Published in final edited form as:

Early Child Dev Care. 2016 ; 186(12): 1952–1960. doi:10.1080/03004430.2015.1137563.

Level of structural quality and process quality in rural preschool classrooms

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Abstract

Preschool classrooms with varying levels of structural quality requirements across the state of West Virginia were investigated for differences in measured structural and process quality. Quality was measured using group size, child-to-teacher/staff ratio, teacher education, and the Early Childhood Environmental Rating Scale-Revised (ECERS-R; Harms, T., Clifford, R. M., & Cryer, D. (2005). *The early childhood environment rating scale-revised*. New York, NY: Teachers College Press). Thirty-six classrooms with less structural quality requirements and 136 with more structural quality requirements were measured. There were significant differences between classroom type, with classrooms with more structural quality requirements having significantly higher teacher education levels and higher environmental rating scores on the ECERS-R subscales of Space and Furnishings, Activities, and Program Structure. Results support previous research that stricter structural state regulations are correlated with higher measured structural and process quality in preschool classrooms. Implications for preschool state quality standards are discussed.

Keywords

Preschool; environment; structural quality; process quality

Early Childhood Education is a broad term that refers to educational programmes geared towards children from birth to age eight years (Copple & Bredekamp, 2009). These programmes for young children include but are not limited to Head Start, preschool programmes, nursery schools, childcare centres, and universal preschool (Morrissey, 2007). Universal preschool programmes serving primarily 4-year-old children are on the rise with 40 states, commonwealths, and Washington, DC (Barnett, Carolan, Fitzgerald, & Squires, 2012). The benefits of quality early childhood experiences cannot be denied as prominent longitudinal studies have found increased high school graduation rates, lower incidence of grade retention, increased rates of college attendance, increased labour force participation and salaries, reduced criminal incidences, and reduced teen pregnancies among individuals who received high-quality early childhood education and childcare programmes (Barnett, Jung, Youn, & Frede, 2013; Campbell et al., 2012; Gray & Klaus, 1970; Weikart, 1967).

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Disclosure statement

No potential conflict of interest was reported by the authors.

Investing in quality early education experiences for young children results not only in major societal benefits, but also in long-term improved cognitive and social development. There is a high rate of return that outweighs the costs (MacEwan, 2013).

President Obama in 2013 proposed expanding access to high-quality preschool for young children in his 'Preschool for All' plan (White House Office of Press Secretary, 2013). The proposal stated that federal funds through the US Department of Education will be dispersed to states upon meeting federal and state requirements to expand high-quality public preschools to reach all low- and moderate income four-year olds (White House Office of Press Secretary, 2013). States will be required to reach quality benchmarks for early learning, hiring of qualified teachers, and comprehensive assessment and data systems. With an emphasis on state-operated preschool programmes comes the emergence of state policies to enforce compliance with specified regulations to ensure high quality. Research supporting state-level regulation to raise the quality of early education programmes includes the Cost, Quality, and Child Outcomes study Team (1995), in which states with more regulations had higher quality classrooms compared to states with less stringent regulations.

Early childhood programme quality is a result of structural and process features (National Institute of Child Health and Human Development [NICHD], 2006). Structural quality features refer to those that are measureable and regulated such as teacher-child ratio, group size, and teacher educational level (NICHD, 2006). Process quality factors refer to the more proximal factor of direct care given by teachers and staff which assist children in developing physically, linguistically, intellectually, emotionally, and socially (Cryer, Harms, & Riley, 2003). It is well established that structural quality provides a foundation and is linked to process quality (Bogard, Traylor, & Takanishi, 2008; Cryer et al., 2003; Early et al., 2006; Smith, 2005). When structural quality is well regulated, process quality has been found to improve (Bordin, Machida, & Varnell, 2000; Cost, Quality and Child Outcomes Study Team, 1995; Cryer, Tietze, Burchinal, Leal, & Palacios, 1999). In contrast, aspects of process quality and proximal factors can be hindered if structural quality is poor (Peisner-Feinberg & Burchinal, 1997; Phillipsen, Burchinal, Howes, & Cryer, 1997).

Teacher education, staff-child ratios, group size, and other aspects of structural quality specifically can be directly regulated by state agencies, and these structural characteristics can influence process quality. Teacher education plays a vital role in process quality with teachers' training influencing the child skill development and experiences they are able to provide for children in their classrooms (Burchinal, Howes, & Kontos, 2002; Clarke-Stewart, Vandell, Burchinal, O'Brien, & McCartney, 2002; Cryer et al., 1999; Lanigan, 2011; Raikes, Raikes, & Wilcox, 2005). The transition to a more highly trained staff in preschool classrooms has been stimulated by the Improving Head Start for School Readiness Act of 2007, which requires at least 50% of Head Start lead teachers to have bachelor's or advanced degrees in early childhood education or related fields (Head Start, 2007). However, few research studies have explored the links among state regulations of preschool classrooms, structural quality, and process quality.

Preschool classrooms exist in both public schools and early childcare centres, with the location of the classroom often determining the state agency that will oversee the

programme. Preschool classrooms can also be located in licensed childcare centres (both private and public), faith-based or private facilities, or Head Start centres, while some preschool classrooms are various combinations of the above. Additionally, collaborating to pull state and federal money together is increasingly helpful to parents who need full day care as well as being economical for programmes to share resources. When such collaboration happens, regulations are intertwined and preschool classrooms must comply with multiple sets of regulations from two or more different agencies concurrently. This leads to the question of how structural quality varies across classrooms that adhere to different state regulatory agencies and how this variation may relate to process quality.

In the current study, varying levels of structural quality requirements were examined in relation to structural quality measured and process quality measured among 172 randomly selected 4-year-old preschool classrooms. The classrooms were from across the entire state of West Virginia. Two levels of structural quality requirements were examined. Specifically, one level included classrooms which were regulated by two state agencies, the state Department of Education and Department of Health and Human Resources (DHHR), and thus had more structural quality requirements. The second level included classrooms that were only regulated by the state's DHHR and thus had fewer structural quality requirements.

Method

The current study is part of a larger project funded by the West Virginia DHHR (Warash et al., 2011). A total of 175 4-year-old classrooms were randomly selected across the state of West Virginia and assessed on environmental quality using the Early Childhood Environmental Rating Scale-Revised (ECERS-R; Harms, Clifford, & Cryer, 2005). Reliability training was conducted at the University of North Carolina at Chapel Hill for five Observer/Trainers who then trained an additional eight Observers prior to initiating the larger project's data collection. The data were hand recorded on standard ECERS-R score sheets by the trained Observers and then entered into a proprietary database developed for this project. The trained ECERS-R Observers also recorded for each classroom number of children present, number of teachers and staff present, and lead teacher's education. Data integrity was examined to assure accuracy and reliability before exporting for analysis. Prior to data collection, a protocol for the project was submitted to and approved by the West Virginia University Institutional Review Board for the Protection of Human Research Subjects. All data collectors completed the IRB Social/Behavioral Research Training and confidentiality was maintained for all classrooms.

Participants

A total of 172 classrooms were included in the current study with three of the original 175 excluded from analysis due to the inability to identify which state regulations they were required to meet at the time of the ECERS-R assessment. Identification of the state regulatory agency or agencies the classrooms were overseen by was obtained from the West Virginia Department of Education. Programmes were contacted directly by one of the investigators to verify if the agency information was current during the time of the data collection. Table 1 summarizes the differences in features by structural quality level.

Preschool classrooms with more structural quality requirements made up 21% of the classrooms ($n = 36$), and were responsible for meeting lower teacher/child ratios and group sizes, using mandated classroom curriculum, utilizing mandated child and classroom assessments, having higher teacher educational level/training requirements, and meeting health and safety standards (West Virginia Department of Education Office of Special Programs, 2012). The health and safety standards included specific requirements for classroom space, sanitation, nutrition, transportation, and obtainment of safety permits. Preschool classrooms with less structural quality requirements made up 79% of the classrooms ($n = 136$) and had to meet the same health and safety standards but had lower teacher/staff qualification requirements, higher teacher/child ratios and group sizes standards, and no curriculum or assessment requirements (West Virginia Department of Education Office of Special Programs, 2012).

Measures

Group size—Classroom group size was based on the number of children present at the time of the ECERS-R observation within that classroom and used as a continuous variable in the current study analysis.

Child-to-teacher/staff ratio—Child-to-teacher/staff ratio was calculated based on the number of children and number of teachers and staff present within each classroom at the time of the ECERS-R observation and used as a continuous number representing the number of children per teacher/staff member.

Teacher education—Teacher education was calculated based on the level of educational degree each lead teacher per classroom had obtained at the time of the ECERS-R observation. Teacher education levels were coded to create a continuous variable from 1 to 7 ranging from high school to a Master of Arts or Science degree. The teacher education levels in ascending order were high school (9.3%), WV Training Certificate 2.3%), Child Development Associate credential or 12 college credits and 300 experience hours (16.3%), WV Apprenticeship for Child Development Specialist (23.8%), Associate of Arts (12.2%), Bachelor of Arts or Science (32.6%), and Master of Arts or Science (2.9%).

Environmental quality assessment—The *Early childhood environmental rating scale-revised edition* (ECERS-R; Cryer et al., 2003) is an environmental quality assessment appropriate for centre-based four-year-old classrooms that were utilized in the larger funded project. The measure contains indicators for 43 items across seven subscales, including Space and Furnishings, Personal Care Routines, Language-Reasoning, Activities, Interaction, Program Structure, and Parents and Staff. The 43 items across these subscales are scored between one and seven based on the observed quality of that item. Items are scored 1.00 through 2.99 for ‘inadequate’, 3.00–4.99 for ‘minimal’, 5.00–6.99 for ‘good’, and 7.00 for ‘excellent’ quality of care. All items within a subscale are added together to find a mean score that represents the quality of care for that subscale area. An overall ECERS-R score is calculated by averaging the seven subscale scores.

Field testing of the ECERS-R has demonstrated good interrater reliability at the indicator, item, and total scale levels (Harms et al., 2005). The percentage of agreement across 470 indicators was 86.1%, with all indicators having a percentage of agreement over 70%. At the item level, the percentage of exact agreement was 48%, with a percentage of agreement within one point of 71%. For the total score, the Pearson product moment correlation was 0.92 and the Spearman rank-order correlation was 0.87. The interclass correlation for the total score was 0.915. The internal consistency of the Environment Rating Scales subscales range from 0.71 to 0.88, while the total scale internal consistency is 0.92.

In the current study, based on the items with each ECERS-R subscale, Space and Furnishings was utilized as a measure of structural environmental quality. Activities, Interaction, Language-Reasoning, Personal Care Routines, and Program Structure were utilized as measures of process environmental quality. The Parents and Staff subscale and overall ECERS-R score were not examined for differences between structural or process quality due to containing both structural and process quality items.

Results

Descriptives

On average across the 172 classrooms, the group size of children was 11.57 ($SD = 4.33$) and the child-to-teacher/staff ratio was 6.64 ($SD = 2.33$). The average lead teacher level of education was 4.37 ($SD = 1.63$) indicative of completing an Apprenticeship for Child Development Specialist programme. The average ECERS-R subscales scores across the classrooms were between 2.78 (for Personal Care Routines) indicating inadequate quality and 5.12 (for Interaction) indicating good quality (see Table 2). The average scores for all the remaining subscales were between 3.00 and 4.99, indicating minimal quality care (see Table 2).

Structural quality

Independent *t*-test analyses were conducted to examine the structural quality variables of child-to-teacher/staff ratio, group size, teacher education, and classroom space. There was no significant difference in the ratio of child to teacher/staff by classroom type, $t(170) = -0.99, p > .05$. Classroom group size was significantly different, with classroom structural quality requirements having larger average group sizes ($M = 13.31, SD = 4.47$) compared to classrooms with less requirements ($M = 11.11, SD = 4.19$) with a moderate effect size, $t(170) = -2.76, p < .01, d = 0.42$. Average teacher education level was significantly higher in preschool classrooms with more structural quality requirements ($M = 4.40, SD = 1.40$) than classrooms with less requirements ($M = 3.11, SD = 1.60$) with a moderate effect size, $t(169) = -4.38, p < .001, d = 0.67$. The ECERS-R subscale of Space and Furnishings was also significantly higher among collaborative compared to non-collaborative classrooms with a large effect, $t(170) = 4.14, p < .01, d = 0.75$ (see Table 2).

Process quality

Independent *t*-test analysis was also utilized to examine process environmental quality. Both the ECERS-R Activities and Program Structure subscales were significantly higher among

classrooms with more structural quality requirements versus classrooms with less requirements with a moderate to large effect sizes: Activities, $t(170) = 4.66, p < .01, d = 0.87$, and Program Structure, $t(170) = 2.42, p < .05, d = 0.45$ (see Table 2). Differences were not statistically significant for the Interaction, Language-Reasoning, or Personal Care Routines subscales by classroom type (see Table 2).

Discussion

Classrooms by type were significantly different on measured structural and process environmental quality. For structural environmental quality, classrooms with more structural quality requirements were more likely than classrooms with less requirements to have more highly educated lead teachers as well as higher ECERS-R Space and Furnishing subscale scores, which captures quality factors of arrangement and appropriateness of size of furniture and equipment for play, learning, privacy, and routine care for children. Interestingly, classrooms with less structural quality requirements, however, had significantly smaller group sizes than classrooms with more structural quality requirements. This is in contrast to the group size requirements for the two classroom types, with classrooms with more stringent standards requiring smaller group sizes than classrooms that have to meet less structural quality requirements. Additionally, there was no significant difference in child-to-teacher/staff ratios by classroom type. These findings together suggest that classrooms with more structural quality requirements, which on average had significantly higher group sizes, may have employed more teachers to keep ratios low and similar to ratios in the other classroom type.

Regarding process environmental quality, classrooms with more structural quality requirements were significantly higher on the ECERS-R subscales Activities and Program Structure compared to classrooms with fewer requirements. The ECERS-R Activities and Program Structure subscales capture how teachers implement activities (e.g. music, fine motor activities, and science) through the materials they utilize and encouragement and guidance they provide the children as well as the teacher-child interactions during free play and group time.

There was no other significant difference in process quality by classroom type. One critical finding to highlight is that classrooms were not significantly different from each other by type on the Personal Care Routines ECERS-R subscale, which captures basic health and safety practices such as hand washing, emergency procedures, and child supervision during indoor and outdoor play; and also teachers not smoking near the children. This is a concern since on average all classrooms and both classroom types in the current study, randomly selected from across the entire state, were in the inadequate quality range. On a positive note is that all classrooms and classroom types on average were in the good quality range for the ECERS-R Interaction subscale.

Given regulatory differences across the classroom types, these findings are consistent with previous work reporting that stricter regulations are correlated with higher environmental quality in preschool classrooms (Bogard et al., 2008; Bordin et al., 2000; Cryer et al., 2003; Early et al., 2006; Phillipsen et al., 1997; Smith, 2005). Higher measured structural and

process quality found among the preschool classrooms in the current study with more structural quality requirements may have been caused by the higher standards. The higher structural requirements and related higher measured structural quality feature of teacher education and physical space may have strengthened process quality features of environmental design and activities in those classrooms, consistent with prior research on teacher education and process quality (Burchinal et al., 2002; Clarke-Stewart et al., 2002; Cryer et al., 2003; Lanigan, 2011; Phillips, Mekos, Scarr, McCartney, & Abbott-Shim, 2000; Phillipsen et al., 1997; Raikes et al., 2005). The current study, however, was non-experimental and cause could not be investigated nor concluded. Future research efforts should be developed to study the effects of varying levels of structural quality requirements through state standards on measured classroom structural and process environmental quality.

An additional explanation to the current study findings, and an avenue for future research, is preschool classroom curriculums. The classrooms with more stringent regulations were required the use of one of three scientifically based curriculums in their classrooms. Both classroom types are required to have daily schedules in each classroom to operate and be licensed, but only classrooms with the more stringent standards must meet a recommended amount of time for specific curriculum areas (e.g. science and math) and have their lesson plans reviewed by their County Departments of Education for meeting West Virginia Content Standards and Common Core learning objectives. Lesson plans for the other classroom type, in contrast, are reviewed internally by staff at the centre if and when reviewed. The additional curriculum requirements may in part help explain the significantly higher ECERS-R Activities and Program Structure subscale scores, indicating higher process quality, within classrooms with more structural quality standards than classrooms with fewer requirements.

It is important to note that another possible explanation for higher quality ECERS-R scores in the preschool classrooms with more structural quality requirements is that teachers in those classrooms are familiar with the ECERS-R as it is required for those sites by the state Department of Education every three years. Having greater exposure to this tool can afford teachers expertise in classroom arrangement and recommended materials needed to score high on the ECERS-R. The state Department of Education also provides funding for educational materials in the classroom. Additional funds for equipment may help these classrooms meet the indicators on the ECERS-R.

Conclusion

Quality of early education classrooms and childcare has been in question for a long time. The NICHD (2006) survey revealed that the majority of childcare operations in the USA were 'fair' or 'poor', with only 10% providing high-quality care. This is consistent with the current study in which even when classroom types did significantly differ on ECERS-R subscales, those average subscale scores were in the range of minimal quality. Additionally, states vary in their regulations and licensing is necessary so that facilities are safe. These are basic foundation features for programmes; however, ECERS-R Personal Care Routines, which captures health and safety procedures as well as sleep, meal, and toileting practices,

was found in the current study, for example, to be inadequate on average across all classrooms. This highlights gaps in current state regulations.

The present study helps support previous findings that additional and stricter state regulations can be linked with both higher structural and higher process environmental quality in early education programmes (e.g. Cost, Quality and Child Outcomes Study Team, 1995), regulations which typically focus on structural quality features. It may be that basic health and safety features need to be enforced or more consistently enforced and be more rigorous, in addition to improving teacher education requirements. Common benchmarks of current initiatives to improve quality of early programmes, such as the Race to the Top Grants (US Department of Education, 2011), all include teacher education level at the top of the list. West Virginia itself with its proposed educational reform is in the midst of requiring higher standards for preschool teachers and assistant teachers. Therefore, the bar for quality in early education programmes appears to be on the rise.

Acknowledgments

Funding

This research was supported in part by a grant from the West Virginia DHHR/Bureau for Children and Families.

Biographies

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Table 1

Differences in features across preschool classrooms with fewer or more structural quality requirements.

Feature	Structural quality requirements	
	Fewer	More
Teacher education	Required to register with the WV S.T.A.R.S. and complete 15 hours of continued education units annually. Degree not mandated.	Required to have a certification or Bachelor's degree.
Teacher-child ratio	One qualified staff member for every 12 children. No more than 24 children per group.	One qualified staff member for every 10 children. No more than 20 children per group.
Child assessments	No required child assessment.	Teachers complete Early Learning Scale (Riley-Ayers, Boyd, & Frede, 2008) child assessment tool.
Classroom assessments	No required classroom assessment.	ECERS-R observation completed every 3 years with annual reviews.
Curriculum	Lessons may be reviewed internally by classroom teachers, but is not required.	Lesson plans are reviewed by the County Department of Education for meeting WV content standards.

Note: Both classroom types are required to be licensed, which involves a site inspection every two years by the state's licensing agency.

Table 2

ECERS-R subscale mean scores of preschool classrooms with less or more structural quality requirements (with standard deviations).

Subscale	All (<i>n</i> = 172)	Less (<i>n</i> = 136)	More (<i>n</i> = 36)	<i>T</i> (<i>df</i> = 170)
Space and furnishings	3.93 (1.11)	3.76 (1.10)	4.58 (.94)	-4.14 **
Personal care routines	2.78 (1.05)	2.80 (1.09)	2.70 (0.87)	0.47
Language-reasoning	4.83 (1.37)	4.75 (1.41)	5.13 (1.16)	-1.48
Activities	3.84 (1.15)	3.64 (1.09)	4.59 (1.07)	-4.66 **
Interaction	5.12 (1.57)	5.06 (1.58)	5.34 (1.52)	-0.95
Program structure	4.01 (1.33)	3.89 (1.34)	4.49 (1.21)	-2.42 *

* Mean difference is significant at the .05 level.

** Mean difference is significant at the .01 level.