



Grocery games: How ethnically diverse low-income mothers support children's reading and mathematics



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ABSTRACT

Parent-child interactions are an important source of variability in children's learning. We asked: (1) to what extent do low-income and ethnically diverse mothers engage in maternal writing support, math support, and directiveness in a grocery shopping game; (2) do these maternal behaviors predict gains in children's reading and mathematics from age 5 (T1) to first grade (T2), and (3) what role do ethnicity and children's baseline skills (T1) play in these associations. Participants were 212 low-income African American, Dominican, Mexican, and Chinese mothers and their 5-year-old children. Maternal writing support predicted gains in children's reading skills but math support did not predict gains in children's mathematics. Maternal directiveness negatively predicted gains in both children's reading and mathematics. Ethnicity and children's baseline skills did not moderate these associations. Implications for family-focused interventions serving low-income and ethnically diverse populations are discussed.

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The way that parents interact with children during literacy and math activities is a key contributor to individual differences in children's reading and mathematics achievement (Morrison & Cooney, 2001). Understanding this source of variability across families of different ethnic backgrounds is important because children's early reading and mathematics skills are strong predictors of later school achievement (Duncan et al., 2007), and early income-based and racial/ethnic disparities in reading and mathematics tend to persist beyond early childhood and into adolescence (Duncan & Murnane, 2014). Here we examined whether three aspects of parent-child interactions – maternal writing support, math support, and directiveness – predicted gains in children's reading and mathematics from age 5 (T1) to first grade (T2) across four ethnic and immigrant-origin groups: African American, Dominican, Mexican, and Chinese.

We chose to study these ethnic groups based on their substantial representation among families living in poverty in the United States (U.S. Census Bureau, 2015) and because economic pressure and poverty-related stressors may affect the ability of these families to interact in supportive and warm ways with their children (Yoshikawa, Aber, & Beardslee, 2012). Furthermore,

African American and Latino children are disproportionately represented among those with low school achievement and high rates of school dropout (U.S. Department of Education, National Center for Education Statistics, 2015). Hence, studying maternal writing support, math support, and directiveness in these ethnic and immigrant-origin groups may provide specific information about which parenting practices support children's learning under challenging economic circumstances in an increasingly diverse society.

1. The development of children's reading and mathematics skills

Before the onset of formal schooling, children develop foundational literacy skills (Teale & Sulzby, 1986). While some of these literacy skills are associated primarily with mastering written language, such as decoding (i.e., identifying the name of letters and words), other skills are associated primarily with oral language such as vocabulary and narrative construction, and yet others are meta-linguistics skills (e.g., phonological awareness). There is substantial evidence that written and oral language skills enhance each other and develop in mutual interaction (e.g., Dickinson, McCabe, Anastasopoulos, Peisner-Feinberg, & Poe, 2003; Sénéchal, LeFevre, Smith-Chant, & Colton, 2001). For example, children who read often develop large vocabularies. In turn, children with relatively larger vocabularies are better able to understand written text, and there-

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fore, have better reading comprehension skills than those with relatively smaller vocabularies. In this study, we focused on three of these literacy skills: decoding, reading comprehension, and vocabulary.

Before the onset of formal schooling, children also develop foundational math skills. Traditionally, these skills have been characterized as: a) procedural knowledge: strategies, rules and algorithms for completing a task (e.g., number calculations such as adding and subtracting); and b) conceptual knowledge: knowledge about mathematical principles and generalizations (e.g., math concepts such as number series; Baroody, Feil, & Johnson, 2007). Procedural and conceptual knowledge about mathematics are intertwined; conceptual knowledge can aid appropriate and efficient use of skills (procedural knowledge), and vice versa (Baroody, Lai, & Mix, 2006). In this study, we focused on number calculations and math concepts.

2. Reading and mathematics in the context of grocery shopping

Children's participation in ongoing cultural routines is central to developing key cognitive abilities (Rogoff, 2003; Vygotsky, 1978). Informal, every day activities, such as cooking and grocery shopping, are unique opportunities for adults to promote, challenge, and extend reading and mathematics abilities in children (Song & Ginsburg, 1987; Vandermaas-Peeler & Pittard, 2014). We focused on grocery shopping because it is a fairly universal food routine for families from different ethnic backgrounds living in urban settings, and also because children are aware of and eager to be part of this routine from very early on (Spagnola & Fiese, 2007). Children can learn and practice a substantial amount of reading and mathematics in the context of grocery shopping; for example, reading labels and prices, counting, adding and subtracting numbers of food items, writing and checking a shopping list, and staying within a specific budget. Thus, we investigated maternal writing support, math support, and directiveness in the context of a grocery shopping game, in which parents and children made a grocery list and shopped at a pretend store.

3. Maternal writing support

Three common activities through which parents support the development of children's reading abilities at home are: reading books, talking about past events, and engaging in joint writing tasks (for a review see Reese, Sparks, & Leyva, 2010). In this study, we focus on mothers' spontaneous strategies in making and using a grocery list, a joint writing task. We chose a joint writing task because it is a great way to develop foundational reading skills in children, including: a) word recognition skills, such as decoding, phonological awareness and sight recognition; and b) language comprehension skills, such as vocabulary, background and literacy knowledge, and verbal reasoning (Aram & Levin, 2004; Bindman et al., 2014; Leyva, Reese, & Wisner, 2012; Skibbe, Bindman, Hindman, Aram, & Morrison, 2013).

Middle-class European American parents who report engaging in high levels of explicit teaching about writing and reading words at home have children with advanced decoding and spelling skills in kindergarten and first grade (Sénéchal, LeFevre, Thomas, & Daley, 1998), as well as advanced reading achievement in third grade (Sénéchal & LeFevre, 2002). One important type of writing-support strategy that parents spontaneously engage in with their children (3–6 years) is breaking a word into units of sounds and linking each unit of sound to its corresponding letter. This type of parental writing support when children were 5- to 6-year-olds was concurrently associated with advanced decoding and phonological

awareness (Aram & Levin, 2001) and predicted reading comprehension and spelling when children were in second grade, in a study of low-income Israeli families (Aram & Levin, 2004).

In subsequent studies conducted in the United States with primarily middle-class European American parents and their 3–5-year-old children (Bindman et al., 2014; Skibbe et al., 2013), parental writing support was concurrently associated with children's decoding (Bindman et al., 2014) and predicted children's decoding and phonological awareness one year later (Skibbe et al., 2013). In another study with middle-income Hong Kong Chinese mothers and their 4- to 7-year-old children, a similar type of writing support was also related to advanced decoding (Lin et al., 2009).

Dictating and sounding out letters is an even more common writing-support strategy that middle-class European American parents naturally engage in with their 3- to 5-year-olds during joint writing tasks (Bindman et al., 2014; Burns & Casbergue, 1992; Skibbe et al., 2013). This strategy is pervasive in communities that speak languages that have opaque orthography, such as English, because the rules of sound-letter correspondence are typically irregular. Consequently, breaking the word into units of sound is not always the most efficient strategy to teach children how to spell a word.

In this study, we focused on parents' efforts to highlight individual letters and sounds by dictating and sounding out letters or by breaking a word into units of sounds and linking each unit of sound to its corresponding letter. This type of writing support is consistently associated with children's decoding, reading comprehension, spelling, and phonological awareness across a range of communities as described above.

To date, no study has examined parental writing support in low-income or ethnically diverse families in the United States. Hence, it is unclear whether parents in these communities engage in writing support in everyday activities at home, and if so, whether parental writing support predicts children's reading achievement. It is important to study low-income and ethnically diverse families to shed light on the different paths parents take in helping their children develop academic skills. Research into variation among parents in their support of academic skills can deepen our understanding of how young children acquire critical reading and mathematics abilities and how such abilities can be facilitated. One factor that may influence the association between parental writing support and reading achievement is the child's skill level. Children with less sophisticated reading skills might benefit more from parental writing support than children with more sophisticated reading skills (Aram, 2007; DeBaryshe, Buell, & Binder, 1996). In fact, recent studies show that the effectiveness of reading instruction programs depends on whether the programs adapt the content and instructional activities to the child's entering skill level (Connor, Morrison, & Katch, 2004). It is thus relevant to determine the moderating role of child skill levels on the association between parental writing support and children's reading achievement.

4. Maternal math support

Common activities through which parents support their children's development of mathematics are playing board games, reading number and shape books, singing number songs, discussing everyday number-related artifacts such as money, calendars and clocks, and engaging with their children in everyday number-related activities such as cooking and shopping. Parents of diverse socioeconomic status (SES) and ethnic backgrounds who report frequently engaging in these number-related activities at home across preschool, kindergarten, first and second grades have children with advanced math performance including number calculation and math concepts such as ordinality, cardinality, equivalence, and

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