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Profiles of foundational learning skills among first graders☆

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ABSTRACT

School readiness includes a constellation of skills and behaviors, such as social and emotional development, language and literacy, and self-regulation that provide a basis critical for classroom participation and learning. Whereas it has been well-established that students who enter kindergarten with weaknesses in language and literacy are more likely to struggle academically, less research has focused on the variability and educational impact of other foundational learning components, including internalizing and externalizing behaviors, particularly in first grade. This study used latent profile analysis to identify the following four subgroups (profiles) of students, using foundational learning components, in a sample of first graders ($n = 324$): Emergent Hyperactive, Externalizing, Generally Good Students, and Internalizing. Latent class growth analysis illustrated significant differences in the average rate of growth in literacy skills from the beginning to the end of first grade across the four profiles, after controlling for gender and socioeconomic status. Findings indicated the greatest growth in literacy skills for students in the Externalizing profile and the least amount of vocabulary growth for students in the Emergent Hyperactive profile followed by the Internalizing profile. Educational implications of how researchers and educators might consider students' individual differences across profiles of foundational learning components to inform ways to support development and learning in the classroom are discussed.

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1. Introduction

The term "school readiness" represents an inclusive constellation of learning readiness skills, attitudes, and behaviors associated with academic success at kindergarten entry and includes students' social and adaptive behaviors (e.g., internalizing and externalizing), language skills, self-regulation, and emergent literacy skills among others (Adams & Snowling, 2001; Arnold, Kupersmidt, Voegler-Lee, & Marshall, 2012; Bodrova & Leong, 2006; Maughan & Carroll, 2006; McClelland et al., 2007). Developmental models suggest that school readiness supports growth and expansion of academic, cognitive, and social and emotional development, providing a basis critical for classroom participation and learning (Breslau et al., 2009; Cabell, Justice, Logan, & Konold, 2013; Caspi, Moffitt, Newman, & Silva, 1996; Duncan et al., 2007). However, much less research has focused on the impact of school readiness after kindergarten—whether constellations of learning skills, attitudes, and behaviors continue to develop and shape academic success during elementary school. School readiness may serve as a precursor to skill acquisition and provide a foundation for classroom participation and learning beyond early childhood. For example, the ability to listen to directions, ask and answer questions, follow classroom routines, effectively regulate emotions, sit quietly when expected, and complete tasks are foundational components of learning that should facilitate educational success within early childhood and elementary school settings (Connor, Ponitz, Phillips, Travis, & Morrison, 2010; Guo, Connor, Tompkins, & Morrison, 2011; Laurent & Rubin, 2004; Rimm-Kaufman, Curby, Grimm, Nathanson, & Brock, 2009). This study extends current research on school readiness into first grade by investigating whether children's patterns of social and emotional development, language skills, and self-regulatory behaviors, cluster into distinct profiles or subgroups. We also examine whether these patterns predict growth through the critical first grade year when students are

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first exposed to extended periods of formal academic instruction (Spira, Bracken, & Fischel, 2005) and are generally gaining academic skills, particularly literacy skills. Whereas typical conceptualizations of school readiness address children's initial school experiences, the foundational components underpinning school readiness are relevant to children's adaptation and achievement in school beyond preschool and kindergarten. Identifying patterns at first grade may provide an important way for educators and researchers to conceptualize and support unique learners in elementary school settings as well as help teachers better individualize their instruction and more precisely identify effective instructional strategies to support students' development and learning.

1.1. Theoretical framework

Dynamic systems theories (Sameroff, 2009; Yoshikawa & Hsueh, 2001) provide a theoretical framework to illustrate the complexity involved in classroom learning and development. This framework posits that learning is a dynamic and transactional process involving multiple sources of influence that work together to shape child development over time, with a core emphasis on the interplay between the child and his or her environment (Sameroff, 2009). The individual skills, behaviors, and developmental characteristics that students bring with them into the classroom, such as their social and emotional development, language skills, and ability to regulate their attention and behavior will influence and be influenced by the classroom learning environment to impact learning and development. In the present study, we consider school readiness as an important source of influence that students bring into the first grade learning environment. For example, many factors may continue to contribute to school readiness in first grade, such as genes and temperament, previous classroom experiences, and exposure to academic materials. We propose that students entering first grade will present distinct constellations of skills, abilities, and behaviors which will influence classroom learning and differentially shape their trajectories of reading acquisition. Thus, recognizing distinct patterns of school readiness-related characteristics in elementary settings may provide an opportunity for researchers and educators to identify profiles of strengths and weaknesses that may hinder or support literacy learning in first grade.

1.2. Foundational learning components

Given first grade students' previous exposure to schooling, we label the focal construct of this study "foundational learning components" rather than "school readiness." Both represent the critical basis or foundation of skills and behaviors needed for successful learning in sequential early school grades. Comparable to school readiness, we define foundational learning components broadly to represent a constellation of skills, attitudes, and behaviors that are associated with initial and continuing academic success. For the current study, we consider students' social and emotional development, language, and self-regulation. Notably, although students' social and emotional development, language, and self-regulation have been evaluated in elementary settings, little research has investigated the collective constellation of these foundational learning components in first grade. Here we define each of the foundational learning components included in this study as well as illustrate their importance in educational settings.

1.2.1. Social and emotional development

Social and emotional development includes the social behaviors needed to successfully establish and maintain relationships with teachers and peers (Hair, Halle, Terry-Humen, Lavelle, & Calkins, 2006; Montroy, Bowles, Skibbe, & Foster, 2014) as well as adaptive behaviors to effectively manage emotions and behavior in a prosocial manner and/or cope with challenging situations (Halle, Hair, Wandner, & Chien, 2012; Hill, Degnan, Calkins, & Keane, 2006; Montroy et al., 2014; Pentimonti, Justice, & Kaderavek, 2014; Rosen et al., 2014; Ukoumunne et al., 2012). A strong foundation of social and emotional

development is integral to navigating the classroom environment (Caspi et al., 1996; Kasari & Smith, 2013; Malecki & Elliott, 2002; Wesley & Buysse, 2003). Studies have documented that social and emotional development is associated with academic achievement (Arnold et al., 2012; Barriga et al., 2002) and positive relationships with peers (Rabiner et al., 2000; Rosen et al., 2014) and teachers (Henricsson & Rydell, 2004; Howes, 2000; Murray & Murray, 2004). Furthermore, social and emotional development in early childhood appears to lay the foundation for later educational success (Hair et al., 2006; Halle et al., 2012) and has been associated with successful transitioning into formal school settings, classroom participation, independence, and fewer observed problematic behaviors (Arnold et al., 2012; Merritt, Wanless, Rimm-Kaufman, & Peugh, 2012; Ziv, 2013). For example, students who are able to interact cooperatively and collaboratively with peers, initiate actions and interactions with others, and appropriately manage their emotions and classroom behavior are more likely to show academic gains (Montroy et al., 2014).

In contrast, students who enter school with social and emotional weaknesses are more likely to exhibit conduct problems, poor social outcomes, school failure, and even school dropout (Breslau et al., 2009; Duncan et al., 2007; Ladd & Dinella, 2009; Merritt et al., 2012; Rabiner et al., 2000). Students who fail to follow rules, fight with others, exhibit defiant behaviors or who are overactive and impulsive have been shown to be less liked by their peers (Rosen et al., 2014) and are at-risk for peer rejection. Additionally, the presence of externalizing or hyperactive behaviors in the classroom (e.g., disobeying rules, being physically aggressive) have been shown to disrupt the smooth operation of the classroom learning environment (Skibbe, Phillips, Day, Brophy-Herb, & Connor, 2012). Similarly, students who exhibit internalizing behaviors (e.g., withdrawing, making self-degrading statements) in the classroom tend to disengage from activities, are more likely to be rejected by their peers, and are less likely to seek out social or learning opportunities (Buhs & Ladd, 2001; Keiley, Bates, Dodge, & Pettit, 2000). All of these behaviors may have a deleterious effect on academic achievement.

However, the relation between the presence of problematic behaviors and later academic achievement is undoubtedly complex. Externalizing, internalizing, and hyperactive behaviors have consistently been associated with poor social outcomes, yet they have not consistently been linked with academic achievement difficulties. Longitudinal research has documented a negative association between the presence of problematic classroom behavior in young children and later academic achievement, showing that students who display more problematic behavior at a young age are at a higher risk for negative outcomes in their later schooling (Barriga et al., 2002; Breslau et al., 2009; Caspi et al., 1996). However; in a study by Rabiner et al. (2000), teacher-rated internalizing, externalizing, and hyperactive behaviors via the Teacher Rating Form (TRF; Achenbach & Rescorla, 2001) were not predictive of reading achievement within a sample of first graders. Duncan et al. (2007) documented similar findings in their sample of kindergarten–third grade students using the TRF, as did Malecki and Elliott (2002) in their sample of fourth and fifth grade students using the Social Skills Rating System (SSRS; Gresham & Elliott, 1990). These findings may reflect a higher prevalence of problematic behaviors within younger samples. Thus attempting to predict which children will maintain problematic levels of externalizing behaviors yields mixed findings. It may be that other factors mediate the relation between problematic behavior and later achievement. For example, students with more disruptive behaviors are likely to spend more time in restrictive educational environments in later grades (Hosp & Reschly, 2003), which may mediate the link between early behavioral difficulties and later academic achievement.

1.2.2. Language skills

The relation between language and literacy has been well-documented. Early language development has been shown to support

students' developing literacy skills (National Reading Panel Report, 2000; Griffin, Burns, & Snow, 1998), and studies have illustrated that a strong semantic background provides the platform needed for a student to acquire and advance in reading (Cain, Oakhill, & Bryant, 2004; Catts & Weismer, 2006; Compton, Fuchs, Fuchs, Elleman, & Gilbert, 2008; Dickinson, Golinkoff, & Hirsh-Pasek, 2010; Lonigan, 2006; Nation & Snowling, 2004). Students with weaker language skills generally have more difficulty attaining proficient literacy skills (Catts & Kamhi, 2004; Compton et al., 2008; Connor et al., 2016; Cutting & Scarborough, 2006). Moreover, students with stronger language skills are typically better able to socially interact with their peers (Mashburn, Justice, Downer, & Pianta, 2009), and are more likely to engage in classroom activities and discussions (Rotheram-Fuller, Kasari, Chamberlain, & Locke, 2010), which in turn supports academic achievement (Murphy, Wilkinson, Soter, Hennessey, & Alexander, 2009). In contrast, there is evidence that students with weaker language and vocabulary are less able to learn from peer-mediated activities (Connor et al., 2012).

1.2.3. Self-regulation

Self-regulation, defined as the aptitude and behaviors required to accomplish a goal, persist through difficulty, attend to relevant instruction, inhibit inappropriate actions, and appropriately manage time and classroom materials (Sektnan, McClelland, Acock, & Morrison, 2010), is a developmental process and an underlying core component supporting learning in the early elementary years (Laurent & Rubin, 2004; Prizant, Wetherby, Rubin, Laurent, & Rydell, 2006). This construct also includes working memory, task inhibition, and attention (Blair, 2010; Connor et al., 2016; Day, Connor, & McClelland, 2015). The association among self-regulation, positive social and emotional development, and academic outcomes has been well-documented. Indeed, studies have shown that students with stronger self-regulation, skills are better able to participate in learning opportunities, generally show greater gains in reading outcomes, are more organized, and are able to establish stronger peer relationships (Connor et al., 2010; Guo et al., 2011; Ponitz, McClelland, Matthews, & Morrison, 2009). Students who exhibit limited self-regulatory skills are less prepared for learning and are at-risk for school failure and peer rejection (Connor et al., 2010; McClelland, Acock, & Morrison, 2006; Ponitz et al., 2009).

1.3. Latent profiles of foundational learning components

Latent Profile Analysis (LPA) is a statistical method for identifying subgroups or profiles of individuals that share characteristics (Jung & Wickrama, 2008; Laursen & Hoff, 2006). Because of the variability of skills, behaviors, and developmental characteristics typically observed in young children, recent studies have begun to utilize LPA in early childhood samples to identify patterns of student characteristics (Cabell et al., 2013; Halle et al., 2012; Hill et al., 2006; Justice et al., 2013; Pentimonti et al., 2014). In a recent study, Pentimonti et al. (2014) reported that four learning profiles emerged from a sample of preschool students in special education settings (socially ready, absolutely average, limited readiness, and socially awkward), with strengths and weaknesses in academic skills as well as social and emotional development differentially predicting profile membership. Comparable to the current study, Pentimonti and colleagues conceptualized school readiness across three primary areas; academic skills, social-emotional skills, and behavior and used the SSRS as one of their primary measures to assess social-emotional skills and behavior.

In a study by Hair et al. (2006), the authors used a broad range of measures, including the SSRS, and documented four readiness profiles within a sample of 4-year-olds entering kindergarten based on physical health, social and emotional development, language and literacy, and cognitive skills (Hair et al., 2006). Interestingly, this study also found that profile membership was predictive of academic and social adjustment, illustrating that students who exhibited "at-risk" social and emotional development prior to entering kindergarten struggled socially

and academically in elementary school settings. In the current study, we extend this work to first graders by using the well-regarded SSRS to better understand how social and emotional development might cluster in elementary students. We further extend work on profiles to include a direct measure of self-regulation. Typically this construct is measured through parent and teacher report.

1.4. Literacy skills

During first grade, students are establishing the academic language and literacy skills that will support their later academic success (Connor et al., 2013; Spira et al., 2005). Unfortunately, too many students fail to fully develop proficient critical literacy skills. According to the most recent National Assessment of Educational Progress (NAEP, 2015) report, only 36% of students perform at or above a proficient level of reading by fourth grade. As previously discussed, the foundational learning skills examined in this study are significantly associated with developing literacy skills. In this study, we examine students' gains in two critical skills, letter-word decoding and picture vocabulary (vocabulary)—both are strongly associated with later school achievement (NICHD, 2000; Verhoeven, van Leeuwe, & Vermeer, 2011). Identified as foundational by the Common Core State Standards (Common Core State Standards Initiative, 2010), the ability to decode text helps provide the platform for proficient reading comprehension and learning (Willson & Rupley, 1997). In much the same way, students' vocabulary in combination with their letter-word decoding skills, predict reading comprehension (Storch & Whitehurst, 2002). Indeed, recent theories of reading for understanding suggest interacting and reciprocal effects of vocabulary and reading comprehension (Connor et al., 2016). Hence, in this study, we use both letter-word decoding and vocabulary to examine whether identified profiles are useful in explaining differences in first graders' literacy gains.

1.5. Research aims

This study has two primary research aims; 1) to evaluate whether distinct profiles of foundational learning components, including social and emotional development, language, and self-regulation can be identified within a sample of first grade students, and 2) to investigate whether specific patterns of foundational learning components differentially predict students' literacy achievement across first grade. Much more attention has been given to younger students in regard to school readiness; however at the beginning of first grade students are likely continuing to acquire and develop the foundational skills, abilities, and behaviors needed for educational success. Without a foundation for learning, academic outcomes may be jeopardized. We hypothesized that foundational learning components would form constellations (distinct profiles or subgroups) that vary systematically among first graders. We further anticipated that these different constellations (i.e., profiles) would help explain individual differences in literacy achievement among first graders during this critical time in their development.

2. Methods

2.1. Participants

The current study included 324 first grade students and their teachers ($n = 28$) in five schools in Northern Florida. Participants were recruited for a longitudinal study (2008–2011) on individualizing student instruction in early elementary classrooms. Students who participated in the longitudinal study were recruited in first grade and followed, along with any new classmates, through third grade. All students were invited to participate and parental consent was obtained for approximately 88% of the students in first grade. Students included in the current study participated in the longitudinal project from first through third grade. However, only information from their first grade

year was used in the current study in order to evaluate differences in foundational learning components during this critical developmental period—early middle childhood (Del Giudice, 2014; Speece et al., 2010).

Of the participating first graders, 44% were male. The students ranged between 5:10 to 7:8 years-of-age. In regard to racial and ethnic background, 84% of the sample identified as Non-Hispanic White, 3% Hispanic White, 6% Black, 2% Asian, and 5% Multiracial. Students attended schools that served diverse student bodies, and approximately 36% of the students in the sample applied for free and reduced price lunch (FARL), a proxy for socioeconomic status; 4% of the sample did not indicate whether they qualified or not for FARL. Furthermore, the sample exhibited variability in regard to their developmental abilities. Fourteen percent of the students had an Individualized Educational Plan (IEP), with 10% speech, 2% language, 1% learning disability (LD), and 1% autism spectrum disorder (ASD) listed as their primary disability. Seven percent were eligible for Exceptional Student Education (ESE) services for reading and/or reading and writing and 3% for gifted and talented.

2.2. Measures

Students were assessed on a battery of measures in the fall, winter, and spring of the school year with a more limited battery in the winter. Assessments were conducted in a quiet area of the students' school by trained research assistants. For each student, the teacher completed the *Social Skills Rating System* (SRSS; Gresham & Elliott, 1990) in the winter of the school year.

2.2.1. Measures used in latent profile analyses

2.2.1.1. Social Skills Rating System (SSRS; Gresham & Elliott, 1990). We define social and emotional development using two well-represented scales from the SSRS; the Social Skills scale and the Problem Behavior scale. The SSRS is a 57-item comprehensive scale completed by classroom teachers. The Social Skills scale measures students' social behaviors across three dimensions; cooperation, assertion, and self-control. Cooperation refers to a students' ability to interact collaboratively with others in the interest of achieving a common goal and includes behaviors such as compromising, accepting others' ideas, and getting along with others. Assertion refers to a set of skills that allow students to initiate actions and interactions with others and includes behaviors, such as introducing oneself and initiating conversations. Self-control refers to a set of skills that enable students to manage their time and effectively utilize classroom materials and includes behaviors, such as using free time appropriately and finishing class assignments. The Problem Behavior scale measures the presence of externalizing behaviors, such bullying, arguing or fighting with others, internalizing behaviors (i.e., likes to be alone, showing anxiety, easily embarrassed), and hyperactive behaviors (i.e., impulsive, fidgety, interrupts conversations). Teachers rate the frequency (never, sometimes, very often) of their students' observable classroom behavior across each of the dimensions on both scales, with higher scores indicating better social behavior on the Social Skills scale and the presence of more externalizing, internalizing, and/or hyperactive behaviors on the Problem Behavior scale. The SSRS is a widely used tool and has overall good reported reliability, with coefficients ranging between 0.80 and 0.90. Total scores from the dimensions were used in the models. Scores were z-scored to help with interpretation on tables and figures (Ukoumunne et al., 2012; Wolff, 2010). In addition, standard scores for the Social Skills and Problem Behavior scales are reported to help characterize the sample.

2.2.1.2. Diagnostic Evaluation of English Variation–Screening Test (DELV-S; Seymour, Roeper, & De Villiers, 2003). We define students' language skills using two constructs from the DELV-S; level of dialectical difference and level of diagnostic risk. The DELV-S was developed to identify students with significant language delays or disorders without misidentifying those who speak dialects that differ from Mainstream American English

(MAE). The DELV-S is an individually administered screening tool that evaluates students' language across four domains; syntax, pragmatics, semantics, and phonology. The four domains are divided into two parts, with Part I measuring dialectical differences and Part II measuring diagnostic risk. The DELV-S yields two scores, which were used in analyses, Language Variation Status for Part I, and Diagnostic Risk Status for Part II, with higher scores indicating stronger variation from MAE and higher risk for language delays or disorders, respectively. The DELV-S has adequate reported reliability of 0.80 for Parts I and II (Seymour et al., 2003).

2.2.1.3. Head-Toes-Knees-Shoulders (HTKS, Ponitz et al., 2008). The HTKS is a 20-item individually administered tool designed to assess students' self-regulation and to tap the coordination of attention, working memory, and task inhibition. The HTKS requires students to remember four paired behavioral rules ("touch your toes," "touch your head," "touch your shoulders," and "touch your knees") and perform the opposite motor response of the verbal direction. Students must be able to attend to directions, listen and remember multiple rules, and control their behavior to perform the gross motor actions opposite of what they hear. For example, if the direction is, "touch your toes," the correct response is for the student to touch his or her head. Students were given a 0 for an incorrect response, a 1 if they were able to self-correct, or a 2 if they responded correctly. Total scores on the HTKS ranging from 0 to 40 were used in the analyses, with scores approaching 40 indicating higher levels of self-regulation. The HTKS has been frequently used across studies (Gunzenhauser & McClelland, 2014; McClelland et al., 2007; Wanless et al., 2011) and has been found to be significantly related to teacher ratings of classroom behavior in first grade, with coefficients ranging from 0.23 to 0.28 after controlling for vocabulary (Connor et al., 2010).

2.2.2. Outcome measures

2.2.2.1. The Woodcock-Johnson III Tests of Achievement (WJ-III; Mather & Woodcock, 2001). The WJ-III is an individually administered standardized measure of student academic achievement. For the current study, the WJ-III was used to assess literacy skills across two domains; the Letter-Word Identification (LW) subtest was used to measure letter-word decoding and the Picture Vocabulary (PV) subtest to measure vocabulary. It is important to note that we did not use the Passage Comprehension (PC) subtest for the current study because of the high correlation observed between LW and PC, ($r = 0.78$). We chose the LW subtest since students at the beginning of first grade are typically still learning how to decode text (Chall, 1996). The WJ-III was standardized on a national sample and has good reported reliability on both scales, with reported reliability coefficients ranging from 0.80 to 0.89 and reported alpha coefficients between 0.88 and 0.94. Analyses in the current study were conducted using Rasch-based W scores (mean [M] = 500, standard deviation [SD] = 15), with a W score of 500 representing an average score for a 10-year-old student. W scores have been documented as the best scores for assessing change in achievement because they provide a common scale to measure student growth (Hughes, Im, & Wehrly, 2014).

2.3. Analytical methods

2.3.1. Latent profile analysis

Initial analyses used Latent Profile Analysis (LPA) to explore whether students exhibited profiles of foundational learning components. The following fit statistics were observed to evaluate model fit, with lower values indicating better fit (Hoyle, 2012; Kline, 2011): Akaike Information Criterion (AIC), Bayesian Information Criterion (BIC), and Sample Size Adjusted Bayesian Information Criterion (SSABIC). In addition, the entropy was evaluated to determine whether the profiles were distinct from one another, with values close to one indicating distinct or clear

classification (Hoyle, 2012; Jung & Wickrama, 2008). The probability of profile membership was also evaluated, with higher values indicating better probability for belonging to a specific profile.

2.3.2. Latent class growth analysis

After identifying distinct profiles within the sample of first graders, the final analyses used latent class growth analysis (LCGA), a type of mixture modeling used to capture the heterogeneity of growth trajectories within the larger population (Jung & Wickrama, 2008). LCGA allows for different profiles of individual growth to vary around different means, resulting in separate growth models for each latent profile. Thus, LCGA provides information on the average growth trajectory (slope [β] and intercept) seen across different profiles (Muthen & Muthen, 2012). For this study, LCGA was used to investigate students' growth in literacy skills across the profiles.

Chi-square difference testing, with the use of slope equality constraints, was used to identify whether growth trajectories among latent profiles were significantly different (Muthen & Muthen, 2012). Analyses utilizing LCGA were conducted controlling for the influence of gender and SES because studies have documented an increase in teacher-rated externalizing and internalizing behaviors for students from lower SES homes (Keiley et al., 2000; Piotrowska, Stride, Croft, & Rowe, 2015) as well as higher levels of externalizing behaviors, such as aggression and competiveness in boys than in girls (Hill et al., 2006; Keiley et al., 2000; Stanger & Lewis, 1993). Analyses were conducted using Mplus software (Muthen & Muthen, 2012).

The LCGA equation used was;

$$CLASSES = c(4);$$
$$\%Overall\%$$
$$i \ s|Outcome@0 \ Outcome@1 \ Outcome@2;$$
$$c \ ON \ SES \ gender;$$

where the CLASSES option specifies the number of latent profiles in the model (4 profiles). The label %Overall% describes the part of the model that is in common for all latent profiles. The | symbol defines the intercept and slope growth factors, and i and s are the names of the intercept and slope growth factors, respectively. The right-hand side of the | symbol indicates the outcome variable and the time scores for the growth model, which are fixed at 0, 1, and 2 to define a linear growth model. The zero time score at time point one defines the intercept at the initial time point (Muthen & Muthen, 2012). In this study, the outcome measures included students' letter-word decoding and vocabulary scores from the WJ-III. Finally, SES and gender are covariates in the model.

3. Results

Students showed substantial variability in their social and emotional abilities in the classroom measured via the SSRS, with a mean of 103.62 ($SD = 16.17$) on the Social Skills scale and 99.82 ($SD = 13.84$) on the Problem Behavior scale. With regard to language, 21% of the students were identified as "at high risk" for having a language delay or disorder and 5% showed strong variation from MAE (measured via the DELV-S), indicating that they were using either African American English or Southern Vernacular English (Oetting & McDonald, 2002; Terry, Connor, Thomas-Tate, & Love, 2010). Finally, the first graders showed generally good self-regulation ($M = 37.48$, $SD = 2.79$), as measured via the HTKS task.

3.1. Profiles of foundational learning components

Profiles were examined based on student performance measures collected in the fall and teacher-report measures collected in the winter of the school year. To evaluate whether distinct profiles could be extracted from the total sample of first graders, LPA was used to compare models with two, three, four, and five identified profiles. See Table 1 for

model fit statistics for each model and reports of membership probability. Findings indicated that four latent profiles best described the first graders' constellation of foundational learning components (AIC = 14,168.10, BIC = 14,349.57, SSABIC = 14,197.32, Entropy = 0.92), showing excellent overall model fit, the best fit in comparison with models of two or three profiles, and strong overall membership probability. In addition, the proportion of students within each of the four latent profiles was above 0.01 or 1% (range = 0.06–0.55), meeting the criteria for good overall model fit (Jung & Wickrama, 2008). The five-profile model did show the highest entropy; however, one of the five profiles exhibited a very small sample of students (≤0.01), which may have jeopardized data analysis and interpretation.

3.2. Profile descriptives

Below is a brief description of the students that comprised each of the four latent profiles: Emergent Hyperactive, Externalizing, Generally Good Students (GGS), and Internalizing. Despite marked differences in gender and SES, all but one profile (Externalizing), exhibited some variability in IEP status and ESE eligibility. See Fig. 1 for the latent profiles of foundational leaning components and Table 2 for student demographic information by profile. Table 3 includes mean literacy scores recorded at the beginning of the school year.

3.2.1. Emergent Hyperactive and Externalizing (Emergent Hyperactive, n = 88)

Students in the Emergent Hyperactive profile exhibited some indication of social and emotional risk compared to the other profiles (Fig. 1). That is, the students' exhibited some hyperactive and externalizing behavior, yet the frequency or intensity of their hyperactive behavior (approaching 1 SD above the mean) and externalizing behavior (0.5 above the mean) on average did not exceed the threshold for clinical deficit (>1 SD). In addition, students' cooperative and self-control social behaviors were close to 1 SD below test norms. Levels of assertiveness, internalizing, language, and self-regulation fell within the typical range. The Emergent Hyperactive profile was the second largest profile, consisting of 27% of the sample. There were an equal number of males (50%) and females (50%), 13% of the students had an IEP, and 33% qualified for FARL, an indicator of family poverty. Students' exhibited a mean W score of 420.29 ($SD = 26.52$) in letter-word decoding and 483.95 ($SD = 9.78$) in vocabulary at the beginning of the school year.

3.2.2. Externalizing and hyperactive (Externalizing, n = 20)

Students in the Externalizing profile consisted of only 6% of the sample and exhibited the greatest weaknesses in social and emotional development, with students exhibiting a high frequency and/or intensity of externalizing behaviors. Foundational learning components for students' in the Externalizing profile were characterized by a higher frequency of externalizing (almost 3 SD above the mean) and hyperactive behaviors (approaching 2 SD above the mean) than internalizing behaviors (1 SD above the mean) as well as generally below typical teacher-rated social behaviors, with the greatest weaknesses in self-control (over 2 SD below the mean) followed by cooperative behaviors (1.5 SD below the mean) and assertive behaviors (1 SD below the mean). Language and self-regulation appeared to be within the typical range represented by the total sample. The Externalizing profile was primarily male (80%) and was the only subgroup that did not include students with IEPs. Fifty percent of the subgroup qualified for FARL. Students' showed a mean letter-word decoding score of 417.85 ($SD = 16.03$) and vocabulary score of 484.90 ($SD = 9.70$) at the beginning of the school year.

3.2.3. Generally Good Students (GGS, n = 174)

At 55% of the sample, the GGS profile was the largest profile. Students' in the GGS profile were characterized by slightly above typical social behaviors across all three dimensions (about 0.5 SD above the

Table 1
Model fit statistics of the four tested models and latent profile probabilities.

Model	AIC	BIC	SSABIC	Entropy
2 profiles	14556.83	14662.69	14573.88	0.90
3 profiles	14290.35	14434.02	14313.48	0.92
4 profiles	14168.10	14349.57	14197.32	0.92
5 profiles	14043.66	14262.94	14078.97	0.93
Profiles	Emergent Hyp.	Externalizing	GGS	Internalizing
Emergent Hyp.	0.937	0.007	0.043	0.018
Externalizing	0.032	0.961	0.013	0.006
GGS	0.021	0.000	0.969	0.008
Internalizing	0.044	0.000	0.041	0.930

Notes. The following fit indices were used to determine model fit—lower values indicate better fit. Akaike Information Criterion (AIC), Bayesian Information Criterion (BIC), Sample Size Adjusted Bayesian Information Criterion (SSABIC). Entropy values close to 1.00 indicate distinct or clear classification. Values represent the probability of profile membership for the model of 4 profiles, with higher values indicating better probability for belonging to a specific profile.

mean) and were well-behaved overall; they did not exhibit externalizing, internalizing, or hyperactive behaviors in the classroom. Language and self-regulation appeared to be within the typical range. The GGS profile was 67% female, 10% of the students had IEPs, and 30% qualified for FARL. Students' exhibited a mean of 427.84 ($SD = 28.04$) for beginning of the school year letter-word decoding and 483.11 ($SD = 8.66$) for vocabulary.

3.2.4. Internalizing with weak language and self-regulation (Internalizing, n = 37)

The Internalizing profile consisted of 11% of the sample and was the subgroup of greatest concern. In this profile, students generally exhibited weaknesses in social and emotional behaviors, language, and self-regulation. Specifically, students' were characterized by increased internalizing behaviors (1.5 SD above the sample mean), below typical classroom assertiveness (1.5 SD below the mean), at-risk language abilities (1 SD above the mean), and weak self-regulation (1 SD below the mean). Cooperative social behaviors also appeared to be weak (0.5 SD below the mean). Over half of the students were male (59%), 11% had IEPs, and 60% were eligible for FARL. Students' exhibited a mean of 407.22 ($SD = 18.73$) for beginning of the school year letter-word decoding and 474.67 ($SD = 9.52$) for vocabulary.

3.3. Latent class growth analysis

LCGA was used to examine growth in literacy skills from the beginning to the end of first grade for each of the four latent profiles, after controlling for gender and SES. Students' in each profile showed significant growth on average in letter-word decoding and vocabulary across the school year ($p < 0.01$–0.001). It is important to note that there were no significant within group differences documented among individual growth rates for letter-word decoding across the school year (students assigned to the same profile grew at the same rate), yet significant variability among individual growth rates in vocabulary were observed in the Emergent Hyperactive ($p < 0.01$), GGS ($p < 0.05$), and Internalizing profiles ($p < 0.05$).

Overall, our hypothesis that the different profiles would be associated with different patterns of literacy skill gains from the beginning to the end of first grade was supported. Findings indicated differential growth based on profile membership. Significant differences in the rate of change in letter-word decoding were observed among all of the profiles excluding the comparison in growth between the Emergent Hyperactive and Internalizing profiles. Significant differences in the rate of change in vocabulary growth were also observed among all of the profiles excluding the comparison in growth between the Externalizing and GGS profiles. See Tables 3 and 4 as well as Figs. 2 and 3 for information on literacy growth models.

Students in the Emergent Hyperactive profile exhibited significantly less growth in vocabulary ($\beta = 1.57$) in comparison to each of the other

profiles. In contrast, students in the Externalizing profile showed significantly greater growth in letter-word decoding ($\beta = 21.45$) than students in the other profiles, and their vocabulary growth ($\beta = 3.97$) was similar to that of the GGS profile ($\beta = 3.21$) yet significantly greater than that of each of the other profiles. Finally, students in the Internalizing profile demonstrated generally lower initial letter-word decoding skills 407.22 ($SD = 18.73$) and vocabulary 474.67 ($SD = 9.52$) than the other profiles as well as significantly weaker vocabulary growth ($\beta = 2.62$) compared to their peers in the Emergent Hyperactive and Externalizing.

4. Discussion

Overall, the results of this study support our hypotheses that (1) students would present distinct profiles of foundational learning components at the beginning of first grade and that (2) patterns of foundational learning components would differentially predict literacy achievement. Indeed, we found that foundational learning components, including social and emotional development, language, and self-regulation cluster differently among students, representing distinctive and potentially important constellations of skills and behaviors. We found that the first graders in our sample were best represented by four distinct profiles, which we characterized as; (1) Emergent Hyperactive, (2) Externalizing, (3) Generally Good Students (GGS), and (4) Internalizing—each profile painting a different picture for first graders in the classroom learning environment, as we discuss more fully below.

Supporting our second hypothesis, we found that the four profiles differentially predict students' developing literacy competencies, providing some insight that distinct patterns of social emotional development, language, and self-regulation are associated with differential literacy growth in first grade. Although students in each profile made significant growth in letter-word decoding and vocabulary over the school year, they exhibited differences in their literacy development based on their profile membership (see Fig. 3). For example, students in the Internalizing profile, with relatively higher internalizing behaviors, limited assertive and self-regulation skills, and a higher risk for having a language disorder, showed less vocabulary growth across the school year than did students with Externalizing and GGS profiles. Whereas students in the Externalizing profile, characterized by relatively frequent externalizing and hyperactive behaviors and limited social behaviors, exhibited the most growth in letter-word decoding as well as more growth in vocabulary than the Emergent Hyperactive and Internalizing profiles. These findings suggest that there may be specific patterns of foundational learning components that are detrimental or adaptive for literacy achievement in early elementary grades. However, it is important to note that we are not indicating that one component may be driving literacy outcomes, rather this study describes patterns of behavior as they are presented across each profile.
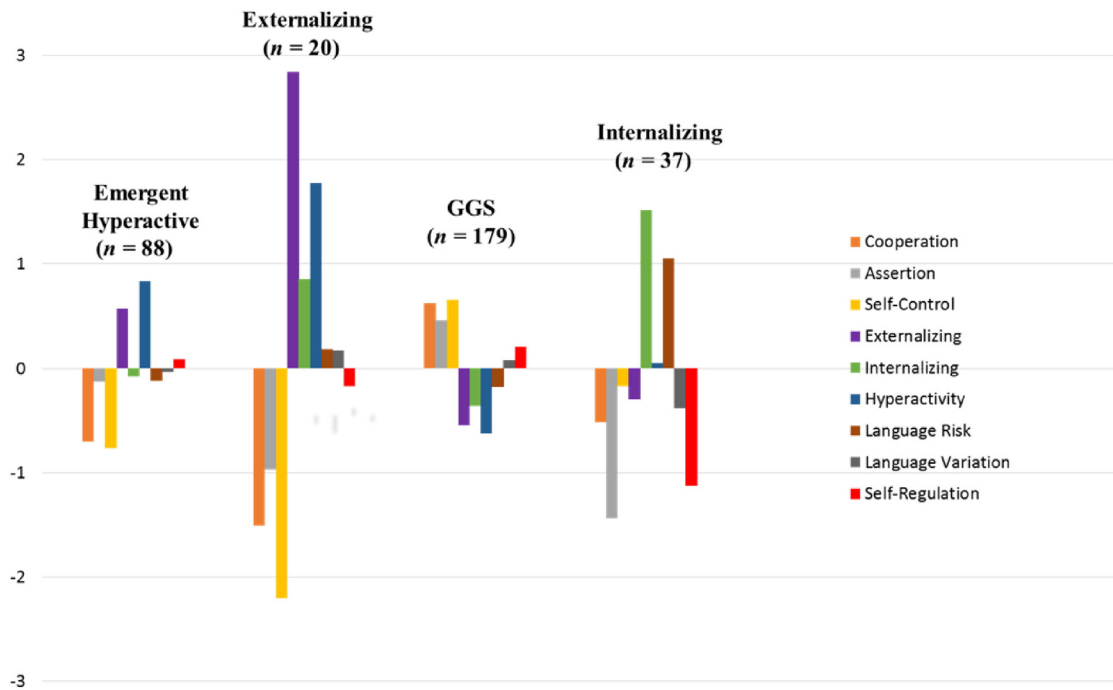
Fig. 1. Latent Profile Analysis of Foundational Learning Components. Values have been z-scored to help with interpretation of findings. Cooperation, Assertion, and Self-Control comprise the Social Skills scale on the SSRS, with higher scores indicating better social skills. Externalizing, Internalizing, and Hyperactivity comprise the Problem Behavior scale on the SSRS, with higher scores indicating the presence of more behavior. Language Risk and Language Variation scores derived from Parts I and II on the DELV-S, with higher scores indicating higher risk for language delays or disorders and stronger variation from MAE respectively. Self-Regulation measured via the HTKS, with higher scores indicating better self-regulation. Emergent Hyperactive (27% of the sample); Externalizing (6% of the sample); Generally Good Students (GGS; 55% of the sample); Internalizing (11% of the sample).

Using the dynamic system theory framework, which emphasizes the interplay among skills as well as between children and their various contexts, this study presents an impetus to further examine interrelations between academic and social emotional development across early elementary school. For example, and as we discuss more fully below, there are likely multiple ways that the limited self-assertion and language abilities demonstrated by children in the Internalizing profile might impact learning in the classroom. For example, the children might not ask questions when they do not understand a lesson, they may not interact and learn from their peers (Connor et al., 2012),

and they might daydream during important learning opportunities (Ostrander, Herman, Sikorski, Mascendaro, & Lambert, 2008). Missing social learning opportunities might, in turn, lead to the weaker vocabulary development that characterized children in this profile. And again, limited vocabulary would directly interfere with social interactions and with reading comprehension (Storch & Whitehurst, 2002). Of course, more research to test these hypotheses is needed.

4.1. Profile membership and growth in literacy skills

4.1.1. Internalizing with weak language and self-regulation

Students' in the Internalizing profile exhibited internalizing behaviors, struggled in their ability to assert themselves, and showed weak language and self-regulation. Furthermore, they performed more poorly on letter-word decoding and vocabulary tasks than all of the other

Table 2
Student demographic information by profile.

Student Demographics	Emergent Hyp.	Externalizing	GGS	Internalizing
Number of students	88 (27%)	20 (6%)	179 (55%)	37 (11%)
Male	44 (50%)	16 (80%)	61 (34%)	22 (59%)
Female	44 (50%)	4 (20%)	118 (67%)	15 (40%)
IEP				
Eligibility	12 (13%)	0	11%	11%
Speech	8 (9%)	0	18 (10%)	6 (16%)
Language	3 (3%)	0	0	3 (8%)
LD	0	0	2 (1%)	1 (2%)
Gifted and talented	1 (1%)	0	0	0
ASD	0	0	0	1 (2%)
Other	0	0	1 (<1%)	0
ESE Status				0
Eligibility	2 (2%)	1 (5%)	3 (1.7%)	2 (5%)
Reading	0	0	0	2 (5%)
Reading and writing	1 (1%)	0	0	4 (10%)
Gifted/Talented	1 (1%)	0	0	0
FARL				
Eligibility	29 (33%)	10 (50%)	53 (30%)	22 (60%)
Missing	4 (4.5%)	1 (5%)	7 (4%)	2 (5.4%)

Notes. Race and ethnical background are reported for the whole sample. Values are reported as the total number and percentage across each of the four profiles. Individual Education Plan (IEP); Exceptional Student Education Eligibility (Eligibility); Learning Disabled (LD); Autism Spectrum Disorder (ASD); Free and reduced priced lunch (FARL); Generally Good Students (GGS).

Table 3
Descriptive Information and Latent Profile Growth Models of Literacy Skills.

Literacy skills by profile	n	M (fall)	SD	Intercept	β
Emergent Hyp.					
LW	86	420.29	26.52	427.60	19.48
PV	86	483.95	9.78	486.18	1.57
Externalizing					
LW	20	417.85	16.03	416.99	21.45
PV	20	484.90	9.70	482.27	3.97
GGS					
LW	176	427.84	28.04	437.51	18.55
PV	176	483.11	8.66	485.00	3.21
Internalizing					
LW	36	407.22	18.73	409.36	19.60
PV	36	474.67	9.52	479.76	2.62

Notes. Fall mean (M) and standard deviation (SD) of literacy skills. Letter-Word Decoding (LW) and Picture Vocabulary (PV) subtests from the WJ-III. Intercept and slopes (β) of latent profile growth models are reported after controlling for gender and SES. Free and reduced price lunch (FARL) information used as a proxy for socioeconomic status. Time scores for the growth models were fixed at 0, 1, and 2 to define a linear growth model. The intercept was calculated at the initial time point. Generally Good Students (GGS).

Table 4
Differences in Growth Trajectories of Literacy Skills among Latent Profiles.

	Emergent Hyp.	Externalizing	GGS
Decoding			
Externalizing	$\Delta X^2 = 37.27\ (2)^{***}$		
GGS	$\Delta X^2 = 24.52\ (2)^{***}$	$\Delta X^2 = 78.32\ (2)^{***}$	
Internalizing	$\Delta X^2 = 3.56\ (2)$	$\Delta X^2 = 50.24\ (2)^{***}$	$\Delta X^2 = 85.52(2)^{***}$
Vocabulary			
Externalizing	$\Delta X^2 = 14.43\ (2)^{***}$		
GGS	$\Delta X^2 = 14.81\ (2)^{***}$	$\Delta X^2 = 2.34\ (2)$	
Internalizing	$\Delta X^2 = 7.62\ (2)^{*}$	$\Delta X^2 = 10.6^{**}$	$\Delta X^2 = 16.44^{***}$

Notes. Chi-square difference testing was used to detect significant differences in literacy growth among the profiles by using slope equality constraints (Muthen & Muthen, 2012). Difference in chi-square (ΔX^2); Difference in degrees of freedom (Δdf).

* $p < .05$
** $p < .01$
*** $p < .001$.

profiles and showed less growth in vocabulary than students in the Externalizing and GGS profiles. The presence of internalizing behaviors has been associated with other psychopathologies including Depression and Anxiety (Ostrander et al., 2008; Solomon, Miller, Taylor, Hinshaw, & Carter, 2012) and has been linked with less classroom participation, which may negatively influence development and academic learning (Buhs & Ladd, 2001). Studies have found an association between internalizing behaviors and disengagement (Ostrander et al., 2008), such that students who tend to internalize also withdraw from classroom activities, putting them at greater risk for peer rejection (Keiley et al., 2000) and school failure. Limited assertiveness in the classroom (e.g., struggling to advocate for their needs, asking for help, standing up for themselves) may also hinder successful classroom participation and thus, academic achievement (Buhs & Ladd, 2001; Stone et al., 2013).

Weak language and self-regulation skills have also been associated with less peer interaction and classroom engagement (Connor et al., 2010; Mashburn et al., 2009) as well as more difficulty acquiring proficient literacy skills (Compton et al., 2008; Cutting & Scarborough, 2006), especially via peer-mediated activities (Connor et al., 2012). Thus, the language and self-regulation weaknesses observed in students in the Internalizing profile may also be impacting literacy growth over the school year. Overall, these findings suggest that specific patterns of foundational learning components may be a red flag for identifying students at-risk for poor academic or social outcomes. However, further research is needed to disentangle the predictive nature of the specific learning profiles with classroom participation and academic achievement

as well as to better understand how individual components interact with each other and with the learning environment to shape profile membership and/or learning over time.

4.1.2. Externalizing and hyperactive

Although a small proportion of the sample (6%), the students in the Externalizing profile may represent a group that is important to identify within the classroom context. In congruence with epidemiological studies and previous research that have consistently documented higher rates of externalizing behaviors in boys than girls (Keiley et al., 2000), the Externalizing profile was 80% male. Despite appropriate literacy skills, our findings suggested that the students in the Externalizing profile demonstrated notable weaknesses in social and emotional development—consistent with previous studies (i.e., Duncan et al., 2007; Malecki & Elliott, 2002). In addition, students exhibited relatively high levels of externalizing and hyperactive behaviors as well as limited social behaviors despite typical language skills and self-regulation. This is especially noteworthy given that the relation between social abilities and language skills has been well-documented in the research literature, with studies showing connections between students' language skills and their ability to socially interact and engage with their peers (Connor et al., 2012; Mashburn et al., 2009; Rotheram-Fuller et al., 2010). Studies have also documented the contribution of self-regulation to successful classroom social behaviors (Rimm-Kaufman et al., 2009).

The notable discrepancies in abilities observed in the Externalizing profile could be indicative of an atypical developmental or learning trajectory and thus warrants further investigation. For example, within the literature, aggressive, disruptive, or off-task behavior has been linked to lower levels of later academic achievement (i.e., Breslau et al., 2009) as well as greater time in more restrictive educational environments in later grades (Hosp & Reschly, 2003). Whereas the relations between the presence of specific behaviors and later academic achievement is complex with multiple causal pathways, the identification of a group of first grade students who present with well-developed academic and typical language skills yet relatively high levels of problematic behaviors may be indicative of a distinct etiology or developmental pathway of academic and/or social emotional issues.

Weak social abilities and the presence of externalizing behaviors in the classroom have also been linked to negative social outcomes, including poor relationship development with peers and teachers, peer rejection, and school dropout (Ladd & Dinella, 2009; Merritt et al., 2012; Rosen et al., 2014). Absent attention to the full constellation of skills and behaviors presented by members of this profile, given their
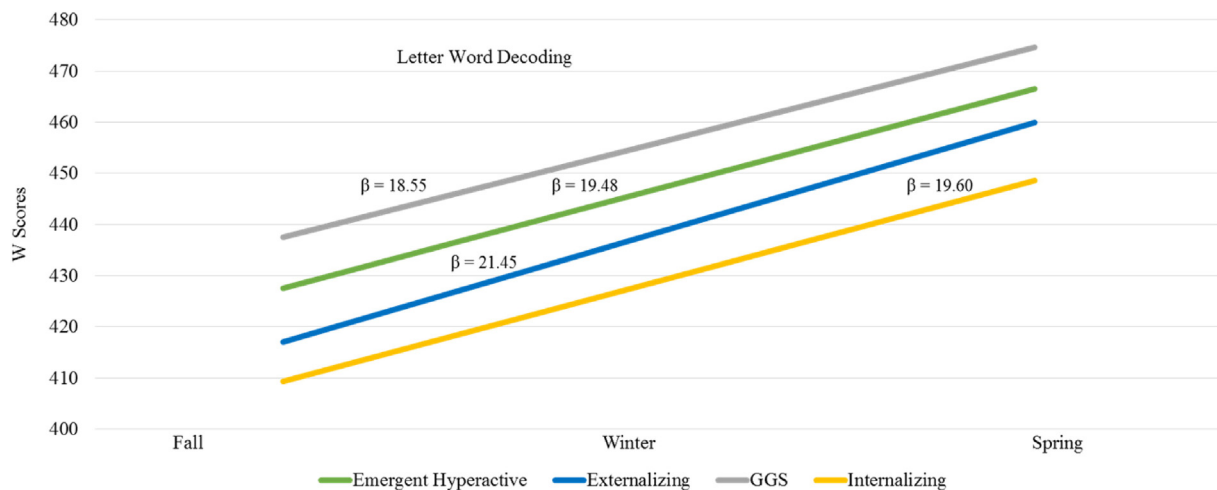

Fig. 2. Latent Profile Growth Models of Letter-Word Decoding (LW) from the beginning to the end of the first grade school year, controlling for gender and socioeconomic status (SES). Free and reduced priced lunch (FARL) information was used as a proxy for SES. Fixed slopes (β) are provided for each growth model. Time scores for the growth models were fixed at 0, 1, and 2 to define a linear growth model. The intercept was calculated at the initial time point. Significant differences in letter-word decoding based on the chi-square difference test were observed among all of profiles excluding growth between the Emergent Hyperactive and Internalizing profiles.
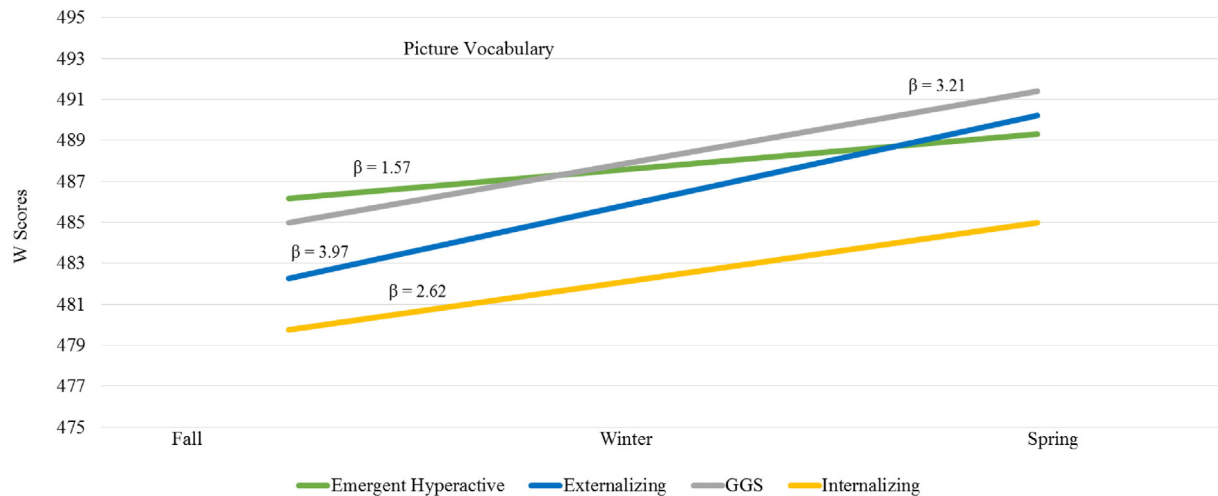
Fig. 3. Latent Profile Growth Models of Picture Vocabulary (PV) from the beginning to the end of the first grade school year, controlling for gender and socioeconomic status (SES). Free and reduced priced lunch (FARL) information was used as a proxy for SES. Fixed slopes (β) are provided for each growth model. Time scores for the growth models were fixed at 0, 1, and 2 to define a linear growth model. The intercept was calculated at the initial time point. Significant differences in picture vocabulary growth based on the chi-square difference test were observed among all of profiles excluding growth between the Externalizing and GGS profiles.

relatively typical literacy performance and language abilities, may lead to a missed opportunity to identify students who may need additional social and emotional classroom support to be successful in educational settings. This may, in turn further jeopardize social and emotional development and impact overall educational success. This study provides some evidence that a profiles-based approach may allow for the identification of students who may be at risk for learning and/or social and emotional difficulties. However, further research is required to investigate how patterns of student behaviors relate to diagnostic eligibility.

4.1.3. Emergent Hyperactive and Externalizing

Students in the Emergent Hyperactive profile exhibited some indication of social and emotional risk and made little growth in vocabulary across the school year. This pattern of foundational learning components is similar to the pattern Pentimonti et al.' (2014) documented in their "limited readiness" profile (2014) of students in early childhood special education classrooms, with students showing weaknesses in social behaviors and academic skills as well as the presence of externalizing behavior. This study extends these findings to a sample of first grade students in general education. Although this finding is consistent with previous research documenting a link between students' social and classroom behavior with their academic performance (Hair et al., 2006; Halle et al., 2012; Wentzel, Barry, & Caldwell, 2004), there could be many reasons for this stalling of growth. One possibility is that the subtle weaknesses in their social behaviors impede learning. Previous research has highlighted the importance of well-developed social behaviors for positive reading outcomes (Ziv, 2013), thus it may be that limited cooperation and/or self-control social behaviors hinder opportunities to participate in classroom learning activities and thus hurt academic growth across the school year.

Although students in the Emergent Hyperactive profile did not exhibit the frequency and or the intensity of hyperactive and externalizing behaviors as the students in the Externalizing profile, they may be just challenging enough behaviorally to suffer more distanced teacher-student relationships. Hyperactive and externalizing behaviors have been found to jeopardize relationships between students and their teachers (Henricsson & Rydell, 2004; Justice, Cottone, Mashburn, & Rimm-Kaufman., 2008), yet teacher-student relationships are associated with social and academic growth (Furrer & Skinner, 2003; Hamre & Pianta, 2001; O'Connor & McCartney, 2007; Rudasill, Niehaus, Buhs, & White, 2013; Wu, Hughes, & Kwok, 2010). Thus, if there exists a dismissing or hostile relationship between the teacher and student, academic growth may be proscribed. Further research is needed to better understand

how frequency and intensity of hyperactive and externalizing behaviors relate to positive relationship development. Finally, although we did not measure students' cognitive skills in the current study, Pentimonti et al. (2014) documented below typical cognitive skills as measured by the Kaufman-Brief Intelligence Test (K-BIT; Kaufman & Kaufman, 1990) in their "limited readiness" profile. This may also be the case here—students' cognitive skills may be affecting vocabulary growth. However, further research is needed to investigate the specific predictors involved in the rate of literacy growth across each of the profiles.

4.1.4. Generally Good Students (GGS)

With over half (55%) of the participating students making up the GGS profile, it is possible that the GGS profile reflects students' typical development and learning in general education classrooms. That is, the students in the GGS profile are the "Generally Good Students" with generally good foundational learning components needed for successful classroom participation, independence, and overall educational success (Connor et al., 2010; Montroy et al., 2014). Students have the social, emotional, and language skills needed to interact and collaborate with peers (Mashburn et al., 2009), and they are able to regulate their emotions and behavior to follow classroom routines, participate in activities, and comply with the rules (Arnold et al., 2012). In addition, the students in the GGS profile likely have the foundational learning components to support relationship development (Murray & Murray, 2004) and overall literacy achievement (Catts & Kamhi, 2004).

4.2. Limitations

A notable limitation of the current study was reliance on the SSRS, a teacher-rater tool, as the primary measure of social and emotional development and the potential bias that teacher-report measures can introduce (Merritt et al., 2012). At the same time, all the other measures, including the assessment of self-regulation, were directly administered with the students. Although different constructs, the SSRS self-control dimension and the HTKS share some commonalities, yet the discrepancy between the two scores documented in this study illustrates the importance for including multiple measures. Future research using classroom observation to characterize student behavior are planned but are beyond the scope of the current study. It is also important to note that inclusion of social and emotional domains together with language domains introduces some ambiguity about what is driving literacy performance. Thus, future research is needed to understand the interplay between individual components as they relate to outcomes as

well as to better understand whether specific components or the interaction of various components in each profile have greater influence on academic gains. Additionally, including measures that characterize the sample, such as a measure of intelligence, within future studies would allow for identification of other specific student characteristics associated with profile membership and literacy growth across profiles. Finally, this study was conducted in the context of a randomly controlled trial where teachers received professional development on how to individualize either reading or math instruction. Although the profiles were created using the fall standardized measures before the interventions took place, it is possible that the interventions affected students' math and vocabulary gains from fall to spring. In a follow-up study, we plan to investigate possible interaction effects between instruction and profile membership change.

Nevertheless, this study included a large, diverse longitudinal sample of first grade students. The size of the sample, diversity of students, and age range of the participants helps to support generalizability to the larger population of early elementary students. In addition, this study used a number of widely used measures, all of which have good reported reliability, and utilized advanced statistical methods in order to consider important questions regarding identification of subsamples and literacy growth in early elementary grades. LPA is a useful approach because it is fundamentally "person-centered" and goes beyond describing means, allowing for the examination of how various components relate to one another. Moreover, with the use of LCGA, our findings suggested that children with different profiles acquired literacy skills differently.

4.3. Educational implications and future directions

The current study has several implications informing both assessment and instruction. As mentioned earlier, of the total sample 14% of the students had an IEP, with speech being the primary disability for the majority of students—only 2% of the students had a diagnosed language disorder and 1% with a LD and ASD diagnosis. Additionally, only 7% of the students were deemed eligible for ESE services. However, the wide variability of social and emotional development that the students exhibited may indicate a problem with identifying students with social and emotional concerns if they are not falling behind academically; that is, educators may only be considering additional classroom support or services to help improve students' academic skills. With current research illustrating the important relations among social and emotional development, language, self-regulation, and educational success, our findings suggest that we may be able to identify students' educational needs by considering a constellation of their skills and behaviors in addition to academic performance. Profile-based methods may help educators better understand and or identify social and emotional strengths and weaknesses in their students.

In addition, by identifying profiles of foundational learning components, this study extends current efforts for individualizing student instruction, an effective strategy for improving student outcomes in elementary classrooms (Connor et al., 2014), by considering educational needs within the context of observable classroom behavior (i.e., teacher ratings of social and emotional abilities). For example, a teacher may observe that one of her students frequently withdraws or disengages from classroom activities, does not advocate for himself in the classroom, and has difficulty requesting help or clarification on assignments—this pattern of observable classroom behavior may help the teacher support this student's individual social and emotional needs in the classroom, and in turn, support classroom involvement and academic growth (Buhs & Ladd, 2001).

In sum, findings from this study offer evidence for understanding constellations of foundational learning components and links between specific patterns of classroom behavior and first graders' academic learning. This study highlights the importance of maintaining a broad conceptualization of the skills and behaviors that relate to later academic achievement, which is congruent with dynamic systems theory, emphasizing the interrelations between children's skills and their learning contexts. These findings provide insight into how researchers and educators might consider students' profiles of foundational learning components to inform how to support development and learning in the classroom. Understanding how individual components interact with each other and with the learning environment as well as the stability of profiles overtime are important future directions of this research. Additionally, these findings provide a framework for future research that could answer important questions related to classroom learning, such as; how do we match effective classroom learning opportunities and support to specific profiles to optimize students' social, emotional, and academic development? How do classroom supports relate to changes in academic skills within profiles? These are questions that will provide important information for improving educational experiences for elementary students with diverse learning needs.

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