



Profiles of school readiness among four-year-old Head Start children[☆]

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ABSTRACT

This study uses the Family and Child Experiences Survey (FACES) data from 1997 to investigate the degree to which child, family, classroom, teacher, and Head Start program characteristics are related to children's school readiness and continued development over the four-year-old Head Start year. Latent class analyses were used to examine the constellation of school readiness competencies within individual Head Start children in both the fall and spring of the four-year-old Head Start year. Multinomial regression analyses examined patterns of association between demographic and program characteristics and profile membership over time. Four distinct developmental profiles were found in the sample in the fall, and three were found in the spring. Furthermore, a substantial proportion of Head Start children (43%) moved from a developmental profile including some risk to a strengths profile between the fall and spring of the Head Start year. Child age, family structure, parental educational attainment, classroom quality and teacher's level of educational attainment emerged as important factors associated with stability and change in profile membership over the four-year-old Head Start year, but receipt of social services through Head Start was not associated with stability or change in profile membership.

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1. Introduction

Children's school readiness has long been of interest to educators and policymakers (Meisels, 1999; Rhode Island Kids Count, 2005). For example, federal initiatives such as *Good Start Grow Smart* have led state early childhood administrators to develop early learning guidelines that articulate what children should know and be able to do by the time they reach kindergarten. State and local administrators have also expanded public pre-kindergarten programs in an effort to enhance the school readiness of young children and prepare them for the increased challenges and demands of kindergarten (Wong, Cook, Barnett, & Jung, 2007); and they have launched kindergarten readiness assessments in an attempt to quantify children's school readiness skills (Daily, Burkhauser, & Halle, 2010). Indeed, the recent *Race to the Top – Early Learning Challenge* grants are motivating states to move forward rapidly

in developing valid and reliable information on children's kindergarten entry skills and developing systems to link this information to data on early care and education as well as indicators of later school achievement. There have also been updates to national standards for early care and education programs in recent years. However, a major challenge for these initiatives is that children from more disadvantaged backgrounds (e.g., low-income and/or single-parent households) lag behind their more affluent peers in cognitive and social outcomes even before kindergarten (Fryer & Levitt, 2006; Halle et al., 2009). This influences their starting point at kindergarten entry (Denton & West, 2002; Lee & Burkham, 2002; National Research Council & Institute of Medicine, 2000; Vandivere, Pitzer, Halle, & Hair, 2002) and may negatively affect their academic trajectories throughout their school years (Duncan, Brooks-Gunn, & Klebanov, 1994; Duncan et al., 2007; Entwisle & Alexander, 1999; Fryer & Levitt, 2004; McLoyd, 1998).

While readiness for school often implies the mastery of certain skills or abilities that enable a child to function successfully both academically and socially in a school setting, experts assert that school readiness is dependent not only on the qualities that children bring to the learning experience, but also on the contexts in which learning occurs – contexts which include the home and school environments as well as the larger community. Indeed, a comprehensive view of school readiness involves interplay between a child's inherent characteristics and past and present environmental and cultural contexts (Carlton & Winsler, 1999; May & Kundert, 1997; Meisels, 1999; Wesley & Buysse, 2003).

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High-quality, comprehensive early care and education, along with warm and supportive relationships with parents and caregivers, have been found to improve the school readiness and long-term outcomes of disadvantaged children (Brooks-Gunn, Fuligni, & Berlin, 2003). For example, analyses using the Early Childhood Longitudinal Study – Birth Cohort (ECLS-B) indicate that high-quality, non-parental care (both home-based and center-based) has the potential to moderate the effects of demographic risk factors on child outcomes at 24 months (Snyder, 2008). Furthermore, parenting practices and the home environment have been found to largely mediate the relationship between family income and children's cognitive outcomes (Borman & Overman, 2004; Rathbun, West, & Hausken, 2003; Yeung, Linver, & Brooks-Gunn, 2002). For low-income children in particular, it is important to examine the contributions of early care and education, comprehensive services, and home practices to children's school readiness and ongoing development.

One model for early comprehensive services targeted to disadvantaged children is Head Start. The main purpose of the current study is to investigate the degree to which child, family, classroom, teacher, and Head Start program characteristics are related to children's school readiness and change over the four-year-old Head Start year. Specifically, this study examines children's school readiness skills at the beginning and end of the four-year-old Head Start year and examines whether characteristics of the child, home, and Head Start contexts are associated with stability and change in school readiness over the Head Start year. An innovation of the current study is that rather than examine each type of school readiness skill individually, this study investigates whether distinct patterns of school readiness skills coalesce within Head Start children, as has been found in previous research with a national sample of first-time kindergartners (Hair, Halle, Terry-Humen, Lavelle, & Calkins, 2006).

1.1. Head Start and school readiness

Head Start was designed as a comprehensive early childhood program that would address the developmental needs of low-income children and their families. As designed, Head Start addresses the needs of the whole child by providing not only a cognitively stimulating and emotionally supportive learning environment for children ages three to five, but also addressing children's health needs by providing health services such as nutritious meals and snacks, hearing and vision screenings, and opportunities for vigorous exercise and rest. In addition, Head Start supports parents in being their child's first and most important teacher and advocate. Examples of such support include parent education classes, English-as-a-second-language courses, computer courses, health fairs, and referrals to social service agencies. Importantly, Head Start services are meant to be responsive to the specific developmental, cultural, ethnic, and linguistic needs of the child and family (Administration on Children, Youth and Families Head Start Bureau, 2006; U.S. Department of Health and Human Services, n.d.).

Findings from nationally representative cohorts of Head Start children in the Family and Child Experiences Survey (FACES) from 1997, 2000, and 2003 indicate that many Head Start children enter the program with cognitive and social skills well below the national average (Administration on Children, Youth and Families Head Start Bureau, 2006; Zill et al., 2001, 2003; Zill, Sorongon, Kwang, Clark, & Woolverston, 2006). Specifically, Head Start children tend to lag behind in vocabulary and early writing and early math skills (Administration on Children, Youth and Families Head Start Bureau, 2006; Zill et al., 2001, 2003; Zill, Sorongon, et al., 2006), as well as early reading (Administration on Children, Youth and Families Head Start Bureau, 2006; Zill, Sorongon, et al., 2006) and letter recognition (Zill et al., 2001, 2003). However, statistically significant gains

are made over the Head Start year in several cognitive domains (Administration on Children, Youth and Families Head Start Bureau, 2006; Zill et al., 2001, 2003; Zill, Sorongon, et al., 2006), including vocabulary knowledge, early writing skills, and early math. In terms of social gains, children in the FACES 2000 cohort scoring in the top quartile for shy, aggressive, or hyperactive behaviors showed significant reductions in these behaviors over the program year (Zill et al., 2003). Despite these gains, the majority of Head Start children remain substantially below the national average on these cognitive and social skills at the end of the year (Administration on Children, Youth and Families Head Start Bureau, 2006; Zill et al., 2001, 2003; Zill, Resnick, et al., 2006).

Recent analyses of FACES data indicate links between child and family characteristics and school readiness (Hindman, Skibbe, Miller, & Zimmerman, 2010). FACES data also indicate a relationship between performance over the Head Start year and performance in kindergarten. For example, analyses of FACES 2000 indicate that the larger the gains in cognitive skills during Head Start, the higher achievement scores in kindergarten (Administration on Children, Youth and Families Head Start Bureau, 2006). Similarly, children who have higher levels of social skills and fewer behavioral problems in Head Start have better cognitive and behavioral outcomes at the end of kindergarten (Administration on Children, Youth and Families Head Start Bureau, 2006).

Findings from the Head Start Impact Study (HSIS) indicate that one program year (i.e., 9 months) of Head Start can result in small to moderate impacts on multiple domains of children's development (Administration on Children, Youth and Families Head Start Bureau, 2005). For instance, both three- and four-year-old first-time Head Start children outperformed their peers in the control group on direct assessments of pre-reading, pre-writing, and vocabulary, and on parent report of children's literacy skills; and three-year-olds had fewer parent reported behavior problems and were reported by their parents to have better access to dental health care and better health status than their peers in the control group. However, much of these gains had disappeared by the end of kindergarten and at the end of first grade (U.S. Department of Health and Human Services, 2010). Some children even experienced negative impacts of the Head Start program by the end of first grade. Most notably, three-year-old children whose parents reported moderate depressive symptoms experienced negative impacts of Head Start on cognitive, social-emotional, and health outcomes in first grade (U.S. Department of Health and Human Services, 2010). This latter finding, in particular, highlights the importance of considering home and family characteristics in the full context of children's school readiness.

1.2. Defining school readiness

Research and policy have focused largely on the importance of cognitive skills and emergent literacy for later academic achievement (Kauerz, 2002; Snow, Burns, & Griffin, 1998); however, children's school readiness is viewed as multidimensional, encompassing not only cognitive and language skills, but also social-emotional development and health. The National Education Goals Panel identified five developmental domains associated with early development and learning: physical well-being and motor development, socio-emotional development, approaches to learning, language development, and cognitive and general knowledge (Kagan, Moore, & Bredekamp, 1995). Physical well-being and motor development encompass such characteristics as rate of growth, physical fitness, chronic conditions such as diabetes, disabilities, nutrition, fine and gross motor skills, and self-care abilities. Despite the importance of physical well-being for children's ability to perform well in school, studies of school success often neglect to

examine the influence of health, disabilities, and health care on achievement (Zill, Peterson, & Moore, 1984).

Social–emotional competency is also important for success in classroom settings. Specifically, the ability to regulate one's emotions and behavior supports a child's ability to pay attention, follow directions, and cooperate and collaborate with peers and teachers on joint activities (Thompson & Lagattuta, 2006). In fact, parents and teachers often agree that the most important school readiness skills children can have as they enter kindergarten are social interaction skills such as listening, following directions, communicating verbally about needs/thoughts, taking turns and sharing, complying with teacher authority, not being disruptive, and being sensitive to others (Kim, Murdock, & Choi, 2005; Knudsen-Lindauer & Harris, 1989; Lin, Lawrence, & Gorrell, 2003; O'Donnell, 2008; Piotrkowski, Botsko, & Matthews, 2000; Wesley & Buysse, 2003).

Approaches to learning refers to the "behaviors, tendencies, or typical patterns that children use in learning situations" (Hyson, 2008, p. 10), including intrinsic motivation to learn, interest and joy in learning, engagement, persistence, task orientation, planning, ability to focus and control attention, flexible problem solving, inventiveness, and tolerance for frustration (Ames, 1992; Fantuzzo, Perry, & McDermott, 2004; Hyson, 2008). Approaches to learning have been found to support other domains of learning, particularly academic skills such as reading and math achievement (McClelland, Acock, & Morrison, 2006; National Center for Education Statistics, 2002).

Language development includes understanding spoken language, using spoken language to accomplish tasks, developing a broad vocabulary, developing an interest in books and stories, understanding the purpose of print, understanding that stories follow a standard sequence, recognizing the letters and sounds of a language, and beginning writing skills (Kagan et al., 1995). The acquisition of language is distinct from early literacy development (i.e., behaviors that lead to conventional reading and writing), but both share a common purpose of communicating meaning (Snow, 2006). Early language and literacy skills are understood to be foundational to children's academic success (Dickinson & Neuman, 2006; National Reading Panel Report, 2000; Snow et al., 1998).

Cognition and general knowledge encompasses knowledge of the properties of objects (such as color and weight); an understanding of the relationships between objects, events, or people (such as being able to determine how two objects are different); and the acquisition of the conventions of society or school-learned knowledge (such as knowing one's address or being able to count by rote; Kagan et al., 1995).

1.3. Profiles of school readiness

As noted above, children's school readiness is multidimensional, encompassing not only cognitive and language skills, but also social–emotional development, approaches to learning, and health. While some dimensions of school readiness have been examined either individually or in combination (Abbott-Shim, Lambert, & McCarty, 2003; Blair, 2002; Konold & Pianta, 2005; NICHD Early Child Care Research Network, 2003), health has typically not been examined as an aspect of school readiness alone or in combination with social–emotional and cognitive development. Some literature suggests that cognitive and social–emotional development in early childhood are closely linked (Bierman, Torres, Domitrovich, Welsh, & Gest, 2009; National Research Council & Institute of Medicine, 2000, 2001), and research has explored the connections between social behavior and literacy skills (Miles & Stipek, 2006). Even so, very few studies have taken a person-centered approach (Laursen and Hoff, 2006) to examining how children's cognitive, language, social, emotional, and health outcomes coalesce within children.

Yet it may be that looking at dimensions of school readiness jointly, rather than separately, more effectively predicts later outcomes.

A study by Hair et al. (2006) used cluster analysis, a person-centered analytic approach, to examine patterns of school readiness in children at school entry and used these patterns to predict first-grade outcomes in a nationally representative sample of first-time kindergartners from the Early Childhood Longitudinal Study – Kindergarten Class of 1998–99 (ECLS-K). Cluster analyses revealed four school readiness profiles, each of which was distinguished by certain demographic features. Furthermore, Hair et al. (2006) found that the four profiles differentially predicted academic and social adjustment in early elementary school, even after controlling for demographic background characteristics. These results suggest that school readiness skills do cluster within individuals in distinct patterns and that they differentially predict outcomes in later schooling. The Hair et al. (2006) study also suggests that health and social–emotional well-being are important aspects of school readiness to consider along with language and literacy skills. Because Head Start is a comprehensive program that specifically provides services across all aspects of development to children and families, it is important to ask whether Head Start teacher, classroom, and program characteristics influence children's school readiness.

1.4. Current study

The purpose of this study is to use the Family and Child Experiences Survey (FACES) data to investigate the degree to which child, family, classroom, teacher, and Head Start program characteristics are related to children's school readiness and continued development over the four-year-old Head Start year. This study makes use of a cohort of Head Start children from the FACES 1997 dataset. The present study builds on previous research by Hair et al. (2006), which examined profiles of school readiness within a nationally representative sample of kindergartners, to examine profiles of school readiness within a nationally representative sample of Head Start children. By utilizing a person-centered approach, this study offers an analytic approach that can adequately capture the conceptual framing of school readiness as a multidimensional characteristic of individual children; it also aligns with the Head Start goal of addressing the needs of the "whole child." This study also provides an alternative approach to analyses of FACES data that have previously focused on a variable-centered approach when examining the associations between child and family characteristics and school readiness (Hindman et al., 2010). An additional aim of this study is to assess the stability of children's developmental profiles across the four-year-old Head Start year.

The first research question addressed in this study was: *What type of school readiness profiles emerge in a sample of four-year-old Head Start students?* In order to examine the factors associated with Head Start children's developmental profiles over the four-year-old Head Start year, we first established what these profiles looked like. We did not have an a priori hypothesis of how many or what kind of school readiness profiles we would find among Head Start children. However, because children included in FACES 1997 and the ECLS-K dataset were all entering kindergarten in the fall of 1998, we were interested in comparing Head Start children's school readiness profiles to those found in the nationally representative sample of first-time kindergartners in the ECLS-K (Hair et al., 2006).

The second research question addressed was: *Are there characteristics of Head Start children (e.g., gender, race/ethnicity, home language) associated with particular profile memberships at the beginning and end of the Head Start year?* Previous examination of school readiness profiles with the ECLS-K dataset (Hair et al., 2006) indicated that some children were more likely to have a particular

school readiness profile (e.g., children whose home language is not English were more likely to have strengths in the social-emotional domain). We therefore anticipated differences by child characteristics in profile membership in a Head Start sample.

The third and final set of research questions included: *Are certain characteristics of Head Start children, families, and programs associated with stability versus change in school readiness profile membership over the course of the four-year-old Head Start year?* Because Head Start children and their families receive comprehensive developmental services aimed at addressing all dimensions of children's development, we hypothesized that many Head Start children would show improvement across developmental domains. To examine improvement, we looked for a shift over the Head Start year from a "risk" profile to a "strengths" profile. Based on the findings from the HSIS, we expected that changes in developmental status would be detected over a single year of Head Start, although the magnitude of the effects might be small to moderate (Administration on Children, Youth and Families Head Start Bureau, 2005). Furthermore, we expected that factors related to the child (e.g., gender), home (e.g., family structure), classroom (e.g., quality), teacher (e.g., qualifications and teaching experience), and Head Start program characteristics (e.g., service provision) would be associated with stability and change in developmental profiles.

2. Method

2.1. Dataset

This study examined a cohort of Head Start children in the Family and Child Experiences Survey (FACES) 1997 data. We selected the FACES 1997 dataset because it most closely matches the ECLS-K dataset in that children in their four-year-old Head Start year would be entering kindergarten in the fall of 1998, as were the first-time kindergartners in the ECLS-K.

FACES began in 1997 as a nationally representative longitudinal study of children and families in Head Start programs. Data were collected from multiple sources on children's cognitive, social, emotional, and physical development; characteristics and well-being of families; quality of Head Start classrooms; and characteristics of Head Start teachers and other staff. The first cohort (FACES 1997) included 3200 children and families from 40 Head Start programs. Children were followed through one or two years of Head Start and into the spring of their kindergarten and first grade years (Administration on Children, Youth and Families Head Start Bureau, 2002).

FACES 1997 used a three-stage sampling approach. Forty Head Start programs were selected using three variables: region, Metropolitan Statistical Area status, and percent minority enrollment. These stratifiers were used to ensure that the 40 programs selected were diverse in each of the above categories. In the second stage, Head Start centers were randomly selected from each of the 40 programs. A total of 180 centers were selected. The third stage involved sampling of Head Start children within centers. A random sample of 3200 children and families was selected (Administration on Children, Youth and Families Head Start Bureau, 2002). The Data User's Guide for FACES 1997 details how sampling weights were developed at the program, classroom, and child levels (Administration on Children, Youth and Families Head Start Bureau, 2002, 2006).

2.2. Sample

Because the focus of this study was school readiness, the sample was restricted to children who were four years old when data collection began in the fall of 1997. The sample included children

for whom fall and spring data were available for their last year in Head Start, as well as data from the spring of their kindergarten year. The resulting sample consisted of 1124 children in the FACES 1997 cohort. Details on the characteristics of the samples can be found in Table 1.

The average age of the children in the FACES 1997 analytic samples was 4.44 years. Approximately one-half of the sample was female (49%). The sample was diverse in terms of racial/ethnic background (see column 2 in Table 1). However, children who were U.S. citizens made up approximately 81% of the sample.

The parent characteristics were identified as parents' employment status and parents' education status. Approximately 10% of the children had two employed parents, 50% had one parent employed, and 40% had neither parent employed. About one-fifth of the sample had parents with less than high school educations, two-fifths of the sample had parents with a high school degree, and about a quarter had parents with some college education. With regard to family structure, over 40% of the sample lived with two parents (see column 2 in Table 1).

The backgrounds of lead teachers in the FACES 1997 ($n=437$) dataset was identified in six areas: years of teaching in Head Start, highest level of education, age category, member of the Early Childhood Education Association, Child Development Associates Certificate or equivalent, and ethnicity (Zill, Resnick, et al., 2006). Approximately two-fifths of the teachers were White, non-Hispanic (42%), one-third were black, non-Hispanic (34%), one-fifth were Hispanic (22%) and 2% were Asian. The majority of the teachers were under the age of 50 (79%). Teachers' years of experience teaching Head Start ranged from one to over ten years, with over half of the sample (63.1%) having five or more years of experience. The percentage of teachers with a high school degree or equivalent was 11% whereas the percentage of teachers with a graduate/professional degree was 3%. About one-third of teachers had some college education (31%) or an associate's degree (30%), while one-quarter had a bachelor's degree (25%). About 53% of the teachers were members of the Early Childhood Education Association. Around 75% of the teachers had a Child Development Associates Certificate or equivalent. More details on the characteristics of the teachers can be found in Table 5-2 in the FACES Head Start technical report (Zill, Resnick, et al., 2006).

2.3. Measures

2.3.1. School readiness variables

Measures of school readiness were included across the following domains: cognitive, language and literacy, social-emotional, health and approaches to learning. The measures were mostly continuous or ordinal, but they were recoded into binary indicators: "on track" versus "not on track." The determination of whether a response would get coded as "on track" versus "not on track" followed a similar protocol as described in Hair et al. (2006). For instance, for children's ability to identify red, blue, and green, if the child could identify "all of them" or "some of them," they were recoded as being "on track." Generally speaking, if the child's score was within the categories of average to very superior, the child was identified as being "on track." For the cognitive direct assessments, the categories established by the Woodcock-Johnson were used (Woodcock & Mather, 1989/1990). Details on how each of the indicators within domains was coded as "on track" versus "not on track" are presented in Table 2.

2.3.1.1. Cognitive. The cognitive domain included assessments of children's ability to identify colors and count, and the child's performance on the Woodcock-Johnson or the Woodcock-Muñoz Applied Problems subscale (Woodcock & Mather, 1989/1990; Woodcock & Muñoz-Sandoval, 1996). Parents were asked whether

Table 1
FACES 1997 sample demographics by profile membership, fall and spring time points.

	Total	Fall					Spring	
		Approaches to Learning Strength	Cognitive Risk	Socio-Emotional Risk	Cognitive Strength	Socio-Emotional Risk	At the Mean in All Domains	Approaches to Learning Strength
Child characteristics								
M, age (years)	4.44 years	4.4 years	4.78 years	4.45 years	4.45 years	4.7 years	4.44 years	4.43 years
Gender, % female	48.80%	43.06%	49.72%	39.69%	50.29%	41.90%	49.86%	47.09%
<i>Race/ethnicity</i>								
Non-Hispanic White	25.38%	16.39%	25.35%	24.48%	26.23%	21.25%	24.73%	26.65%
Non-Hispanic Black	33.62%	33.52%	33.66%	27.59%	34.36%	37.50%	33.90%	35.38%
Hispanic	31.34%	41.15%	31.29%	38.28%	29.63%	34.58%	31.70%	28.54%
Other	9.66%	8.94%	9.70%	9.66%	9.77%	6.67%	9.67%	9.43%
Low birth weight	19.66%	19.79%	17.96%	28.00%	17.65%	19.76%	18.99%	19.73%
U.S. citizen	80.45%	71.82%	80.39%	79.18%	81.86%	80.82%	80.23%	80.74%
English language learner	35.91%	44.67%	35.87%	41.64%	34.11%	37.55%	36.11%	33.10%
Parent characteristics								
<i>Parents employment status</i>								
Both parents employed	9.93%	10.89%	9.95%	9.36%	9.90%	9.26%	9.89%	10.10%
One parent employed	50.15%	52.02%	50.26%	59.55%	49.94%	51.85%	49.26%	52.22%
Neither parent employed	39.92%	37.10%	39.79%	31.09%	40.15%	38.89%	40.85%	37.68%
<i>Parents education status</i>								
Less than high school	18.25%	27.39%	18.05%	23.55%	16.41%	24.49%	18.41%	15.97%
High school degree	42.46%	51.65%	42.44%	43.34%	42.55%	41.22%	41.82%	48.15%
Some college	28.03%	11.76%	28.39%	23.89%	29.38%	25.71%	28.21%	25.69%
Associates degree	6.33%	5.15%	6.24%	5.46%	6.48%	6.12%	6.37%	5.56%
College plus	4.93%	4.04%	4.88%	3.75%	5.17%	2.45%	5.19%	4.63%
Parent married	44.93%	48.35%	44.93%	45.39%	44.74%	39.59%	44.03%	43.29%
Teen mom	53.41%	59.55%	53.02%	54.77%	52.25%	58.50%	52.95%	55.16%
Family characteristics								
<i>Family structure</i>								
Mother and father	43.91%	47.43%	43.96%	39.93%	43.62%	36.33%	44.03%	43.98%
Mother only	32.28%	29.96%	32.46%	34.81%	33%	37.55%	32.49%	33.33%
Other	23.81%	22.61%	23.59%	25.26%	23.38%	26.12%	23.48%	22.69%

Source: FACES 1997.

children could identify the colors red, blue, and green, and responses ranged from 1 “all of them” to 3 “none of them.” For counting numbers (Clay, 1979; Mason & Stewart, 1989; Teale, 1988, 1990), the children were presented with 10 teddy bears and asked to point to and count the bears. The assessor then rated on a scale of 1 “cannot count or did not try to count” to 5 “made no mistakes in counting.” The Woodcock–Johnson or Woodcock–Muñoz Applied Problems subscale assessed children’s ability to solve practical math problems involving counting, adding, and subtracting. The internal reliability of this subtest is 0.92 (Woodcock, McGrew, & Mather, 2001).

2.3.1.2. Language and literacy. The language and literacy domain included measures of early reading, early writing, and language development. For early reading, parents were asked whether their child ever pretends to read and whether their child can recognize their own name. Parents also reported how well children could identify letters on a scale from 1 “all of the letters in the alphabet” to 4 “none of them”. For early writing, parents reported whether their child writes/draws rather than scribbles and whether the child can write their first name. For language development, parents were asked whether their child’s speech is understandable to strangers, and whether the child stutters or stammers. The Woodcock–Johnson or Woodcock–Muñoz Letter–Word Identification subscale (Woodcock & Muñoz-Sandoval, 1996) tested identifying letters and words and has an internal reliability of 0.92 (Woodcock et al., 2001). The Woodcock–Johnson Dictation subscale measured children’s pre-writing (e.g., drawing lines, copying letters) and writing (e.g., writing a letter) skills, and has an internal reliability of 0.90.

2.3.1.3. Social–emotional. The social–emotional domain included measures of both teacher- and parent report of children’s social skills and problem behaviors. Parent items come from the Entwisle Scale of Personal Maturity (Entwisle, Alexander, Cadigan, & Pallis, 1987) and the Child Behavior Checklist for Preschool-Aged Children (Achenbach, Edelbrock, & Howell, 1987). Teacher items come from the Personal Maturity Scale (Alexander & Entwisle, 1988), the Social Skills Rating System (Elliot, Gresham, Freeman, & McCloskey, 1988), the Child Behavior Checklist for Preschool-Aged Children, Teacher Report (Achenbach et al., 1987) and the Behavior Problems Index (Zill, 1990). The social–emotional domain included four subdomains: social skills, aggression, withdrawn, and hyperactive. The *social skills* subdomain included parent-report items such as being able to make friends, comfort friends, accept friends’ ideas, get along well with others, and act their age. All parent-report items were rated on a scale from 0 “not true” to 2 “very true or often true.” The teacher-report items included making friends, not getting upset when teased, inviting others to join in play, waiting for their turn, complimenting playmates, saying nice things to playmates, and accepting playmates’ ideas for sharing. All teacher-report items were rated on a scale from 1 “not true” to 3 “very true or often true.” The *aggression* subdomain included parent-report items such as child has temper tantrum, hits or fights, and is disobedient at home. The teacher-report items included child disobeys rules, disrupts ongoing activities, hits or fights, and has temper tantrums. The *withdrawn* subdomain included parent-report items such as being unhappy/sad, worried, and feeling worthless. The teacher report included items such as being unhappy, worried, sleepy or tired, keeping to self, and being hard to understand. The *hyperactive* subdomain included parent and teacher reports of the child being nervous or high strung and being restless. All aggression, withdrawn, and hyperactive scales were reverse-coded.

Table 2
Constructs and response coding of school readiness measures included in profile analyses.

Construct	Source	Child coded as “on track” for the following responses
Cognitive		
Children can identify red, blue and green	Parent	“all or them” or “some of them”
Counting	Direct assessment	“perfectly, no mistakes,” “very well, one or two mistakes but child self corrected,” or “fairly well, child made one or two uncorrected mistakes”
Woodcock–Johnson/Woodcock–Muñoz: Applied Problems	Direct assessment	Score of 80 or higher
Language and literacy		
Child pretends to read	Parent	Yes
Child can recognize own name	Parent	Yes
Identify letters	Parent	“all of the letters of the alphabet,” “most of them,” or “some of them”
Child writes/draws rather than scribbles	Parent	Yes
Child can write first name	Parent	Yes
Child’s speech understandable to strangers	Parent	Yes
Child stutters or stammers	Parent	No
Woodcock–Johnson/Woodcock–Muñoz: Letter-Word Identification	Direct assessment	Score of 80 or higher
Woodcock–Johnson: Dictation	Direct assessment	Score of 80 or higher
Social–emotional		
Social skills	Parent	“very true or often true” or “somewhat or sometimes true”
Social skills	Teacher	“very true or often true” or “somewhat or sometimes true”
Aggression	Parent	“not true” or “somewhat or sometimes true”
Aggression	Teacher	“not true” or “somewhat or sometimes true”
Withdrawn	Parent	“not true” or “somewhat or sometimes true”
Withdrawn	Teacher	“not true” or “somewhat or sometimes true”
Hyperactive	Parent	“not true” or “somewhat or sometimes true”
Hyperactive	Teacher	“not true” or “somewhat or sometimes true”
Health		
General health status	Parent	“excellent,” “very good” or “good”
Child has special needs	Parent	No
Child can button clothes	Parent	Yes
Child holds pencil properly	Parent	Yes
Child trips, stumbles, or falls easily	Parent	Yes
Body control	Teacher	“child moves around while manipulating an object” or “child engages in complex movements”
Manual coordination	Teacher	“child manipulates small objects with precision” or “child performs precise actions involving opposing hand movements”
Approaches to learning		
Teacher-report items	Teacher	“very true, or often true” or “somewhat or sometimes true”
Parent-report items	Parent	“sometimes,” “always,” “often,” or “very often”

Note: Principal component factor analyses were conducted within each domain of school readiness to create a factor-based summary score for each domain. Factor-based standardized z-scores were then used in the latent class analyses.

2.3.1.4. Health. The health domain included a parent report of the child’s fine (e.g., can button shirt) and gross motor skills (e.g., child trips, stumbles, or falls easily), as well as parent report of the child’s general health status (rated on a scale from 1 “excellent” to 5 “poor”) and whether the child had special needs (yes/no). In addition, the teachers reported on the child’s body control and manual coordination.

2.3.1.5. Approaches to learning. The approaches to learning domain included teacher report of several child characteristics associated with attention and task orientation: follows teachers’ directions, joins activity without being told, helps put materials away, follow rules when playing, uses free time in acceptable ways, cannot concentrate or pay attention, lacks confidence learning new things. Parent also reported how much their child enjoys learning, likes to try new things, shows imagination, wants to hear he/she is doing ok, and can’t concentrate. All items were on a scale from 1 “not true” to 3 “very true or often true,” and come from the Entwistle Scale of Personal Maturity (Entwistle et al., 1987) and the Child Behavior Checklist for Preschool-Aged Children (Achenbach et al., 1987).

2.3.2. Covariates

Covariates included those at the child, home, classroom, teacher and Head Start program levels. Variables included at the program level were mainly information about service provision.

2.3.2.1. Child characteristics. Several child characteristics were included in analyses of school readiness profiles. They included:

the child’s age in months (as of 12/31/97), gender, race/ethnicity (White, non-Hispanic, Black, non-Hispanic, Hispanic, and other), whether the child was born with a low birth weight, whether the child was a U.S. citizen, and whether the child’s home language was English. We also accounted for how many years a child attended Head Start.

2.3.2.2. Family characteristics. In the dataset, the following parent variables were included in analyses: child’s primary caregiver’s educational attainment (less than high school, high school, more than high school), whether the primary caregivers were employed or not employed, the current marital status of the parents, and whether the child’s mother was a teen mother at the birth of her first child. The primary caregiver’s education variables combine the mother and father education variables. The parents’ education variable reflects the highest education of either the father or the mother.

In addition, the family’s poverty status, family structure (mother only or other family structure) and whether the family received the services they needed from Head Start were included as covariates at the level of the family.

2.3.2.3. Classroom characteristics. Five classroom quality variables were examined in analyses: the ratio of adults to children in the classroom, the type of classroom the child was in (full-day or half-day schedule), the mean Arnett Caregiver Interaction (Arnett, 1989) score of the lead teacher, the mean ECERS-R Total score (Harms & Clifford, 1980), and the Quality

Composite score. The Arnett Caregiver Interaction Scale is a measure of the teacher's behavior toward the children in the classroom. The ECERS-R Total score provides a global rating of classroom quality based on structural features of the classroom. The Quality Composite score is derived from factor analysis of the ECERS-R Language score, Assessment Profile Scheduling raw score, and Assessment Profile Learning Environment raw score.

2.3.2.4. Teacher characteristics. Teacher characteristics included number of years of teaching experience, and the teacher's educational attainment (high school/GED or less; some college or vocational school; associates degree; or a bachelor's degree).

2.3.2.5. Head Start health and social service provision. These variables measure the number of different services received and whether there were any unmet service needs. The service variables included six categories of variables: income support, health/mental health, housing, education, child care, and family functioning variables.

2.3.3. Missing data

The latent class analyses used *Mplus*' full-information maximum likelihood (FIML) algorithm to calculate the correct standard errors based on the level of missing data for each model. FIML is the preferred method for the treatment of missing data in latent variable modeling because it uses all available data and produces less-biased parameter estimates and more accurate fit indices than other methods such as pairwise or listwise deletion of cases when data are missing completely at random or missing at random (Arbuckle, 1996; Enders, 2001; Enders & Bandalos, 2001).

3. Results

3.1. Principal components factor analyses within each school readiness domain

We created factor-based standardized z-scores for each of the school readiness domains at each time point. Observed measures used to construct each factor are described in Section 2. For each domain, we limited the number of factors to 1. The eigenvalues for all the factors across all the school readiness domains was greater than 1.0 (e.g., socio-emotional, 1.14; cognitive, 1.62, health, 1.36, language, 1.79, and approaches to learning, 1.19). Factor loadings within each of the domains varied. The factor loadings for socio-emotional development ranged from 0.3 to 0.7; the factor loadings for cognitive development ranged from 0.10 to 0.62; the factor loadings for health ranged from 0.10 to 0.73; the factor loadings for language ranged from 0.10 to 0.68, and the factor loadings from approaches to learning ranged from 0.23 to 0.70. These factor-produced z-scores were then used in the latent class analyses (described in the following section), allowing each school readiness domain to be in the same metric.

3.2. Examination of school readiness profiles

Developmental profiles of children at the fall and spring of the Head Start year were examined. The analytic model assumes that a latent construct of school readiness is represented by multiple dimensions of development, including developmental status in the cognitive, language, social, approaches to learning, and health domains, within individual children.

To examine children's membership in developmental profiles in the fall and spring, Latent Class Analysis (LCA) was used. LCA is a statistical method for finding subtypes of related cases (latent profiles) from multivariate categorical data. An extension of LCA permits the same analysis using continuous variables (Lazarfeld &

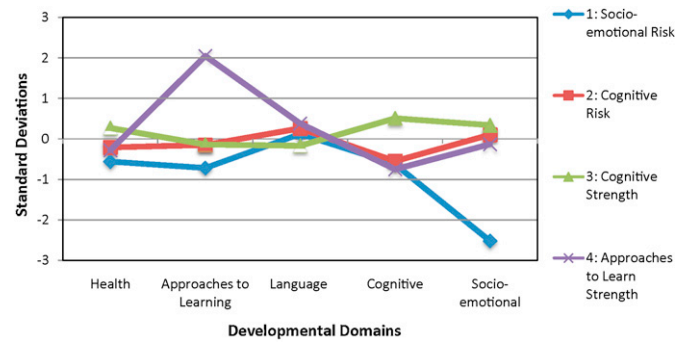


Fig. 1. Developmental profiles of children at the fall of the four-year-old Head Start year, FACES 1997.

Henry, 1968). LCA is analogous to cluster analysis (the method used by Hair et al., 2006): it is used to discover types of cases based on observed data and also possibly to assign cases to groups. However, there are two primary differences between cluster analyses and LCA. First, cluster analysis assigns each individual into a single group, whereas LCA assigns each individual a *probability* of membership in each of the available groups. In addition, LCA allows for covariates to be included when determining the group membership, whereas cluster analysis does not. For the present analyses, the factor-based summary scores for each domain of development were included in the LCA model.

Latent Class Analysis was conducted in *Mplus* Version 5.0 (Muthén & Muthén, 1998–2008). Solutions with different numbers of classes are run to determine which solution (with how many classes) is best. To help determine which n-class solution model is best (Lo, Mendell, & Rubin, 2001; Ramaswamy, DeSarbo, Reibstein, & Robinson, 1993), we examined the Akaike Information Criterion (AIC), Bayesian Information Criterion (BIC) and Sample Size Adjusted Bayesian Information Criterion (SSABIC); for these indices, lower values indicate better fit (i.e., which class solution does the best job balancing the number of parameters and the information from those parameters), although there is no test of statistical significance. The entropy (whether the classes are distinct from one another) should be close to 1, which indicates clear classification. See Table 3 for fit indices for the 3-, 4-, and 5-class solutions for the fall and spring. Importantly, we also examined the mean school readiness scores of each profile in our final solutions to ensure that the profiles were meaningfully (and not just significantly) different. For example, a 5-class solution may have better fit than a 4-class solution as indicated by the fit indices, but may have two classes that are indistinguishable; in that case, we would choose the 4-class solution. This process led us to conclude with a 4-class solution for fall data and a 3-class solution for spring data.

Fig. 1 represents the four classes that emerged from analyses of the fall FACES 1997 data. It should be kept in mind that because these profiles were based on z-scores for the various school readiness indices within domains, the profiles represent children's standing within this particular population (i.e., a nationally representative sample of four-year-old Head Start children) rather than their standing within a national sample. Most of the children were either in the Cognitive Strength (45% of the sample; $n=494$) or Cognitive Risk (38%; $n=417$) profiles. Children in both of these profiles were close to the sample average in the health, approaches to learning, language, and social-emotional domains; but for the cognitive domain, children in the Cognitive Strength and Cognitive Risk profiles were about a half a standard deviation above and below the mean, respectively. Fewer children were in the Approaches to Learning Strength profile (8%; $n=92$), which was characterized by being about two standard deviations above the mean on approaches to learning and over half a standard deviation below

Table 3
Fit indices for LCA models, Fall and Spring of Head Start year.

Number of classes	AIC	BIC	SSABIC	Entropy
Fall				
3	27253.656	28229.608	27610.241	0.701
4	27152.503	28253.577	27554.804	0.723
5	26996.211	28222.407	27444.228	0.751
Spring				
3	27477.101	28456.908	27837.534	0.907
4	27527.101	28632.524	27933.743	0.507
5	27316.733	28547.772	27769.584	0.778

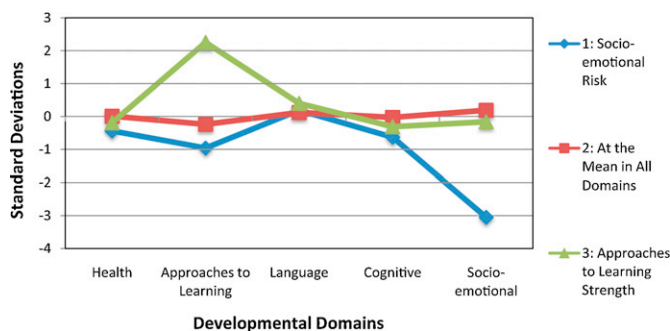


Fig. 2. Developmental profiles of children at the spring of the four-year-old Head Start year, FACES 1997.

the mean in the cognitive domain. The Social-emotional Risk (9%; $n = 99$) profile was also small and was characterized by being over two standard deviations below the mean in the social-emotional domain and about half a standard deviation below the mean in the domains of health, approaches to learning, and cognition.

Like in the fall, the spring FACES 1997 data also yielded a small Approaches to Learning Strength profile (11% of the sample; $n = 122$) and a small Social-emotional Risk profile (4%; $n = 48$; see Fig. 2); both of these profiles replicated the characteristics found in the fall. The rest (and large majority, 85% or $n = 954$) of the children were in the At the Mean in All Domains profile, and they were close to average across all domains.

3.3. Characteristics associated with profile membership

Sample demographics by school readiness profile for the FACES 1997 dataset are shown in Table 1. As the data in this table suggest, there is some variability in the distribution of child and family demographic characteristics by profile membership. In order to explore these patterns systematically, multinomial regression analyses were conducted comparing the covariates in the model for each profile with the most comprehensively “positive” profile at each time point. For example, for comparing fall profiles, the Cognitive Strength profile was the reference group and other groups were compared to it with regard to demographic characteristics. Independent variables for each multinomial regression were entered simultaneously (see Table 4).

For the fall FACES profiles, older children had lower odds of being in the Social-emotional Risk profile ($OR = 0.81$) or the Cognitive Risk profile ($OR = 0.76$), compared to the Cognitive Strength profile. Girls also had greater odds of being in the Cognitive Strength profile compared to any other profile. Black non-Hispanic children (compared to White children) and children whose mothers were under 20 when they were born had increased odds of being in the Cognitive Risk profile, compared to the Cognitive Strength profile ($OR = 3.38$ and 2.94 , respectively). U.S. citizens had lower odds of being in the Cognitive Risk profile, compared to the Cognitive Strength profile ($OR = 0.17$). Children whose parents had less than a high school education ($OR = 5.13$) and who lived in a single-mother family structure

($OR = 2.71$) had increased odds of being in the Approaches to Learning Strength profile, compared to the Cognitive Strength profile. Children with no parents employed had lower odds of being in the Approaches to Learning Strength profile, compared to the Cognitive Strength profile ($OR = 0.41$). Finally, children who had more years in Head Start had lower odds of being in the Social-emotional Risk profile, compared to the Cognitive Strength profile ($OR = 0.00$). For the spring profiles, the At the Mean in All Domains profile was the reference group (see Table 5). Girls had higher odds of being in that profile compared to either the Socio-emotional Risk profile ($OR = 0.26$) or the Approaches to Learning Strength profile ($OR = 0.56$). Children who were a race other than Black, Hispanic, or White (and compared to White children), had lower odds of being in the Socio-emotional Risk profile, compared to the At the Mean in All Domains profile ($OR = 0.12$). Children whose parents had less than a Bachelor's degree (compared to children whose parents had a Bachelor's degree) had higher odds of being in the Socio-emotional Risk profile, compared to the At the Mean in All Domains profile (ORs range from 2.87 to 8.99, depending on parents' education). And finally, children who live in family structures other than single-mother and two-parent structures (comparison group is two-parent families) had higher odds of being in the Approaches to Learning Strength profile, compared to the At the Mean in All Domains profile ($OR = 2.13$).

3.4. Examination of stability and change in profile membership over the head start year

Multinomial regression analyses were run to determine whether particular child, family, and/or Head Start program characteristics were associated with change versus stability in school readiness profiles over the four-year-old Head Start year. We did this by comparing children who had stayed or moved to a “strengths” profile with those who had stayed or moved to a “risk” profile over the Head Start year. In order to conduct these analyses, we first created a categorical variable with the following categories “stayed in strengths profile,” “moved to strengths profile,” “stayed in risk profile,” and “moved to risk profile.” For the purpose of this analysis, the At the Mean on All Domains profile was considered a strengths profile. The reference group for the dataset was “stayed in strengths profile.” The multinomial regression took into account factors related to the child (e.g., gender), home (e.g., family structure), classroom (e.g., quality), teacher (e.g., qualifications and teaching experience), and Head Start program characteristics (e.g., service provision).

Analyses examining the change in profile membership across the Head Start year indicated that a majority of children in the FACES 1997 sample either stayed in a strengths profile (52%) or moved to a strengths profile (43%). Only a small proportion of children moved to a risk profile (3%) or stayed in a risk profile (2%). As noted in Table 6, girls had lower odds of moving to a risk profile or staying in a risk profile compared to staying in a strengths profile ($OR = 0.17$ and 0.14 , respectively). Older children also had lower odds of moving to a

Table 4

Multinomial regression model of child and family characteristics predicting school readiness profile memberships (reference group: Cognitive Strength) for the fall of the four-year-old Head Start year, FACES 1997.

	Social-emotional Risk		Cognitive Risk		Approaches to Learning Strength	
	OR	Sig	OR	Sig	OR	Sig
Child characteristics						
Child's age	0.81	*	0.76	*	0.92	
Child is female	0.20	*	0.36	*	0.37	*
Low birthweight	2.28		1.74		1.62	
<i>Race/ethnicity</i>						
White non-Hispanic	Ref.		Ref.		Ref.	
Black non-Hispanic	2.08		3.38	*	0.50	
Hispanic	4.82		5.30		2.15	
Other race	1.78		1.66		0.63	
English language learner	0.61		0.95		1.21	
U.S. citizen	1.09		0.17	*	0.44	
Family Characteristics						
<i>Parents' education</i>						
Less than high school	7.90		24.22		5.13	*
High school	3.84		8.52		2.23	
Some college	2.33		3.68		2.03	
Associate's degree	0.01		4.66		2.54	
Bachelor's degree	Ref.		Ref.		Ref.	
No parents employed	0.66		0.40		0.41	*
Poverty	2.69		1.63		1.29	
Teen mother	1.56		2.94	*	1.45	
<i>Family structure</i>						
Two-parent	Ref.		Ref.		Ref.	
Mother only	1.96		0.90		2.71	*
Other family structure	2.42		1.32		1.96	
Parent Married	1.80		1.19		1.33	
Head Start						
Number of years in Head Start	0.00	*	1.06		1.03	

Source: FACES 1997.

* $p < 0.05$

Table 5

Multinomial regression model of child and family characteristics predicting school readiness profile memberships (reference group: At the Mean in All Domains) for the spring of the four-year-old Head Start year, FACES 1997.

	Socio-emotional Risk		Approaches to Learning Strength	
	OR	Sig	OR	Sig
Child characteristics				
Child's age	1.03		0.96	
Child is female	0.26	*	0.56	*
Low birthweight	1.29		1.07	
<i>Race/ethnicity</i>				
White non-Hispanic	Ref.		Ref.	
Black non-Hispanic	0.62		0.91	
Hispanic	0.35		0.89	
Other race	0.12	*	0.93	
English language learner	2.35		0.77	
U.S. citizen	0.78		0.61	
Family characteristics				
<i>Parents' education</i>				
Less than high school	8.99	*	1.22	
High school	3.21	*	1.28	
Some college	2.87	*	0.86	
Associate's degree	4.09	*	1.29	
Bachelor's degree	Ref.		Ref.	
No parents employed	0.77		0.61	
Poverty	1.17		1.38	
Teen mother	0.95		1.07	
<i>Family structure</i>				
Two-parent	Ref.		Ref.	
Mother only	2.34		1.91	
Other family structure	2.28		2.13	*
Parent married	0.92		1.66	
Head Start				
Number of years in Head Start	1.50		0.80	

Source: FACES 1997.

* $p < 0.05$.

Table 6
Multinomial regression model of service, child, family, classroom, and teacher characteristics predicting whether children moved school readiness profiles within the Head Start year (reference group: Stayed Positive) for FACES 1997.

	Moved to risk profile		Stayed in risk profile		Moved to strengths profile	
	OR	Sig	OR	Sig	OR	Sig
Services						
Unmet services	1.67		0.86		1.17	
Classroom characteristics						
Type of classroom	1.16		0.32		0.83	
Ratio of children to adults	1.02		1.06		1.02	
Mean ECERS total score	0.52	*	1.29		0.92	
Lead teacher mean Arnett	1.03		0.98		1.01	
Classroom quality composite	1.00		0.80	*	1.00	
Teacher characteristics						
<i>Education</i>						
Bachelor's degree	Ref.		Ref.		Ref.	
High school or less	6.20	*	1.60		1.67	
Some college or vocational school	0.66		0.54		1.01	
Associate's degree	7.20	*	0.69		1.39	
Years teaching	1.03		1.02		1.00	
Child characteristics						
Child's age	0.86	*	0.85		0.78	*
Child is female	0.17	*	0.14	*	0.82	
Low birthweight	2.64		1.44		1.82	*
<i>Race/ethnicity</i>						
White non-Hispanic	Ref.		Ref.		Ref.	
Black non-Hispanic	0.54		1.06		1.12	
Hispanic	1.09		1.77		3.42	*
English language learner	0.95		2.55		1.34	*
U.S. citizen	0.31		1.05		0.29	*
Family characteristics						
<i>Parents' education</i>						
Less than high school	5.83	*	3.20		2.06	*
High school	0.77		1.35		0.74	
Bachelor's degree	Ref.		Ref.		Ref.	
No parents employed	0.47		0.70		0.49	*
Poverty	1.21		1.97		1.93	*
Teen mother	2.23		0.61		2.42	*
<i>Family structure</i>						
Two-parent	Ref.		Ref.		Ref.	
Mother only	6.63	*	1.19		2.07	*
Other family structure	1.85		3.49		2.25	*
Parent married	1.83		0.57		0.96	
Head Start						
Number of years in Head Start	2.54		0.73		0.57	*

Source: FACES 1997.

* $p < 0.05$.

risk profile or moving to a strengths profile, compared to staying in a strengths profile ($OR=0.86$ and 0.78 , respectively). Children whose parents had less than a high school degree, compared to parents with a Bachelor's degree, had greater odds of moving to a risk profile or moving to a strengths profile than staying in a strengths profile ($OR=5.83$ and 2.06 , respectively). Children in single-mother families, compared to children in two-parent families, had higher odds of moving to a risk profile or moving to a strengths profile than staying in a strengths profile ($OR=6.63$ and 2.07 , respectively). Children whose teachers had a high school degree or less, or an associate's degree, compared to children whose teachers had a Bachelor's degree, had greater odds of moving to a risk profile than staying in a positive profile ($OR=6.20$ and 7.20 , respectively). Children in classrooms with higher mean ECERS total scores had decreased odds of moving to a risk profile, compared to staying in a strengths profile ($OR=0.52$). Children in classrooms with higher classroom quality composite scores also had decreased odds of staying in a risk profile, compared to staying in a strengths profile ($OR=0.80$). Children who had low birth weights, were Hispanic (compared to White), were English language learners, lived in poverty, had teen mothers, and lived in an "other" family structure (neither single-parent nor two-parent; comparison group is two-parent family structure) had increased odds of moving to a strengths profile compared to staying in a

strengths profile. Conversely, children who were U.S. citizens, had no parents who were employed, and had more years in Head Start had lower odds of moving to a strengths profile compared to staying in a strengths profile. Head Start service provision did not distinguish children who stayed or moved in their profile membership over the four-year-old Head Start year.

4. Discussion

The main goal of this study was to investigate the degree to which child, family, classroom, teacher, and Head Start program characteristics are related to children's school readiness and continued development over the four-year-old Head Start year. Latent class analyses revealed four distinct developmental profiles in the FACES 1997 sample in the fall, and three distinct profiles in the spring of the four-year-old Head Start year. Examination of these groupings indicated that a substantial proportion of Head Start children moved from a developmental profile including some risk (either cognitive or social-emotional) to a strengths profile between the fall and spring of the Head Start year. Regression analyses indicated that child age, family structure, parental educational attainment, classroom quality and teacher's level of educational attainment are important factors associated with stability and change in profile membership over the Head Start year, but receipt

of social services through Head Start was not associated with stability or change in profile membership. We discuss these findings in light of previous research and highlight key conclusions from this study.

The developmental profiles of the Head Start children in this study resembled those found among first-time kindergartners within the ECLS-K dataset in that there were children who were doing well across developmental domains as well as children who were distinguished by social-emotional risk. While there were similarities in the findings across the FACES and ECLS-K datasets, there were also differences. Specifically, unlike the kindergarten profiles, health was not a distinguishing factor in the Head Start profiles. Although we had no a priori predictions about the types of profiles we might find among Head Start children, given that Head Start is more likely than community-based programs to have a high proportion of enrolled children with an identified disability, we might expect to find a group of children who had distinct health risks as part of their developmental profile. It could be that we did not find such a group of children because there was not enough variability from the mean score on the health measures in the FACES dataset. A related possibility is that these discrepancies are due to differences in the way indicators of school readiness were calibrated across the two studies. Specifically, if the indicators of school readiness were standardized based on a nationally representative sample of four-year-old children rather than on a nationally representative sample of four-year-old Head Start children, we may have found a school readiness profile that was indeed distinguished by health risk. Nevertheless, because Head Start enrolls a large proportion of children with special needs, and provides health screenings and other health-related supports to children and families, children's physical health and well-being should continue to be a focus of study for the Head Start population. Indeed, physical health and well-being should continue to be a focus of researchers, educators, and policymakers concerned with all children's school readiness (Kagan et al., 1995).

Approaches to learning was an important characteristic distinguishing the Head Start profiles; about 8% of four-year-old Head Start children had relatively high scores in approaches to learning in the fall, and the proportion of children in this profile increased to 11% in the spring. These findings suggest that approaches to learning is an important school readiness dimension and one that differentiates children both at the beginning and end of the Head Start year. In contrast, the school readiness profiles of first-time kindergartners in the ECLS-K did not include measures of approaches to learning due to lack of variability in the measure in the ECLS-K dataset (Hair et al., 2006). Researchers' decisions about inclusion and exclusion of specific school readiness indicators in analyses likely contribute to the level of comparability found in school readiness profiles across datasets. Happily, the measures for assessing children's approaches to learning have been expanding and improving in recent years (Hyson, 2008) and this bodes well for future investigations of this important aspect of school readiness.

Overall, these findings suggest that many Head Start students are improving in their developmental status over the four-year-old Head Start year. This finding mirrors other reports using FACES data to examine Head Start children's progress over the program year (Administration on Children, Youth and Families Head Start Bureau, 2006; Zill et al., 2001, 2003; Zill, Sorongon, et al., 2006). However, a small percentage of four-year-old Head Start students stay in or move to a developmental risk profile over the year. Although a small proportion of the overall Head Start population, these children warrant special attention and support to address their developmental needs.

Our findings suggest that characteristics of the teacher and the quality of the classroom do matter for children's development in Head Start. Specifically, results indicate that higher classroom

quality and higher levels of teacher's educational attainment are associated with moving to a more strengths-based developmental profile over the Head Start year, whereas lower quality and lower levels of teacher educational attainment are associated with staying in or moving to a risk profile. These findings are inconsistent, however, with previous studies examining the link between teacher/classroom quality and child outcomes. Early and colleagues (Early et al., 2007) present findings suggesting that early childhood educators' educational attainment is not linked to classroom quality or to child outcomes. Specifically, a meta-analysis of data across seven major studies of early care and education programs did not find a consistent association between teachers' educational attainment and the quality of early childhood classrooms or children's achievement during the year prior to kindergarten (Early et al., 2007). It might be that other forms of professional development, including participation in ongoing training, that early childhood educators may pursue regardless of a higher education degree, is more closely associated with change in children's developmental status. This is a hypothesis that is being examined in recent studies of professional development of the early childhood workforce (Zaslow, Halle, & Tout, 2010; Zaslow, Tout, Halle, Vick, & Lavelle, 2009). Taken together, this study's findings along with other recent research suggest that supporting professional development efforts among Head Start teachers to improve classroom quality and support children's development across multiple school readiness domains is an endeavor likely to reap benefits.

Although we had specifically included receipt of services through Head Start (such as connections to community-based services) in our models, we did not find a significant association between receipt of services and change in children's developmental profiles over the Head Start year. It is likely that a more targeted study asking more in-depth questions about types of services provided and received would yield more nuanced results. The measure of unmet family need that was available in the FACES 1997 dataset is intriguing and is worth further investigation in future research.

Previous research has indicated that child and family characteristics are associated with Head Start children's developmental status over time (Hindman et al., 2010). The current study found similar evidence of the association between child and family characteristics and change in developmental profiles over the Head Start year. Specifically, the data revealed that compared to children who stayed in a strengths profile, children who moved to a strengths profile (from a risk profile) had more indicators of risk (e.g., being born low birth weight, having parents with lower levels of education, or being from a single-parent household). It is very encouraging to see that over the course of a year of Head Start, so many children (43% of the sample) were able to move into the same strengths profiles as their peers who started out with more demographic advantages. This finding is consistent with previous reports of gains in developmental outcomes over a 9-month Head Start year (Administration on Children, Youth and Families Head Start Bureau, 2005), and further suggests that the benefits of Head Start may be experienced most acutely by those within the Head Start-eligible community who are the most at risk.

Much research has already been devoted to examining the influence of Head Start. The current study contributes to that body of literature by using a person-centered approach to find patterns of school readiness among Head Start children, thereby considering the "whole child" rather than isolated measures of school readiness. Beyond this methodological contribution, this study also finds that teachers' level of educational attainment matters for children, although this finding is somewhat contested in the field of early childhood education research. This study also indicates that classroom quality is associated with changes in children's developmental profiles over time; this finding adds to the growing body of research suggesting that a focus on increasing classroom

quality, perhaps by way of targeted professional development of early childhood educators, can benefit child outcomes. Finally, results suggest that Head Start may have particularly positive effects on the most at-risk children: a large number of children starting out with demographic and school readiness risk factors change to a position of relative strength by the end of the Head Start year.

4.1. Limitations

It is important to keep in mind that measures of school readiness skills used to produce the school readiness profiles reported in this study are based on the norms for Head Start children in these samples. Since these children's scores are relative to the median within a high-risk sample, being at or above the median may not necessarily indicate a developmental "strength." It is also telling that the majority of children fell into a profile labeled At the Mean in All Domains by the end of the four-year-old Head Start year, suggesting a regression to the mean. A further test of children developing strengths in school readiness domains would be to compare these children's performance on developmental indicators with the norms for a national sample. However, as noted in numerous studies, low-income children consistently trend below national norms on standardized assessments, and this is no less true of Head Start samples (Administration on Children, Youth and Families Head Start Bureau, 2005). It is, therefore, useful to examine how Head Start children are performing relative to their peers to determine what factors may make a difference in improving their performance.

It is also important to consider that similar measures collected from multiple reporters (for example, both parents and teachers reporting on children's social-emotional development) may lead to some shared variance between the measures. While this is a possibility, the fact that the multiple reporters in this case (i.e., parents and teachers) were asked about different behaviors and were responding to children's behaviors in different contexts mitigates this issue.

5. Directions for future research

There are several avenues for future research suggested by the current study, including isolating certain dimensions of school readiness for more in-depth study, assessing the linkages between school readiness profiles and later child outcomes, and experimenting with different methodologies to further understand how developmental competencies change over time.

Although the measure of health used in this study included direct assessments of fine and gross motor skills as well as the parent's report of the child's general health, future research should explore this domain in more detail. A parent rating of the child's general health may not provide enough variability to be able to see differences across groups. Detailed assessments of children's health including fine and gross motor skills, weight status, oral health, and disability status could provide additional insight for children's development and success in school. In addition, the specificity and sensitivity of health rating scales completed by parents need further investigation.

Children's social-emotional well-being should be explored in more detail as well. Children's ability to interact competently in social situations and the development of their self-concept may play an extremely important role in children's readiness for school, as well as for their developmental trajectories throughout elementary school. Furthermore, including measures of parent and teacher depressive symptoms may shed

additional light on the contexts of Head Start children's development, especially in the social-emotional domain.

A natural next step for the current set of analyses would be to link the developmental profiles at age four with these children's outcomes at the end of kindergarten. Unfortunately, due to a significant amount of missing data in the kindergarten wave of the FACES 1997 dataset, including missing data for teacher and classroom characteristics as well as child outcomes, we were unable to conduct analyses examining this important research question in the current study. These analyses may be possible utilizing subsequent cohorts of FACES data.

Another way of looking at stability and change in development among children is to examine improvements in performance on a particular aspect of development within a developmental domain. For example, we might have expected to see children improve in their language or literacy skills between the fall and spring of the Head Start year, even if they did not change profile membership. Indeed, improvements in individual aspects of cognitive and social development were observed in FACES progress reports and the HSIS first year findings (Administration on Children, Youth and Families Head Start Bureau, 2005, 2006; Zill et al., 2001, 2003; Zill, Sorongon, et al., 2006). For example, HSIS findings indicated that Head Start children had pre-reading, pre-writing and vocabulary scores closer to the national norm on standardized tests at the end of one year of Head Start than did the control group children, even though the Head Start children's absolute scores were still well below the national average (Administration on Children, Youth and Families Head Start Bureau, 2005). An examination of changes within developmental domain over time would lend itself to a variable-centered (e.g., hierarchical linear modeling) rather than person-centered approach. Future research could compare different methodological approaches to examining stability and change in children's developmental competencies over time.

6. Implications for practice

One of the aims of this study was to explore the associations between Head Start (in terms of classroom characteristics, teacher characteristics, and connections to community-based services) and changes in children's developmental status over the course of a Head Start year. Classroom quality and teacher's level of educational attainment emerged as important factors associated with stability and change in profile membership over the four-year-old Head Start year. Specifically, among children who started out in the fall with a strengths profile, those who were in lower quality classrooms and had teachers with a lower level of educational attainment were more likely to move to a risk profile over the Head Start year. These findings suggest that investing in professional development for Head Start teachers and supporting other quality improvement initiatives that include Head Start classrooms are critically important for supporting low-income children's school readiness and ongoing development.

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