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Are structural quality indicators associated with preschool process quality in China? An exploration of threshold effects

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ABSTRACT

In this study, the generalized additive modeling (GAM) was used to explore possible threshold effects on multiple program structure quality indicators (class size, child-to-teacher ratio, teaching experience, teacher salary) in relation to the classroom teacher-child interaction quality indicators as measured by the Classroom Assessment Scoring System (CLASS) in a sample of Chinese kindergarten classrooms. One hundred eighty classrooms in 60 preschools were selected for the study, based on a stratified sampling procedure. The results were mixed, and revealed threshold effects on some structural indicators. The findings are discussed in the context of Chinese early childhood education practice. As the first study of its kind in a Chinese context, the findings could have some implications for early childhood education policy and practice despite some limitations of the study. Future research may consider better design and more representative sample for studying these issues.

1. Background

An encouraging finding from experimental and longitudinal investigations in the U.S. is that high-quality early childhood education (ECE) could serve as a protective factor for children in poverty (Arteaga, Humpage, Reynolds, & Temple, 2014; Campbell et al., 2014; Campbell, Ramey, Pungello, Sparling, & Miller-Johnson, 2002; McCormick et al., 2006; Reynolds, Temple, Ou, Arteaga, & White, 2011; Schweinhart et al., 2005; Vitiello, Moas, Henderson, Greenfield, & Munis, 2012; Williford, Maier, Downer, Pianta, & Howes, 2013). Evidence from developing countries also found that quality ECE contributes to better school attendance and improves children's mental development, motor development, behavior and schooling trajectory (Baker-Henningham & López Bóo, 2010). Encouraged by the empirical evidence about the positive effects of quality ECE on children's development and growth, policy makers worldwide have sought to include high-quality ECE initiatives in their policy reforms. International organizations worldwide including OECD, UNESCO, UNICEF, and the World Bank considered access to, monitoring of, and improvement of ECE quality through quality accountability systems as top priorities for international policy platforms.

Policy makers in most countries including China, often set thresholds for structural quality measures (e.g., class size, child-to-teacher ratio) in their quality accountability systems for assessing overall quality of a program. These thresholds, such as rating score for a program's quality, promotion and funding of programs, have high-stakes implications in practice. Under such an approach, we assume meaningful threshold values exist on a structural variable (e.g., years of teaching, class size), above or below which, its relation with ECE program quality either strengthens or weakens. Researchers are thus encouraged to explore such possibilities for kindergarten structural indicators in relation to ECE quality (Zaslow et al., 2010). The approach of setting thresholds on a structural indicator, however, has only seen limited empirical research; in most cases, thresholds were set with little or no empirical evidence (Le, Schaack, & Setodji, 2015).

1.1. ECE situation in the Chinese context

In China, the goal of providing high-quality ECE for all Chinese young children is clear in recent national initiatives and reform agendas. Most children of three to six year olds attend early childhood programs called kindergarten, which is a full-day program offering three levels of classes: K1 (3–4 years old), K2 (4–5 years old), and K3 (5–6 years old). K3 is equivalent to kindergarten class in the U.S. In 2010, the Chinese government promulgated the *Compendium for China's Mid- and Long-term Education Reform and Development (2010–2020)* (Central People's Government of the People's Republic of China, 2010), which declared that by 2020, 75% of children should receive three

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years of ECE. Ministry of Education of People's Republic of China (2012) then issued a national document stressing the importance of improving the quality of ECE. Many reform efforts have been made, such as free admission, subsidized tuition and vouchers in rural areas, aiming to increase socioeconomically disadvantaged children's access to ECE services (Hu, Zhou, Li, & Roberts, 2014). As a result, China has made significant progress in increasing the number of children attending kindergartens. The quality of these programs, however, remains a serious concern (Hu et al., 2014; Rao, Sun, Zhou, & Zhang, 2012; Wong, Luo, Zhang, & Rozelle, 2013). Calls have been made that future research efforts for improvement of ECE quality should provide empirical evidence on appropriate thresholds for some critical structural indicators (e.g., class size, child-to-teacher ratio, teaching experience, expenditure per teacher on salaries) that are highly likely to be associated with ECE quality (e.g., Hu, Mak, Neitzel, Li, & Fan, 2016). Therefore, in this study, we explored threshold effects for some common structural indicators in the Chinese context that could impact the quality of ECE classroom teaching.

1.2. Structural vs. process quality of ECE

To better support the ECE quality initiatives, it is necessary to develop a common understanding among international professionals about what constitutes ECE quality, the components of such quality, and effective ways of measuring the quality. Quality is not a static concept; rather, it varies across time and contexts (Hu, 2015; Moss & Dahlberg, 2008; Tobin, 2005). Consequently, some scholars do not support a universal standard for quality (Tobin, 2005). However, for the sake of scholarly communication and policy implementation, most scholars agree that quality should be divided into two main domains: structural and process. Structural quality refers to some indicators that could be regulated or controlled by the relevant government agency and/or the program such as class size and child-to-teacher ratio, and some program-level variables such as expenditures on teachers' salaries, training, and program facilities. These indicators are often determined in specific cultural and social contexts and represent distal indicators of ECE quality that may have an indirect effect on children development and growth (Bryant, Zaslow, & Burchinal, 2010; Phillips, Mekos, Scarr, McCartney, & Abbott-Shim, 2000). Process quality, in contrast, refers to the indicators that may have a direct effect on program-level and classroom-level teaching/learning quality (Burchinal, Howes, & Kontos, 2002). Most definitions of process quality refer to specific interactive activities that children experience in the classroom, most commonly teacher-child interactions, peer interactions and language stimulation by the teacher.

One frequently examined process quality indicator is teacher-child interaction quality, measured by the widely known and used Classroom Assessment Scoring System (CLASS; Pianta, La Paro, & Hamre, 2008). The CLASS measures three aspects of teacher-child interaction: emotional support, classroom organization, and instructional support. Emotional support, which fosters children's willingness to participate in classroom activities, assesses the positive and warm relationship between teacher and child (Hamre & Pianta, 2005). Class organization is mainly concerned with teachers' use of proactive behavior management strategies to keep students engaged in learning and play, which helps children to develop better self-regulation skills (Rimm-Kaufman, La Paro, Downer, & Pianta, 2005). Instructional support refers to how teachers effectively promote children's higher-order thinking skills and language abilities in classroom instructional activities. It should be noted that both emotional support and classroom organization underpin high quality instructional support (Pianta & Hamre, 2009).

Both structural and process quality indicators have been included in many different systems in the U.S. (Schaack, Tarrant, & Boller, 2012; Zellman & Perlman, 2008). The general belief is that structural variables may not only be correlated with process quality, but more importantly, they may also be precursors to process quality (Cryer, Tietze, Burchinal, Leal, & Palacios, 1999; Hu, Mak et al., 2016; Phillips et al., 2000; Phillipsen, Burchinal, Howes, & Cryer, 1997; Pianta et al., 2005; Slot, Leseman, Verhagenm, & Mulder, 2015). Studies on relations between structural and process quality have been conducted across many cultures (Cryer et al., 1999; Hu, Mak et al., 2016; Slot et al., 2015). For example, in a cross-cultural comparison study (Cryer et al., 1999) that used the Early Childhood Environment Rating Scale-Revised (ECERS-R; Harms, Clifford, & Cryer, 1998) for assessing process quality, child-to-teacher ratio was reported to be related to higher process quality in the U.S., but not in Portugal and Spain. In Netherlands, De Kruif and colleagues reported that better child-to-teacher ratio was related to higher process quality, but they did not find a similar relation between teachers' education and process quality (as cited in Slot et al., 2015). In China, using the Chinese adapted version of the same environmental rating scale, researchers also found that child-to-teacher ratio was a strong predictor for both "Provisions for Learning" and "Teaching and Interaction" components of program quality (Hu, Mak et al., 2016).

Under the framework of teacher-child interaction quality, process quality was reflected by the indicators in CLASS. By using these CLASS indicators, researchers showed that many structural variables (e.g., class size, child-to-teacher ratio, teacher's degree, years of teaching, expenditures) were associated with process quality. For example, teachers who scored higher on process quality indicators tend to have more years of experiences and/or higher education degrees (Phillips et al., 2000; Phillipsen et al., 1997; Pianta et al., 2005; Slot et al., 2015). Hu, Fan, LoCasale-Crouch, Chen, and Yang (2016), using a latent profile analysis approach, found teachers' experiences, education, and some other professional status variables were significantly distinctive across four profiles of teacher-child interaction patterns. On the other hand, Slot et al. (2015) failed to find a relation between either class size or child-to-teacher ratio with emotional and educational process quality. Similarly, Pianta et al. (2005) did not find better child-to-teacher ratio made any difference for process quality. Finally, it is noteworthy that several studies reported that better teacher salary was related to higher level of classroom process quality (Phillips et al., 2000; Phillipsen et al., 1997).

In summary, the findings from previous studies on the associations between structural quality and process quality have not been consistent (Early et al., 2006, 2007). We surmise that the relations between ECE structural quality indicators and process quality indicators might not be linear. Recently, some researchers have used a different approach in examining this issue and are exploring whether there are baseline and ceiling thresholds for kindergarten structural indicators (such as years of teaching and class size) in relation to ECE quality (Zaslow et al., 2010).

1.3. Research on threshold effects

For the relations between process quality indicators (e.g., teacher-child interaction quality as represented by emotional support, classroom organization and instructional support) and children's social and academic outcomes, there has been some active research that explored whether a critical threshold value existed for an ECE process quality indicator, above or below which the relation between the quality indicator and children's social and academic outcomes was different (Burchinal, Vandergrift, Pianta, & Mashburn, 2010; Burchinal, Vernon-Feagans, Vitiello, & Greenberg, 2014; Finch, Johnson, & Phillips, 2015; Leyva et al., 2015; Weiland, Ulvestad, Sachs, & Yoshikawa, 2013). These studies provided some evidence that there may exist critical threshold values on the process quality indicators in relation to the children's outcomes.

For the relations between ECE program's structural quality indicators and the process quality indicators, however, there has been very limited research on possible critical threshold/ceiling values. Le et al.