networks.
Cappella, E., Cramer, T., Quirola, C., Rojas, N., & Raver, C.

APPAM 2017

Assistant and Lead Teachers in Early Childhood Education: Examining Workforce and Social Network Characteristics within a Large Urban District.
Cramer, T., Cappella, E., & Raver, C.

NRCEC 2018

Who are They and What do They Need? Characterizing and Supporting the Early Childhood Assistant Teacher Workforce in a Large Urban District
Cramer, T., & Cappella, E.

SRCD 2019

Seeking Advice in Schools: Understanding Social Network Ties among Educators.
Cappella, E., & Cramer, T.

NYC-ECRN Research Symposium 2019

Understanding Advice Seeking & Knowledge Dissemination Among Early Childhood Professionals.
Cappella, E. & Allen, L., Cramer, T., Keays, K., Moraes, J., & McKenna, A.

Publications:

Cramer, T., & Cappella, E. (2019). Who are they and what do they need: Characterizing and supporting the early childhood assistant teacher workforce in a large urban district. *American Journal of Community Psychology*, 63, 312–323

Cappella, E., Cramer, T., & Raver, C. C. (under review). Advice networks in early childhood education: Predicting teachers' workplace experiences over time.

Cramer, T., Porto de Moraes, J. C., McKenna, A., Keays, K., & Allen, L. (under review). Understanding advice-seeking and knowledge dissemination among early childhood professionals.

Aim 1

Given the unprecedented expansion of NYC's pre-k system, including the hiring and training of new teachers, and the ongoing goal of quality, we examine the distribution of early childhood education (ECE) teachers with varying levels of experience and qualifications across the city. We focus on variation in teacher background characteristics by site composition and borough. To complete these analyses, we acquired, cleaned, and merged several data sets including DOE site-level data, ASPIRE workforce data, and U.S. Census data. We conducted descriptive and predictive analysis and created a set of maps to visualize patterns of results.

Results indicate some but not substantial variation in distribution of teachers across sites and boroughs by levels of education and experience in 2015-2016. Lead teachers with the highest levels of education were slightly less likely to teach in the Bronx or in mid-high or high poverty ECE programs. Staten Island teachers were more likely than teachers in other boroughs to have high levels of education and more teaching experience.

| | NYCEECs | DOE Schools |
|--------------------|---|---|
| Data Cleaning | <ul style="list-style-type: none">• Recoded/renamed variables• Standardized position titles• Differentiated between classroom and non-classroom staff• Unified education credentials• Added missing geographic information• Merged with school district data | <ul style="list-style-type: none">• Recoded/renamed variables• Merged HR assignment, salary, and biographic data• Identified pre-K teachers• Obtained geographic information• Interpreted salary codes• Categorized education, experience, and salary• Merged with school district data |
| Data analysis | <ul style="list-style-type: none">• Frequencies of classroom staff with different levels of education• Variance decomposition• Predictive models | <ul style="list-style-type: none">• Frequencies of lead teachers with different levels of education, experience, salary |
| Data visualization | <ul style="list-style-type: none">• Color coded maps by<ul style="list-style-type: none">○ School district poverty○ 3rd grade proficiency○ Census tract poverty• Geocoded NYCEEC addresses• Color coded NYCEECs by site-level proportion of qualified classroom staff | |

Table 1. Data cleaning, analysis and visualization by dataset conducted for Aim 1.

Table 2

*NYCEEC Classroom Staff Qualifications**N=5,311 Classroom Staff (2,805 Teachers and 2,506 Teaching Assistants)*

| | Teacher Qualifications | | | | | Staten Island |
|--|------------------------|-------|----------|-----------|--------|------------------|
| | Overall | Bronx | Brooklyn | Manhattan | Queens | |
| <i>General Education Levels</i> | | | | | | |
| Classroom Staff with BA (%) | 75.92 | 74.32 | 73.19 | 77.78 | 78.54 | 80.88 |
| Teachers with BA (%) | 95.83 | 95.97 | 93.95 | 95.14 | 97.35 | 99.39 |
| Teaching Assistants with BA (%) | 53.63 | 48.22 | 51.71 | 58.22 | 56.51 | 61.54 |
| Classroom Staff with MA (%) | 37.43 | 37.37 | 33.55 | 37.52 | 41.21 | 41.07 |
| Teachers with MA (%) | 66.81 | 65.12 | 62.9 | 67.17 | 70.71 | 74.85 |
| Teaching Assistants with MA (%) | 4.55 | 3.93 | 3.19 | 4.11 | 6.66 | 5.77 |
| Classroom Staff with Certification (%) | 44.36 | 39.32 | 40.05 | 45.89 | 50.61 | 54.55 |
| Teachers with Certification (%) | 65.35 | 54.73 | 64.27 | 66.87 | 71.59 | 79.75 |
| Teaching Assistants with Certification (%) | 20.87 | 20.75 | 14.99 | 22.26 | 26.04 | 28.21 |

Table 3

Education and Experience among Public School Pre-K Lead Teachers across Boroughs

| | Overall | Bronx | Brooklyn | Manhattan | Queens | Staten Island |
|--|---------|--------|----------|-----------|--------|------------------|
| Teacher Education (n = 1660) | | | | | | |
| Bachelor's Degree | 100% | 100% | 100% | 100% | 100% | 100% |
| Bachelor's Degree, Master's Degree, + Specialization | 45.90% | 36.63% | 47.59% | 41.88% | 47.45% | 68.48% |
| Teacher Experience (n = 1656) | | | | | | |
| 5 or fewer years of experience | 19.86% | 21.67% | 18.48% | 20.51% | 22.39% | 8.69% |
| 6-12 years of experience | 31.40% | 33.33% | 32.99% | 26.50% | 31.49% | 27.17% |
| 13-21 years of experience | 32.91% | 35.00% | 32.99% | 35.47% | 29.27% | 36.96% |
| 22 or more years of experience | 15.82% | 10.00% | 15.54% | 17.52% | 16.85% | 27.17% |

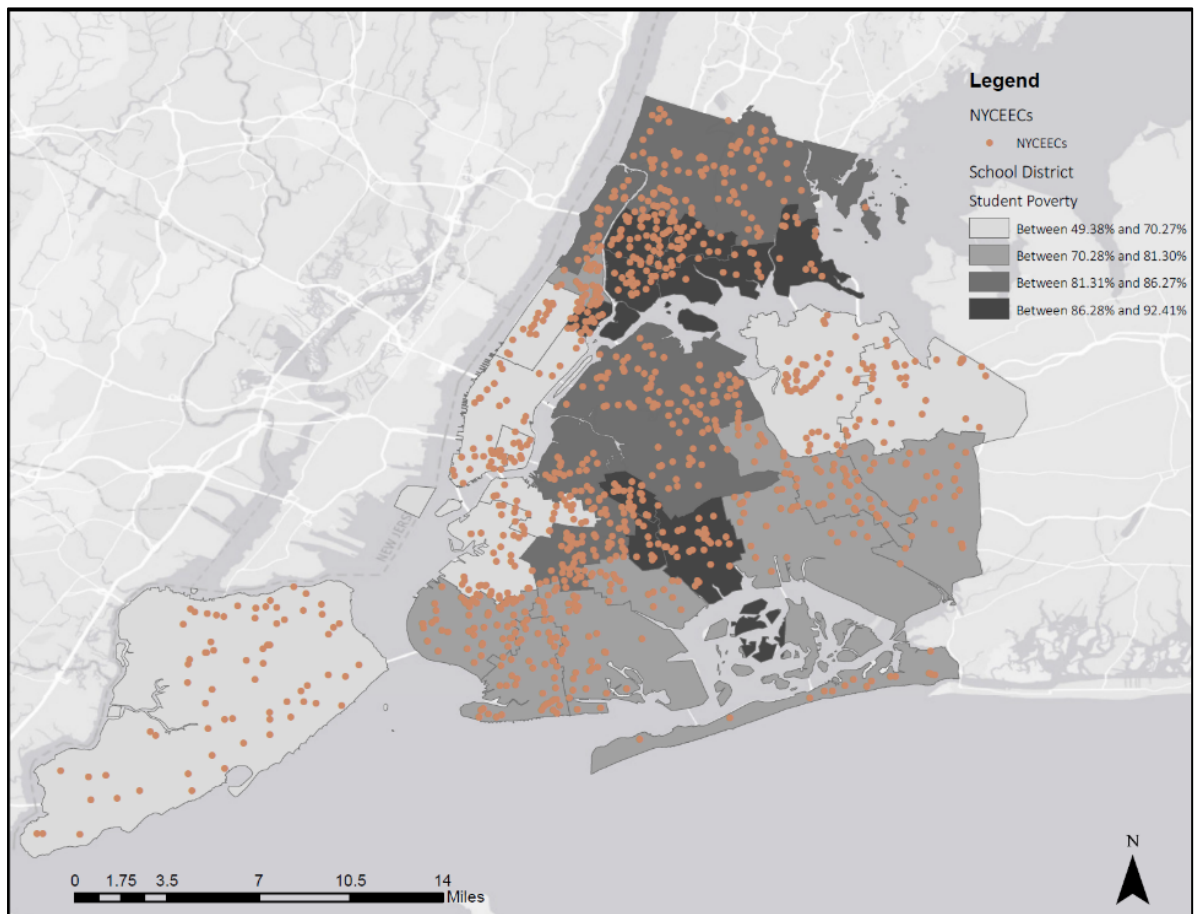
Table 4

Education and Experience among Public School Pre-K Lead Teachers across District Poverty Quartiles

| | Overall | Low-Poverty | Mid-Low Poverty | Mid-High Poverty | High-Poverty |
|--|---------|-------------|-----------------|------------------|--------------|
| Teacher Education (n = 1660) | | | | | |
| Bachelor's Degree | 100% | 100% | 100% | 100% | 100% |
| Bachelor's Degree, Master's Degree, + Specialization | 45.90% | 53.53% | 47.41% | 40.00% | 41.30% |
| Teacher Experience (n = 1656) | | | | | |
| 5 or fewer years of experience | 19.86% | 17.76% | 20.91% | 22.35% | 17.87% |
| 6-12 years of experience | 31.40% | 30.52% | 31.47% | 35.48% | 26.96% |
| 13-21 years of experience | 32.91% | 31.21% | 29.96% | 31.80% | 41.07% |
| 22 or more years of experience | 15.82% | 20.50% | 17.67% | 10.37% | 14.11% |

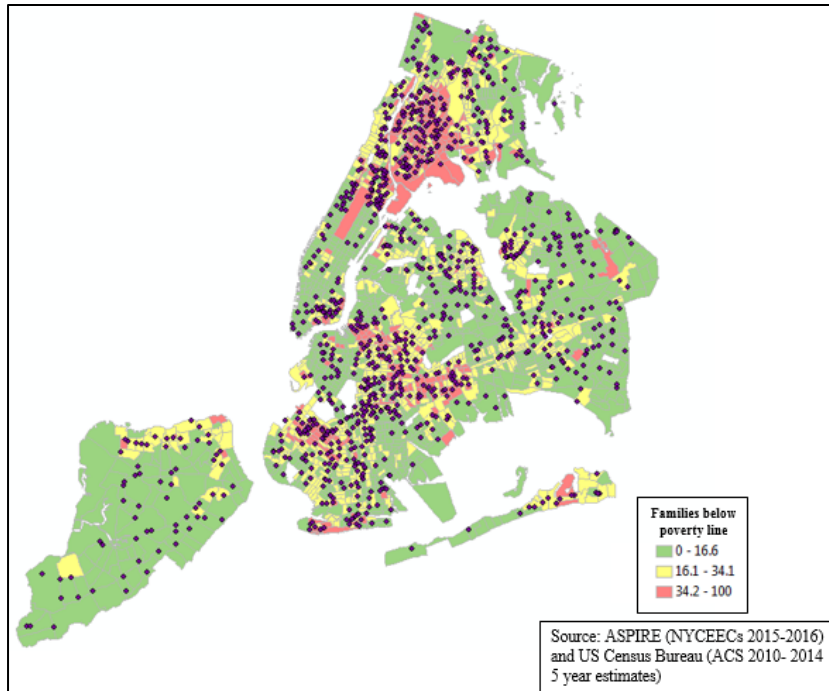
Maps are also included to visualize our findings. These maps include:

- Location of NYCEECs based on color coded school districts, by school district poverty (Map 1)
- Location of NYCEECs based on color coded census tracts, by census tract poverty (Map 2)
- Color coded school districts by school district math proficiency (Map 3)
- NYCEEC sites with above-average percentage of classroom staff with a BA degree, layered on color-coded school districts, by school district poverty. (Map 4)
- NYCEEC sites with above-average percentage of classroom staff with a Certification layered on color-coded school districts, by school district poverty. (Map 5)
- Side-by-side comparison of NYCEEC sites with above-average percentage of classroom staff with a BA, for Districts 8 and 21 (Map 6)
- Side-by-side comparison of NYCEEC sites with above-average percentage of classroom staff with a Certification, for Districts 8 and 21 (Map 7)

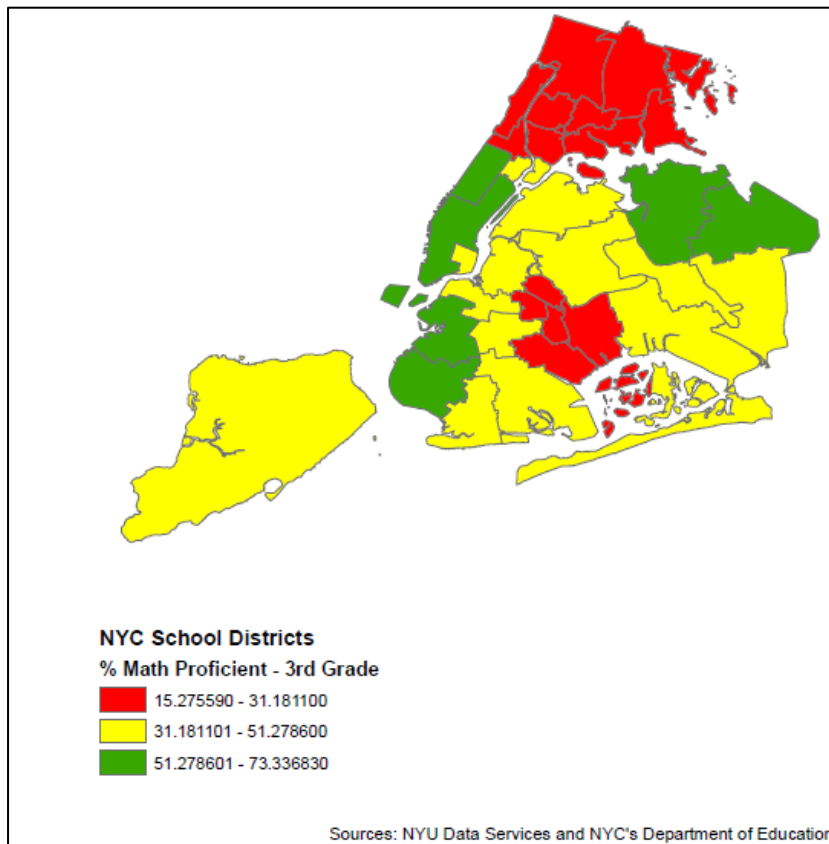


Map 1: Location of 2015-2016 NYCEECs, based on color coded school districts by school district poverty

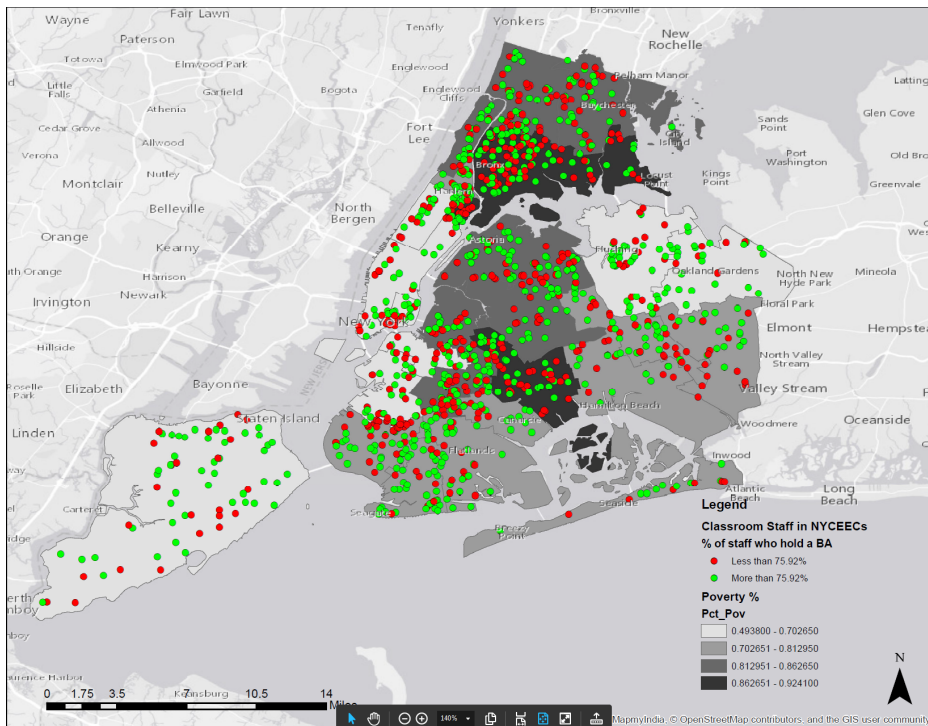
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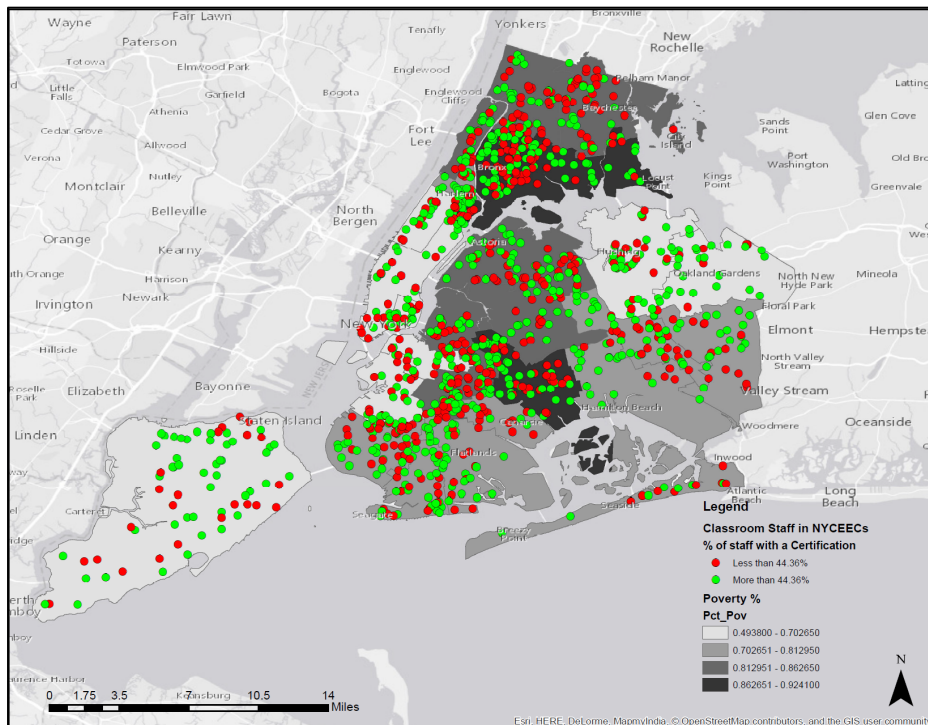
Map 2: Location of 2015-2016 NYCEECs, based on color coded census tracts by census poverty



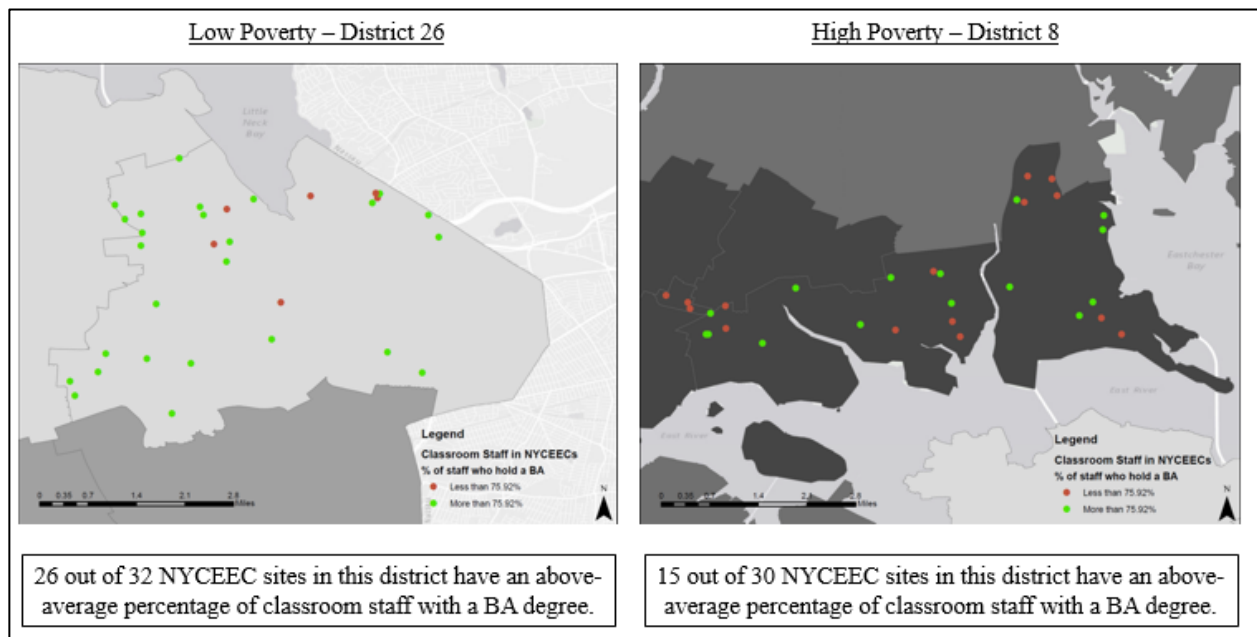
Map 3: Color coded school districts by school district math proficiency



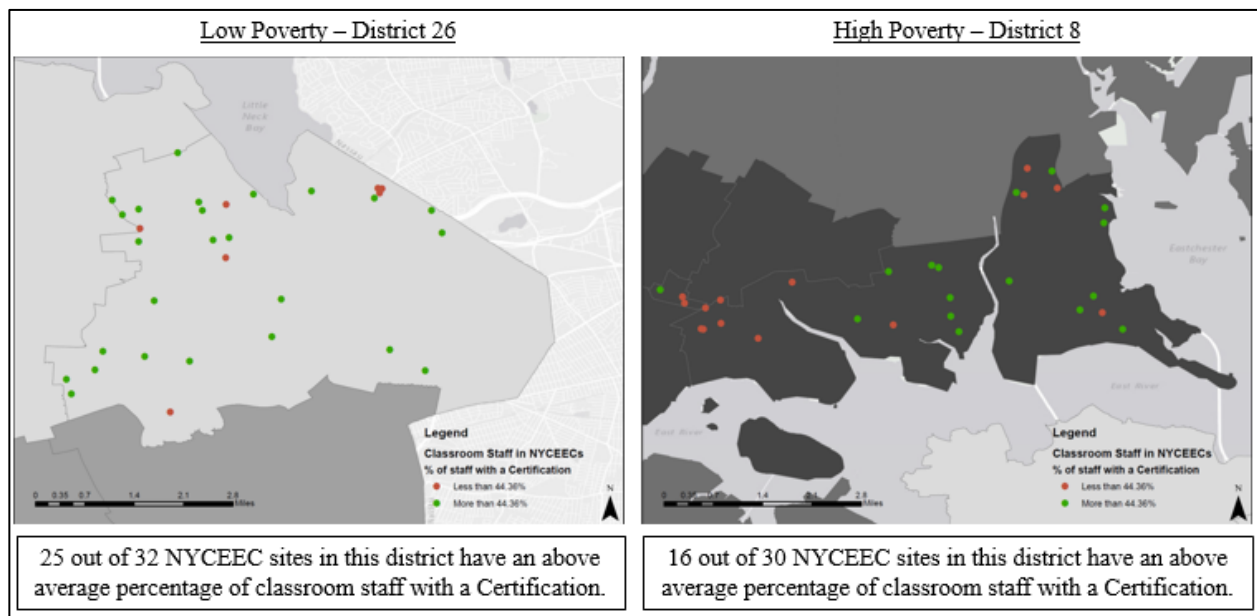
Map 4: NYCEEC sites with above-average percentage of classroom staff with a BA degree, on color-coded school districts (Note: Cutoff chosen based on citywide individual means)



Map 5: NYCEEC sites with above-average percentage of classroom staff with a Certification, on color-coded school districts (Note: Cutoff chosen based on citywide individual means).



Map 6: Comparison of NYCEEC sites with above-average percentage of classroom staff with a BA, for Districts 8 and 21



Map 7: Comparison of NYCEEC sites with above-average percentage of classroom staff with Certification, for Districts 8 and 21

Aim 2

Early childhood educators spend each day surrounded by other educators with relevant and varied knowledge, skills, and experiences. Instrumental connections with these colleagues, i.e., job-related interactions involving collaboration, problem-solving, or advice-seeking, may enable educators to feel more supported in their role. Interacting with a range of colleagues provides the chance to deepen and reinforce one's existing knowledge and skills and/or to build new knowledge and skills. In addition, the workplace network may facilitate the diffusion of knowledge and skills from formal PD experiences across more members of the ECE program. Aligned with diffusion of innovation theory, education scholars theorize that "innovation" (e.g., information, practices) will spread more readily across the workplace if educators are highly interconnected or linked to specific colleagues in specific positions or roles in the network. Overall, these theories highlight the potential of instrumental ties to strengthen the ECE workforce; yet, research has not adequately studied these improvement processes in ECE settings, which limits the field's ability to harness this potential.

The current study uses a large, representative sample of ECE programs in one large city to answer two research questions: (1) What is the nature and prevalence of instrumental connections (i.e., advice-seeking ties) in ECE settings by professional role and advice area? (2) Do advice-seeking ties in the fall relate to ECE teachers' professional experiences and quality improvement orientation in the spring? Given the lack of prior research on advice networks in the context of ECE settings, our first research question aims to describe the advice-seeking ties among the range of staff in an ECE program and across the substantive areas of ECE practices that are emphasized in professional development and aligned with quality. Our second question builds on the k-12 education literature to anticipate that teachers who have a higher proportion of colleagues from whom to seek job-related advice will have better professional experiences and improvement orientations over the school year. In this work, we aim to expand understanding of ECE advice networks and inform opportunities for professional development to increase the likelihood that teachers have workplace experiences that, over time, improve practices and enhance children's learning.

Setting and Participants

Participants include staff members from 43 ECE centers from nine strategically sampled communities within a large urban school district. Community poverty level was a primary sampling criterion. Specifically, the nine communities were equally distributed across three designations: high-poverty (i.e., > 50% of population), moderate-poverty (i.e., < 30% of population), or low-poverty (i.e., < 15% of the population). Beyond community poverty level (a), additional site-level sampling criteria consist of the community's (b) income-to-needs ratio of families, (c) number of ECE centers and seats in the community, (d) child racial/ethnic composition in ECE centers, and (e) passing rates on public schools' English Language Arts assessment. Our sample of sites is distributed across the nine communities is thus reflective of the community diversity within the school district. In the sample, 70% of ECE centers were community-based (e.g., Head Start, standalone nonprofit preschools) and 30% were school-based (i.e., preschools part of existing public or charter schools), which aligns with the distribution of ECE centers in the broader school district. The median staff response rate in our sample of ECE centers was 89 percent. See Table 1 for sample demographic and professional characteristics.

This study uses two analytic samples that differ with respect to which professional roles are included. First, for the descriptive analyses, all professional roles were included in the analytic sample. In this way, these analyses reflect the full breadth of advice-seeking dynamics within ECE centers. Second, for the predictive analyses, only lead and assistant teachers were included in the analytic sample. In this way, these analyses offer insights into how advice-seeking ties may support the specific experiences of the ECE teaching workforce.

Procedures and Measures

Data were collected in the fall and spring of the 2016-2017 school year. Participants completed 25-minute surveys electronically or on paper, based on preference, with ECE centers receiving 200 dollars for their participation in fall and spring. The survey included background questions and established scales as well as questions on site-based and external advice networks. In order to capture complete ECE site-based advice networks, site administrators provided a full list of the staff involved in the educational mission of their ECE program, including teachers, administrators, family workers, and other staff; these lists were included in site-based advice network questions (see below).

Advice network. To identify instrumental advice ties within the site-based network, staff viewed a full list of their ECE colleagues (i.e., a bounded network) and identified from whom they sought advice in four different content areas that encompass the key responsibilities of ECE educators: “managing children’s behavior,” “engaging families,” “the instructional curriculum and instructional practices,” and “assessments of children and use of data.” We bounded the network within each ECE center so that respondents identified colleagues they could access in their daily work to support the educational mission of the center.

In order to compare ECE centers with differ in size, we calculated outdegree as a proportion of the number of colleagues identified by the participant divided by the total number of available colleagues (i.e., the size of the network minus one because participants cannot have ties to themselves). As such, our outdegree measure can be interpreted as the percentage of colleagues a respondent sought for advice within the respondent’s ECE center. Subsequent to predictive analyses, and because we did not hypothesize differential predictions across content areas, we created a more parsimonious measure of outdegree by aggregating the four networks into a single measure capturing the overall amount of advice a teacher seeks from colleagues. This aggregate measure aligns with our aggregate measures of in-service training and coaching. All calculations were conducted using UCINET software.

To calculate indegree, we accounted for the number of survey respondents at each site by dividing the number of colleagues who identified a participant as a source of advice by the number of colleagues who could have identified that participant (i.e., total respondents at a site minus one). As such, our indegree measure can be interpreted as the percentage of respondents who sought a particular individual for advice.

External advice. Staff were asked to indicate “anyone outside your site/school from whom you seek advice around teaching, family engagement, child behaviors, and/or education-related work.” Staff could list up to five individuals and their professional roles, if applicable.

Job satisfaction. Staff completed a version of a job satisfaction questionnaire developed for Head Start teachers and shown to be predictive of their retention. Sixteen items were rated on a seven-point Likert scale ranging from “Strongly Disagree” to “Strongly Agree.” Items in the scale include “Happy at work,” “Workload is manageable,” and “Positive impact on children.” The scale demonstrated high reliability in our sample (Cronbach’s $\alpha = .91$).

Teaching efficacy. Staff completed the Teacher Sense of Efficacy Scale Short Form as a measure of teaching efficacy (Cronbach’s $\alpha = .94$) used in prior studies of ECE teachers. Twelve items were rated on a nine-point Likert scale ranging from “None at All” to “A Great Deal.” The scale has three subscales: student engagement (e.g., “How much can you do to help your students value learning?”), instructional strategies (e.g., “How well can you implement alternative teaching strategies in your classroom?”), and classroom management (e.g., “How much can you do to get children to follow classroom rules?”). Because the subscales were highly correlated ($r > .70$), we aggregated them to form a single measure of teaching efficacy (Cronbach’s $\alpha = .94$).

Orientation to innovation. Staff completed a measure tapping the extent to which teachers at their school are willing to engage in learning opportunities and are open toward new ideas and change. Three items asked respondents to rate teachers in their school on a five-point Likert scale ranging from “none” to “nearly all” (e.g., “How many teachers in this school are really trying to improve their teaching?”). Three items asked staff to rate teachers in their school on a four-point Likert scale ranging from “strongly disagree” to “strongly agree” (e.g., “In this school, teachers are continually learning and seeking new ideas”). Given the different response scales, the measure was standardized. The scale demonstrated high reliability in our sample (Cronbach’s $\alpha = .88$).

Collective efficacy. Staff completed the Collective Teacher Efficacy Belief Scale, which measured their perceptions of their ECE colleagues’ capability to accomplish a range of student learning goals and behavioral outcomes. Items include: “How much can teachers in your school do to produce meaningful student learning?” and “To what extent can teachers in your school help control disruptive behavior?” Twelve items were rated on a nine-point Likert scale ranging from “None at All” to “A Great Deal.” The scale demonstrated high reliability in our sample (Cronbach’s $\alpha = .96$).

Professional qualifications. Staff reported their educational attainment using a six-point Likert scale ranging from “Some high school” to “Doctoral degree.” Staff could report having one or more certifications; if any of the reported certifications satisfied the district’s certification requirements (e.g., a CDA), the staff member was considered certified on a binary variable.

Experience. Staff reported their years of experience by answering, “How many years have you worked with children or families in any school or community-based organization, not counting this year?” We turned responses into a non-linear measure based on existing literature of teaching experience; we created a categorical variable wherein 0 indicates less than a year of experience (i.e., none), 1 indicates one to three years of experience (i.e., low), 2 indicates three to nine years of experience (i.e., medium), and 3 indicates ten or more years of experience (i.e., high). Missing data values were imputed for this ordinal measure, and the imputed data were recoded as separate indicator variables for analyses.

Teaching role. We designated staff as lead teachers if they indicated “Lead Teacher” as their primary title and assistant teachers if they noted “Assistant Teacher” or “Teacher’s Aide.”

In-service training and on-site coaching. Staff reported their in-service training and on-site coaching in four content areas: “Classroom/Behavior Management,” “Family Engagement,” “Instructional Curriculum and Instructional Practices,” and “Assessments of Children and Use of Data.” Specifically, staff reported the days of in-service training they received over the past six months on a six-point Likert scale ranging from “No training” to “More than 4 full days.” This time span encompassed the training received to date for the current school year (because in-service training begins in the summer). Staff also reported the frequency of on-site coaching they received over the past three months on a five-point Likert scale ranging from “Never” to “Once a week or more.” This scale reflects how coaching in the district occurs with varying levels of periodicity. At the time surveys were completed, this time span encompassed the coaching received to date for the current school year (on-site coaching begins in the fall). We aggregated across the four content areas to create two single measures capturing the overall in-service training and the overall on-site coaching a teacher received during the school year.

School and community characteristics. Site type was determined with administrative data that designate ECE sites as community-based organizations or public schools; ECE sites designated as public schools are located within and managed by public schools. Using the sampling criteria described earlier (community poverty levels, family income-to-needs ratio) the nine communities within our sample were designated as high, medium, or low resource.

Analytic Strategy

Descriptive analysis was conducted on the complete sample of ECE professionals (i.e., all professional roles) in order to reflect the full breadth of advice-seeking dynamics within ECE centers. We explored the extent to which staff in different professional roles seek and are sought for advice across ECE content areas. To do so, we calculated means and standard deviations for indegree and outdegree by role (e.g., lead teacher, administrator) and content area (e.g., behavior management, family engagement). We also calculated bivariate correlations between outdegree for each content area to investigate whether ECE staff members’ advice seeking in one content area related to their advice seeking in other areas. With Jaccard similarity coefficients in UCINET 6, we examined overlap between advice ties in each possible pair of networks (e.g., behavior management network and family engagement network) within each ECE center.

Predictive analyses were restricted to lead and assistant teachers in our sample in order to investigate specific issues pertaining to the ECE teaching workforce. With respect to missing data, the mean level of missingness was 13.2 percent (range: 0.0-25.7%). To account for these missing data, we used STATA’s mi impute chained equations subroutines (MICE) to create 20 imputed datasets. The imputation model was specified for each variable type (binary, categorical, or continuous), and the MICE procedure allows for different types of distributions. Ordered categorical variables with five or more categories were treated as continuous, and imputations were conducted stochastically to accommodate existing variation in the dataset. We ran all analyses in Stata 15. Due to the nested nature of the data, we specified a mixed effects model with random ECE-center intercepts. All predictors were collected in the fall and outcomes were collected in the spring. Fall levels of the outcome were included in predictive models except for the model predicting collective efficacy, which was collected only in the spring.

Summary of Results

Results indicate that ECE staff seek advice from approximately one in four colleagues, on average, with variation by content area; most staff also report seeking advice from external sources – primarily teachers and some administrators. ECE program administrators served as the most prominent source of advice regardless of advice content. In addition, lead teachers served as advice sources for almost three times as many colleagues as assistant teachers did. Specialized staff, such as family/social workers, were advice sources in content areas aligned with their role. In across-time models, we found that having more advice-seeking ties with one's ECE center colleagues predicted positive professional experiences, including teaching efficacy and job satisfaction; teachers with more advice-seeking ties reported higher collective efficacy but not orientation to innovation.

Table 1

| <i>Descriptive statistics of professional role, demographics, and qualifications</i> | |
|--|-----------------|
| | Mean/Percentage |
| <i>Professional Role</i> | |
| Lead Teacher | 37% (n = 140) |
| Assistant Teacher | 37% (n = 140) |
| Administrator | 14% (n = 52) |
| Social/family Worker | 5% (n = 17) |
| Office Worker | 3% (n = 10) |
| Other Support Staff | 4% (n = 15) |
| <i>Demographics</i> | |
| Female | 92% |
| Latina/o | 44% |
| Black | 28% |
| White | 22% |
| Asian or Pacific Islander | 6% |
| Age | 37 years |
| Years of Experience | 10 years |
| <i>Professional Qualifications of Teaching Staff</i> | |
| Has Early Childhood Certification | 68% |
| Has Bachelor's Degree | 64% |

Table 2

Network Centrality by Staff Role and Advice Area

| | Lead Teacher | Assistant Teacher | Administrator | Family/Social Worker | Office Professional | Other Support Professional |
|-------------------------|---------------|-------------------|---------------|----------------------|---------------------|----------------------------|
| | <i>M (SD)</i> | <i>M (SD)</i> | <i>M (SD)</i> | <i>M (SD)</i> | <i>M (SD)</i> | <i>M (SD)</i> |
| Behavior Management ID | 0.30 (0.28) | 0.16 (0.18) | 0.67 (0.29) | 0.28 (0.24) | 0.10 (0.10) | 0.08 (0.16) |
| Family Engagement ID | 0.32 (0.31) | 0.13 (0.17) | 0.65 (0.32) | 0.47 (0.34) | 0.20 (0.31) | 0.05 (0.14) |
| Instruction ID | 0.33 (0.30) | 0.11 (0.16) | 0.61 (0.31) | 0.08 (0.13) | 0.02 (0.04) | 0.07 (0.14) |
| Assessments and Data ID | 0.31 (0.29) | 0.11 (0.15) | 0.53 (0.35) | 0.12 (0.20) | 0.08 (0.16) | 0.06 (0.13) |
| Behavior Management OD | 0.31 (0.29) | 0.24 (0.23) | 0.31 (0.36) | 0.16 (0.25) | 0.16 (0.18) | 0.24 (0.36) |
| Family Engagement OD | 0.31 (0.31) | 0.23 (0.22) | 0.37 (0.37) | 0.19 (0.32) | 0.17 (0.16) | 0.19 (0.30) |
| Instruction OD | 0.29 (0.29) | 0.22 (0.23) | 0.31 (0.33) | 0.09 (0.10) | 0.09 (0.16) | 0.16 (0.29) |
| Assessments and Data OD | 0.25 (0.29) | 0.20 (0.23) | 0.30 (0.36) | 0.19 (0.26) | 0.09 (0.14) | 0.13 (0.27) |

Note. ID = Indegree; OD = Outdegree

Table 3

Jaccard Similarity Coefficients across Content Areas

| | Median | <i>SD</i> | Range |
|---|--------|-----------|--------------|
| Behavior Management – Family Engagement | 0.59 | 0.25 | 0.13 to 1.00 |
| Behavior Management – Instruction | 0.61 | 0.22 | 0.18 to 1.00 |
| Behavior Management – Data and Assessment | 0.53 | 0.21 | 0.14 to 1.00 |
| Family Engagement – Instruction | 0.51 | 0.24 | 0.12 to 1.00 |
| Family Engagement – Data and Assessment | 0.50 | 0.23 | 0.14 to 1.00 |
| Instruction – Data and Assessment | 0.62 | 0.11 | 0.13 to 1.00 |

Table 4

Social Network and Outcome Descriptives

| | Mean | SD | Response Scale |
|--|------|------|----------------|
| Outdegree | 0.25 | 0.24 | 0 to 1 |
| Teaching Efficacy- spring | 7.41 | 1.12 | 1 to 9 |
| Job Satisfaction- spring | 4.86 | 1.05 | 1 to 7 |
| Commitment- spring | 3.16 | 0.57 | 1 to 4 |
| Orientation to Innovation- spring ^S | 0.01 | 0.81 | — |
| Collective Efficacy- spring | 7.29 | 1.30 | 1 to 9 |
| Teaching Efficacy- fall | 7.32 | 1.05 | 1 to 9 |
| Job Satisfaction- fall | 4.78 | 0.99 | 1 to 7 |
| Orientation to Innovation- fall ^S | 0.09 | 0.78 | — |

^S Standardized, note: mean is not equal to zero as a result of multiple imputation

Table 5

Mixed Effects Model Results

| <i>Fixed effects</i> | Teaching Efficacy | | Job Satisfaction | | Orientation to Innovation | | Collective Efficacy | |
|-----------------------|-------------------|-----------|------------------|-----------|---------------------------|-----------|---------------------|-----------|
| | <i>B</i> | <i>SE</i> | <i>B</i> | <i>SE</i> | <i>B</i> | <i>SE</i> | <i>B</i> | <i>SE</i> |
| Intercept | 4.03** | 0.69 | 2.29** | 0.46 | -0.19** | 0.30 | 7.85** | 0.54 |
| Outdegree | 0.18* | 0.08 | 0.18* | 0.07 | 0.09 | 0.06 | 0.30** | 0.10 |
| Fall Outcome | 0.41** | 0.07 | 0.55** | 0.06 | 0.46** | 0.07 | — | — |
| Coaching | -0.09 | 0.08 | -0.15* | 0.07 | -0.04 | 0.06 | -0.16† | 0.09 |
| Training | 0.07 | 0.07 | 0.01 | 0.06 | 0.03 | 0.05 | 0.04 | 0.09 |
| Education | 0.03 | 0.09 | 0.01 | 0.08 | -0.03 | 0.06 | -0.08 | 0.11 |
| Certification | -0.16 | 0.17 | 0.01 | 0.11 | 0.00 | 0.11 | -0.11 | 0.19 |
| Low Experience | 0.21 | 0.30 | -0.26 | 0.23 | 0.20 | 0.19 | -0.33 | 0.34 |
| Medium Experience | 0.10 | 0.28 | -0.09 | 0.22 | 0.04 | 0.20 | -0.64* | 0.32 |
| High Experience | 0.30 | 0.27 | -0.02 | 0.22 | 0.17 | 0.19 | -0.33 | 0.33 |
| Lead Teacher | 0.04 | 0.19 | 0.04 | 0.16 | -0.10 | 0.14 | 0.00 | 0.22 |
| School | 0.00 | 0.22 | -0.12 | 0.21 | 0.05 | 0.16 | -0.20 | 0.28 |
| Medium Resource | -0.23 | 0.19 | 0.03 | 0.20 | 0.14 | 0.14 | 0.05 | 0.26 |
| High Resource | 0.15 | 0.18 | 0.12 | 0.20 | 0.22 | 0.14 | 0.42† | 0.25 |
| <i>Random effects</i> | σ^2 | <i>SE</i> | σ^2 | <i>SE</i> | σ^2 | <i>SE</i> | σ^2 | <i>SE</i> |
| ECE Center Intercept | 0.05 | 0.30 | 0.35 | 0.08 | 0.18 | 0.07 | 0.05 | 0.22 |
| Residual Variation | 0.96 | 0.06 | 0.76 | 0.05 | 0.66 | 0.04 | 0.72 | 0.04 |

** $p < 0.01$; * $p < 0.05$; † $p < 0.10$

Aim 2 (Supplementary)

Here, we examine the characteristics, professional supports, and workplace experiences of ECE *assistant teachers*. First, we describe their demographic and professional characteristics. Second, we identify the ways in which assistant teachers seek and provide their colleagues with professional advice and interpersonal support; we also examine how that varies by their professional qualifications. Third, we examine whether assistant teachers' stress and job satisfaction vary by their professional qualifications. Fourth, we explore how different forms of professional support – in-service training, coaching, and collegial networks – relate to assistant teachers' work-related stress and job satisfaction. Our focus on three forms of professional support highlights different approaches through which assistant teachers can receive on-the-job supports that may directly relate to their work-related stress and job satisfaction. Thus, this study addresses outstanding questions regarding how assistant teachers may benefit from in-service training and coaching—two widely studied approaches for supporting lead teachers in ECE; and, it illuminates how ECE assistant teachers' collegial networks may contribute to their workplace experiences, an aspect of on-the-job support that, to our knowledge, has not been studied in ECE. As a whole, we aim to provide the groundwork for future research and intervention to support assistant teachers and retain them in the ECE workforce, which are critical for strengthening classroom quality and for maintaining assistant teachers in the ECE lead teacher pipeline.

Setting and Participants

The analytic sample is comprised of 120 assistant teachers from 35 centers where at least one assistant teacher completed a survey. For centers with available data, the consent rate for assistant teachers was 89 percent, suggesting that our sample largely reflects the assistant teachers working within the ECE centers in the school district. Including all staff members, the median staff response rate for ECE centers was 75 percent (range 28% to 100%). ECE centers in the sample are distributed across nine strategically sampled communities. Community poverty level was a primary sampling criterion; communities were designated as high-poverty (i.e., > 50% of population), moderate-poverty (i.e., < 30% of population), and low-poverty (i.e., < 15% of the population), and an equal number of communities was drawn from each of the three levels. Additional sampling criteria included the income-to-needs ratio of families in the community, the number of ECE centers and seats in the community, the child ethnic composition served by ECE centers, and passing rates on an English Language Arts assessment of public schools in the community. Any ECE center within one of these nine communities that was involved in the district's universal public preschool program met inclusion criteria for the study, and all ECE staff in these centers were eligible to participate. In the analytic sample, 78% of ECE centers were community-based (e.g., Head Start, childcare, preschool) and 22% were school-based (e.g., public schools, charter schools), which reflects the distribution of ECE centers in the broader school district. At the median, 5 (14.2%) ECE centers were from each community with a range of 1 to 6 ECE centers per community (2.9% to 17.1%, respectively). Ultimately, this approach yielded a sample representative of the ECE centers and communities within the district.

On average, at ECE centers in the analytic sample, 51.2% of children are Latino (range 2.3% to 100%), 23.0% are Black (range 0.0% to 70.6%), 6.0% are Asian (range 0.0% to 40.7%), 18.4% are White (range 0% to 57%), and 3.0% are another ethnicity (range 0.0% to 11.1%). On average, 26.9% of children speak a language other than English (range 0.0% to 69.0%).

Procedures

During the fall of the 2016, assistant teachers completed surveys electronically or on paper, based on their preference. For social network questions, center directors were asked to provide a list of staff members who contributed to the educational mission of the ECE center, and survey respondents were able to select any of these staff members when completing the social network questions. Based on available data from respondents, in the average ECE center, a network included at least 3 lead teachers (range 1 to 14), 4 assistant teachers (range 1 to 14), 1 administrator (range 1 to 4), 1 social/family worker (range 0 to 4), and 1 other support professional, such as an office, kitchen, or custodial worker (range 0 to 4). As such, the networks reflected close to the full collegial support system within an ECE center.

Missing Data

The mean level of missingness for the variables was 4%, ranging from 0-8%. To preserve our full sample, we use STATA's *mi* impute chained equations subroutines (MICE) to create 20 imputed datasets. The imputation model was specified for each type of variable (binary, categorical, or continuous); the MICE procedure is flexible as the model allows for different types of distributions. Ordered categorical variables with five or more categories were treated as continuous. Imputations were conducted stochastically to accommodate existing variation in dataset. As discussed in our analytic strategy, variance decomposition analyses were computed on each of the 20 datasets and pooled. All other analyses were conducted using STATA's *mi* estimate routine.

Analytic Strategy

Using Stata 15, we first examine the means and standard deviations of assistant teachers' demographic characteristics and professional qualifications, as well as their work-related stress and job satisfaction. Second, we examine the means and standard deviations of assistant teachers' receipt of in-service training and coaching across content areas, as well as indegree and outdegree with respect to their professional advice and interpersonal support networks within ECE programs. Third, we calculate bivariate correlations between assistant teachers' professional qualifications and (a) their network position and (b) their work-related stress and job satisfaction.

Fourth, we use Shapley value variance decomposition and Owen values to explain the observed variation in assistant teachers' work-related stress and job satisfaction that is explained by different aspects of teachers' receipt of professional support. Shapley value decomposition is an econometric approach to variance decomposition that calculates the marginal R^2 change of each of each predictor as it is eliminated in succession and averages these marginal R^2 changes over all the possible elimination sequences, treating each elimination sequence as equally probable. In this manner, Shapley value decomposition effectively accounts for the interrelations between predictors for a given outcome. We used an extension of Shapley values called Owen values, which allows for conceptually related *groups* of predictors to be included in the decomposition calculation rather than individual predictors. Owen values therefore represent a rigorous approach for estimating the R^2 contribution of different conceptual groupings of predictors.

Specifically, we calculated 90% bootstrapped confidence intervals with 10,000 replications for the Owen values of assistant teachers' (a) in-service training; (b) coaching; (c) professional advice sought from their network (i.e., outdegree); and, (d) interpersonal support sought from their network. In addition, we calculated bootstrapped confidence intervals for Shapley values of the predictors within each conceptual grouping. A single estimate is calculated by pooling confidence intervals across the 20 imputed data sets. In addition, we provide bivariate correlations between each of the outcomes and each of the variables within these conceptual groups to aid the interpretation of the variance explained by each conceptual group. As a whole, these analyses aim to describe the assistant teacher workforce and to explore different pathways for supporting assistant teachers, setting a foundation for future work focusing on these critical members of the ECE workforce.

Summary of Results

A majority of the assistant teachers in our sample is certified and has earned at least an associate's degree; most report earning between \$20,000 and \$30,000 a year for full-time work. Our demographic results indicate that assistant teachers in our sample are primarily Black and Latino with a small minority being White and Asian. In addition, more than a third immigrated to the United States and speak a language other than English in the classroom. Thus, compared to lead teachers in our sample, assistant teachers more closely resemble the diversity of children and families served by ECE programs in the city, which may represent a strength in working with communities.

Assistant teachers were sought for professional advice considerably less than other ECE professionals in our sample. This discrepancy is not likely driven by colleagues' lack of familiarity with assistant teachers because they are sought by a high proportion of colleagues for interpersonal support. Moreover, we find evidence that assistant teachers with longer tenure at their center are sought for interpersonal support by more colleagues. In addition, coaching and advice seeking around classroom/behavior management (compared to other content areas) appears to be the most important (measured) contributor to assistant teachers' lower stress and higher job satisfaction over the school year. Lastly, the information that assistant teachers receive from their colleagues' advice is a meaningful source of professional support. Collegial advice and in-service training accounted for the same amount of variance in assistant teachers' stress and job satisfaction; however, the coaching that assistant teachers receive accounted for the largest amount of variance in their stress and job satisfaction.

Table 1

Descriptives of demographics, professional qualifications, and workplace experiences

| | Mean/Percentage | SD |
|---|-----------------|-------|
| <i>Demographics</i> | | |
| Age | 35.67 | 11.90 |
| Income | 2.01 | 0.75 |
| Work Hours | 3.48 | 1.22 |
| White | 9.2% | — |
| Latino | 53.3% | — |
| Black | 30.8% | — |
| Asian | 6.7% | — |
| Immigrant | 41.3% | — |
| Speaks Second Language | 42.2% | — |
| Female | 91.7% | — |
| Primary Earner Parent | 37.5% | — |
| <i>Professional Qualifications</i> | | |
| Experience | 7.76 | 6.79 |
| Tenure at ECE Center | 3.97 | 5.71 |
| New at ECE Center | 19.0% | — |
| Bachelor's Degree | 28.3% | — |
| Associate's Degree | 27.5% | — |
| High School Degree or GED | 40.8% | — |
| Certification | 56.5% | — |
| <i>Workplace Experiences</i> | | |
| Stress | 2.46 | 0.86 |
| Job Satisfaction | 4.76 | 1.01 |

Table 2

Descriptives of professional support

| | Mean | SD |
|---|------|------|
| <i>In-service Training</i> | | |
| Classroom/Behavior Management In-service | 3.55 | 1.52 |
| Family Engagement In-service Training | 3.14 | 1.48 |
| Instructional Curriculum/Practices In-service | 3.78 | 1.45 |
| Assessments of Children/Use of Data In-service | 3.78 | 1.47 |
| <i>Coaching</i> | | |
| Classroom/Behavior Management Coaching | 3.05 | 1.33 |
| Family Engagement Coaching | 2.81 | 1.41 |
| Instructional Curriculum/Practices Coaching | 3.08 | 1.38 |
| Assessments of Children/Use of Data Coaching | 3.20 | 1.42 |
| <i>Outdegree Social Network Position</i> | | |
| Classroom/Behavior Management Outdegree | 0.25 | 0.23 |
| Family Engagement Outdegree | 0.23 | 0.22 |
| Instructional Curriculum/Practices Outdegree | 0.22 | 0.23 |
| Assessments of Children/Use of Data Outdegree | 0.20 | 0.23 |
| Socialize Outdegree | 0.37 | 0.30 |
| <i>Indegree Social Network Position</i> | | |
| Classroom/Behavior Management Indegree | 0.16 | 0.18 |
| Family Engagement Indegree | 0.13 | 0.17 |
| Instructional Curriculum/Practices Indegree | 0.11 | 0.16 |
| Assessments of Children/Use of Data Indegree | 0.11 | 0.15 |
| Socialize Indegree | 0.39 | 0.24 |

Notes. For in-service training, 3 refers to “A half day to a full day” and 4 refers to “1 to 2 full days.” For coaching, 2 refers to “Once in the past 3 months” 3 refers to “Once a month,” and 4 refers to “Once every 2 or 3 weeks.”

Table 3

Bivariate correlations between social network position and professional qualifications

| | Education | Certification (Cohen's <i>d</i>) | Experience | Tenure at ECE Center |
|---|-----------|--------------------------------------|------------|-------------------------|
| <i>Outdegree Social Network Position</i> | | | | |
| Outdegree: Behavior | 0.06 | 0.06 | -0.06 | 0.02 |
| Outdegree: Family Engagement | 0.14 | 0.19 | -0.04 | 0.08 |
| Outdegree: Instruction | 0.09 | 0.01 | -0.01 | 0.03 |
| Outdegree: Data | 0.11 | 0.02 | -0.04 | 0.05 |
| Outdegree: Social | 0.10 | -0.07 | -0.10 | 0.08 |
| <i>Indegree Social Network Position</i> | | | | |
| Indegree: Behavior | 0.07 | -0.03 | 0.19* | 0.27** |
| Indegree: Family Engagement | 0.11 | -0.04 | 0.06 | 0.13 |
| Indegree: Instruction | 0.15 | -0.01 | 0.08 | 0.16† |
| Indegree: Data | 0.09 | -0.22 | 0.03 | 0.07 |
| Indegree: Social | 0.11 | -0.06 | 0.03 | -0.02 |

*** $p < 0.001$; ** $p < 0.01$; * $p < 0.05$; † $p < 0.10$

Table 4

Bivariate correlations between workplace experiences and professional qualifications

| | Job Satisfaction | Work-Related Stress |
|-----------------------------------|------------------|---------------------|
| Experience | 0.03 | 0.04 |
| Tenure at ECE Center | 0.04 | 0.17† |
| Education | -0.05 | 0.06 |
| Certification (Cohen's <i>d</i>) | 0.15 | 0.05 |

*** $p < 0.001$; ** $p < 0.01$; * $p < 0.05$; † $p < 0.10$

Table 5

Bivariate correlations between workplace experiences and professional support

| | Job Satisfaction | Work-Related Stress |
|--|------------------|---------------------|
| <i>In-service Training</i> | | |
| In-service Training: Behavior | 0.03 | 0.04 |
| In-service Training: Family Engagement | 0.14 | -0.08 |
| In-service Training: Instruction | 0.12 | 0.07 |
| In-service Training: Data | 0.08 | 0.04 |
| <i>Coaching</i> | | |
| Coaching: Behavior | 0.30*** | -0.19* |
| Coaching: Family Engagement | 0.21** | -0.09 |
| Coaching: Instruction | 0.15 | -0.15 |
| Coaching: Data | 0.24** | -0.14 |
| <i>Instrumental Support</i> | | |
| Outdegree: Behavior | 0.19* | -0.12 |
| Outdegree: Family Engagement | 0.11 | -0.02 |
| Outdegree: Instruction | 0.16† | -0.07 |
| Outdegree: Data | 0.17† | -0.01 |
| <i>Expressive Support</i> | | |
| Outdegree Social | 0.20* | -0.12 |

*** $p < 0.001$; ** $p < 0.01$; * $p < 0.05$; † $p < 0.10$

Table 6

R² estimates and 90% bootstrapped CIs for professional support domains

| | Job Satisfaction | Work-Related Stress |
|---------------------------------------|--------------------------|--------------------------|
| <i>In-service Training</i> | 0.06 [0.02, 0.13] | 0.07 [0.02, 0.15] |
| In-service Training Behavior | 0.01 [0.00, 0.04] | 0.01 [0.00, 0.05] |
| In-service Training Family Engagement | 0.02 [0.00, 0.07] | 0.02 [0.00, 0.07] |
| In-service Training Instruction | 0.01 [0.00, 0.04] | 0.02 [0.00, 0.07] |
| In-service Training Data | 0.01 [0.00, 0.03] | 0.01 [0.00, 0.04] |
| <i>Coaching</i> | 0.14 [0.06, 0.25] | 0.08 [0.03, 0.17] |
| Coaching Behavior | 0.06 [0.02, 0.14] | 0.03 [0.00, 0.08] |
| Coaching Family Engagement | 0.02 [0.00, 0.05] | 0.01 [0.00, 0.03] |
| Coaching Instruction | 0.02 [0.01, 0.05] | 0.02 [0.00, 0.06] |
| Coaching Data | 0.03 [0.01, 0.09] | 0.01 [0.00, 0.04] |
| <i>Instrumental Support</i> | 0.06 [0.03, 0.11] | 0.07 [0.03, 0.15] |
| Outdegree Behavior | 0.02 [0.00, 0.05] | 0.03 [0.01, 0.08] |
| Outdegree Family Engagement | 0.01 [0.00, 0.03] | 0.01 [0.00, 0.04] |
| Outdegree Instruction | 0.01 [0.00, 0.04] | 0.01 [0.00, 0.03] |
| Outdegree Data | 0.01 [0.00, 0.03] | 0.01 [0.00, 0.05] |
| <i>Expressive Support</i> | 0.02 [0.00, 0.07] | 0.01 [0.00, 0.05] |
| Outdegree Social | — | — |

Aim 3

Traditional in-service professional development (PD), such as individualized coaching and training, often do not produce meaningful improvements in teaching practices, highlighting a need to explore additional pathways for strengthening the ECE workforce. By identifying how to improve the effectiveness of in-service PD, scholarship can enhance ongoing efforts to support the ECE workforce. In addition, educators' interactions with their colleagues may help them make sense of educational ideas in ways that shape their classroom practices.

Using semi-structured interviews from a sample of ECE professionals in a large urban school district, the current study pursues two complementary aims regarding key issues for strengthening the ECE workforce development. First, we examine what ECE educators believe enhances and hinders the quality of the training experiences they received as part of a large-scale workforce development initiative at the district. Second, we examine knowledge dissemination processes in ECE centers, including how PD content is diffused among educators working within ECE settings. Overall, this study aims to illuminate how to better utilize different pathways for supporting the ECE workforce at scale. As such, this study responds to the growing need to identify effective large-scale workforce development approaches in ECE.

Setting and Participants

Nine ECE centers were sampled from a pool of schools that were representative of a large urban district and had previously participated in a large quantitative study. In total, the sample included 44 ECE professionals with varying roles: lead teachers ($n = 20$), assistant teachers ($n = 16$), and administrators ($n = 8$). 86 percent of participants were from community-based centers ($n = 38$) whereas 14 percent of participants were from public schools ($n = 6$). An informed consent agreement was signed by each participant and each school received a \$100 gift card to purchase school supplies as an incentive for participation. In addition to PD offered by their centers, educators in the district were given the opportunity to attend a minimum of four off-site trainings each year that are organized by the district office.

Research Procedures

Six members of the research team were trained to implement an interview protocol consisting of 16 questions while also allowing for targeted follow-up questions. The protocol consisted of questions about teachers' experiences with professional development and their experiences with how information is shared in ECE centers: "What kinds of professional development events have you attended over the past six months and how did it influence you to try something new or different in your work?" and "Think of a time when you reached out to a co-worker for job-related advice or support. What made you reach out to a co-worker at that time?" Interviews took place at the schools where the interviewee worked and ranged in length from 10 to 60 minutes.

Analytic Strategy

A directed approach to qualitative content analysis was used, wherein we created an initial set of codes based on the existing empirical scholarship on teacher professional development and knowledge dissemination processes. Specifically, the lead researchers began

with overarching codes related to the overall research aims (e.g., professional development, information sharing), including a priori codes to describe ECE staff members' professional interactions with their colleagues (e.g., frequency, length, content, and number of people involved). Lead researchers revisited and revised the codes during the analytic process to reflect the themes articulated by interviewees and the emerging relationships among the codes. In this process, granular sub-codes emerged (e.g., turn-keying after PD).

After the codebook was developed, the research team underwent training on how to apply the codes. Using Dedoose Version 8 (2018), each transcript was coded and then reviewed by at least three team members to ensure that codes were consistently applied. With more than 80 percent agreement on each code, we found evidence for consistency. Any coding discrepancies were discussed with the entire team and resolved by reaching consensus, which yielded the final coded documents.

Summary of Results

The present study aimed to examine two critical workforce development topics in a sample of ECE professionals working in a large urban school district: (1) the quality of educators' in-service training experiences and (2) knowledge dissemination processes in ECE centers.

We found that ECE teachers value trainings that use active learning principles and that provide opportunities to plan how to implement professional development (PD) content in their own classrooms. Educators expressed frustration with trainings that had redundant information or that overlooked contextual matters related to the communities where teachers worked. In our sample, the school district undertook a tremendous challenge of delivering large-scale PD trainings. Although the school district succeeded in supporting teachers' implementation of practices and using active learning principles, it fell short in differentiating the training content to teachers' skill level and the specific student populations that teachers served. As public ECE programs expand across the nation, large-scale workforce development strategies will become increasingly important. Our research study offers a case study for this undertaking and suggests that practitioners should seek to differentiate PD supports to account for the varied skillsets and professional needs that exist within a sizable workforce.

With respect to knowledge dissemination, ECE professionals described exchanging information through formal channels (e.g., scheduled staff meetings) and informal channels (e.g., extemporaneous meetings, advice-seeking). Approximately one-half of our sample used these channels to share information about PD trainings that they attended; educators reported disseminating PD content relatively equally across formal and informal channels (45% and 55%, respectively). ECE professionals explained they sought certain colleagues for information/advice based on the colleague's expertise and job title as well as their familiarity with that colleague. Thus, ECE educators use both professional and interpersonal considerations when determining whom to seek for advice.