Implications of different methods for specifying classroom composition of externalizing behavior and its relationship to social–emotional outcomes

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ABSTRACT

In this paper, we examine common methods for using individual-level data to represent classroom composition by examining exemplary studies that thoughtfully incorporate such measures. Building on these studies, and using data from the Chicago School Readiness Project (CSRP), this paper examines theoretical and analytical implications of a set of different transformations of individual ratings of child externalizing behaviors in order to examine and compare the influence of these representations of classroom composition on Kindergarten internalizing behaviors, social competence, and attention/impulsivity problems. Results indicate that each Kindergarten outcome is influenced by distinct aspects of classroom composition of externalizing behaviors. Kindergarten internalizing behaviors are positively associated with the proportion of children in the Head Start classroom who started with externalizing scores above the 75th percentile regardless of the average value of externalizing behaviors in the classroom. In contrast, Kindergarten social competence is predicted by three aspects of the classroom distribution of externalizing behaviors in the fall of Head Start—the classroom mean, standard deviation, and skew. Finally, Kindergarten attention/impulsivity problems were not associated with any aspect of classroom composition of externalizing behavior examined in this paper.

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Introduction

Researchers in the developmental and prevention sciences are increasingly interested in the effects of classroom composition (DeRosier, Cillessen, Coie, & Dodge, 1994; Dmitrieva, Steinberg, & Belsky, 2007; Justice, Petscher, Schatschneider, & Mashburn, 2011; Mashburn, Justice, Downer, & Pianta, 2009; Moller, Forbes-Jones, Hightower, & Friedman, 2008; Thomas, Bierman, & Powers, 2011). In this paper, we use the phrase *classroom composition* to refer to the characteristics of the peer group with whom a child shares a classroom. We will use it to refer to classroom-level characteristics such as externalizing behavior problems. In the field of economics, studies of classroom characteristics such as classroom size, aggregate language skills, or average socioeconomic status have featured prominently in peer effects studies (Bonesrønning, 2008; Glewwe, 1997; Hanushek, Kain, Markman, & Rivkin, 2003; Lavy & Schlosser,

2011; Neidell & Waldfogel, 2008). Yet, in other fields, classroom composition is understudied despite a long tradition of general theories of human development that posit a central role of context, including micro-contexts such as classrooms, in generating individual child developmental outcomes (Bronfenbrenner, 1979; Bronfenbrenner & Morris, 2006; Sameroff, 2010). Indeed, current theoretical frameworks offer little guidance in how to operationalize features of context such as classroom composition of social–emotional characteristics in empirical work.

In recent years, studies of child development, particularly evaluations of preschool and school-based interventions, have measured and modeled context as a key predictor of a range of child outcomes. These interventions often leverage changes in classroom context to alter child outcomes (Raver, Jones, Li-Grining, Zhai, Metzger, & Solomon, 2009; Raver, Jones, Li-Grining, Zhai, Bub, & Pressler, 2011). While interest in how classroom composition contributes to heterogeneity in child outcomes has increased, the development of a shared set of methods to account for this important environmental characteristic have lagged due to a range of issues including the lack of (1) theory regarding how specific characteristics of classrooms influence individual outcomes, and (2) consensus

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among researchers regarding what aspects of context matter most and whether this varies from one characteristic to another. In this paper, we examine common methods for using individual-level data to represent classroom composition by examining exemplary studies that thoughtfully incorporated contextual measures. Building on this work, we propose an additional method to transform individual-level ratings of child behavior to the classroom-level. Then, using data from the Chicago School Readiness Project (CSRP) as an illustrative example, we present theoretical and analytical implications of a range of transformations of individual ratings of child externalizing behaviors in order to first determine the implications of each of these transformations and then to unpack the influence of this Head Start classroom compositional measure on important Kindergarten outcomes.

Exemplar investigations of classroom context

Bioecological theories of human development emphasize the importance of multifaceted, dynamic interactions between an individual and her social and physical environment. Bronfenbrenner (1979) set forth a comprehensive theory of human development in which an individual is nested in a series of contexts that move from proximal and therefore direct in their influence, to distal and indirect. For children under five, out-of-home care experiences are highly salient for development and learning as these are the contexts in which children may establish and develop their first non-familial adult and peer relationships. The adults in these settings—the teachers and teacher assistants—are often able to provide an important and accurate depiction of child behaviors and characteristics for several reasons including (1) the frequency and intensity of teachers' interactions with each child as she is interacting with peers and the physical environment and (2) the early childhood development and learning acumen of teachers built through training and experience with children (Ladd & Profilet, 1996).

Bronfenbrenner's framework and those that incorporate it (Sameroff, 2010) provide important groundwork for investigating the role of environmental composition but offer little guidance regarding how to carry out these investigations. In fact, with few exceptions, researchers who are interested in the role of classroom composition in child outcomes operate without the guidance of broadly tested empirical frameworks regarding how to operationalize classroom composition and link it to child outcomes. In this paper, we examine commonly used methods for operationalizing classroom composition as a means to generate specific hypotheses to be tested in future empirical work.

Using measures of heterogeneity to represent classroom composition

The developmental theories of Piaget and Vygotsky posit specific hypotheses regarding the role of age composition in preschool peer groups. These theories have guided the operationalization of classroom age composition in studies that have investigated the association between this classroom characteristic and individual child outcomes. Researchers have used what they view as a conflict between these theorists to generate testable hypotheses. For example, interpreting Piaget's notion that children learn best when cooperating with same-age peers to construct a shared meaning of the environment, researchers propose that children benefit most when the age spread of a peer group is quite small (Piaget, 1983). However, Vygotsky posits that children benefit most when there is age heterogeneity in a child's peer group since younger children are challenged by older peers and older children learn from modeling and caring for younger peers (Vygotsky, 1987).

Piaget and Vygotsky's theories suggest that the most salient aspect of a classroom's age composition is not the mean age of the group but the degree to which age is homogenous vs. heterogeneous in the classroom. In fact, studies investigating age composition typically operationalize this environmental characteristic by using either the classroom range or standard deviation of the age around the classroom mean. A recent study by Bell, Greenfield and Bulotsky-Shearer (2013) exemplifies this approach. In this study, the authors examined the relationship between classroom composition of age, operationalized as the standard deviation around each classroom mean, and child trajectories of school readiness in Head Start. They found no association between classroom age heterogeneity and children's school readiness outcomes. However, they did find that younger children in classrooms in which the standard deviation around the mean age was high had greater gains in the approaches to learning constructs compared to older children in the same classrooms and to younger children in classrooms with lower standard deviations (Bell et al., 2013).

The standard deviation is well-suited to investigations of whether children benefit from homogenous vs. heterogeneous age groupings in classrooms since it represents the degree of similarity or divergence of individual values from the mean within a classroom or other higher-level grouping of individuals. Yet, when only the standard deviation is used to characterize classroom composition, several other aspects of the classroom remain unaccounted for including the average level of the characteristic (e.g., following this example, the average age) in the classroom and whether, and if so, where, children are clustered in the overall classroom distribution of the characteristic. Additionally, because of the way that it is calculated, the standard deviation is sensitive to the presence of children whose values for the characteristic of interest are extreme compared to the rest of their peers.

For Bell et al. (2013), and other researchers interested in the impact of classroom composition of age, prior theoretical work provided a framework for understanding and making informed choices about this trade-off. Yet, absent theoretical guidance, investigating other aspects of classroom composition, whether it be the composition of behavior problems or cognitive developmental competencies, is a pursuit best undertaken carefully. Frequently, researchers either avoid examining the role of classroom context altogether or default to mathematically simplistic methods for operationalizing classroom characteristics such as the proportion of children above a predetermined threshold or the classroom mean.

Using proportions and counts to represent classroom composition

Proportions and counts divide the children in a classroom into two groups by comparing their value to a predetermined threshold for a characteristic of interest. A study by Dmitrieva et al. (2007) exemplifies the use of this method to describe Kindergarten classroom composition of extensive preschool experience. They investigated whether the proportion of students in a Kindergarten classroom who had either been placed in preschool before age two or who had prior extensive experience in preschool (greater than or equal to 30 h a week) predicted individual child outcomes in Kindergarten children. Their investigation also examined whether a child's experience of this context differed by whether he, himself, had extensive preschool experience or had been placed in care before age two. Dmitrieva et al. (2007) found that children who had little or no experience in child care had higher levels of externalizing behaviors in Kindergarten when in classrooms where a large proportion of their peers had extensive experience in preschool.

Counts and proportions are derived from the use of a threshold or cut-point of either substantive or statistical interest. Some instruments have an identified threshold. For example, the Center for Epidemiologic Studies-Depression Scale (CES-D) has a threshold, validated within various subgroups, that is used to distinguish between people with a high probability versus a low probability