Predictors of Special Education Referral:
Child Characteristics and State Pre-kindergarten Quality

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ABSTRACT

Linda Nugent: Predictors of Special Education Referral: Child Characteristics and State Pre-kindergarten Quality
(Under the direction of Diane Early)

Past research has demonstrated that attending high quality early education programs is associated with the reduction of later need for special education services. However, little research has looked specifically at how different program characteristics affect these outcomes. Additionally, no research has examined such associations within the state-funded pre-kindergarten programs that have recently become more widespread. The current study aimed to add to the literature by exploring the potential benefits of state-funded pre-kindergarten programs for children who are at-risk for needing later special education services. More specifically, the study had three purposes: (1) to identify early social and academic skills that serve as predictors of special education referral at the end of kindergarten, among children without individualized education plans (IEPs) at entry to pre-kindergarten, (2) to investigate the associations between classroom quality in state-funded pre-kindergarten programs and special education status for this group of children, and (3) to examine whether classroom quality moderates the relation between young children’s skills and later special education placement.

To explore these issues the present study draws from the National Center for Early Development and Learning’s (NCEDL) Multi-State Study of Pre-Kindergarten and the State-Wide Early Education Programs (SWEEP) study. Combined, these studies offer a sample of
nearly 3,000 children from over 700 classrooms in state-funded pre-kindergarten programs in 11 states. Participants were followed longitudinally throughout their pre-kindergarten and kindergarten years. No study participants had an IEP at the start of pre-kindergarten.

Results suggest that academic and social skills at the start of pre-kindergarten predict special education placement at the end of kindergarten. Specifically, both lower language and social skills were related to greater chance of later referral for special education services. Results did not support an association of classroom quality and special education status. Similarly, support was not found for an interaction between abilities of young children and classroom quality, and later special education. Limitations of the present study and implications for future research are discussed.
# TABLE OF CONTENTS

| LIST OF TABLES | vi |
| LIST OF FIGURES | vii |

**Chapter**

I INTRODUCTION ..........................................................1

II REVIEW OF THE LITERATURE ........................................4

- State-funded Pre-kindergarten Programs ..........................4
- Special Education History and Legislation ..........................5
- Benefits of Early Childhood Education and Care .................11
  - Model programs ..................................................12
  - Large-scale studies ...........................................14
- Early Childhood Education and Care and Placement in Special Education ..................................................17
- Predicting Later Special Education Placement ..................19
  - Demographics ..................................................21
  - Language Skills ................................................22
  - Social-emotional Competence ..................................23
- Effects of Program Characteristics on Child Outcomes .......25
- Purpose of Study ..................................................28

III METHODS ....................................................................30

- Participants .........................................................30
- Procedure and measures ..........................................37
  - Classroom quality .............................................37
- Observer Training and Reliability ................................41
# LIST OF TABLES

<table>
<thead>
<tr>
<th>Table</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Characteristics of Children</td>
<td>35</td>
</tr>
<tr>
<td>2. Characteristics of Teachers and Classrooms</td>
<td>36</td>
</tr>
<tr>
<td>3. Correlations between Measures of Pre-kindergarten Classroom Quality</td>
<td>40</td>
</tr>
<tr>
<td>4. Correlations between Measures of Child Predictor Variables</td>
<td>44</td>
</tr>
<tr>
<td>5. Special Education Status</td>
<td>46</td>
</tr>
<tr>
<td>6. Children with IEPs by Disability Category</td>
<td>48</td>
</tr>
<tr>
<td>7. Special Education Status Variable</td>
<td>50</td>
</tr>
<tr>
<td>8. Participant Characteristics Before and After Multiple Imputation</td>
<td>52</td>
</tr>
<tr>
<td>9. Child Characteristics by Four Levels of Special Education Status</td>
<td>57</td>
</tr>
<tr>
<td>10. Child Characteristics by Dichotomous Special Education Status</td>
<td>62</td>
</tr>
</tbody>
</table>
# LIST OF FIGURES

<table>
<thead>
<tr>
<th>Figure</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Special Education Status Flow Chart</td>
<td>47</td>
</tr>
</tbody>
</table>

vii
CHAPTER I

INTRODUCTION

High quality early childhood education can benefit both children with disabilities and those at risk for developing disabilities by improving developmental outcomes and reducing the need for later special education services (Brown & Scott-Little, 2003; Bowman, Donovan, & Burns, 2000; Barnett, Lamy, & Jung, 2005; Campbell & Ramey, 1995; Schweinhart, Barnes, & Weikart, 1993). Very little research, however, has looked more specifically at how different early childhood program characteristics affect these outcomes. Furthermore, virtually no research has investigated these factors in state-funded pre-kindergarten populations.

Recently, state-funded pre-kindergarten programs have become a more widespread option in early childhood education and care, with nearly all states serving at least some portion of their three- and four-year-olds in state pre-kindergarten programs (Barnett, Hustedt, Robin, & Shulman, 2005; Bryant et al., 2002). Despite the prevalence of these state-funded programs, little research has been done investigating these services and the children they serve (Barnett, et al., 2005). In light of the nation’s current focus on providing early education and prevention services, two important areas in need of research within the larger arena of state-funded pre-kindergarten are 1) the identification of children with disabilities and 2) the possible role pre-kindergarten programs play in preventing later special education participation. Whereas severe disabilities are more easily identified prior to school
entry, milder disabilities are considerably more difficult to diagnose early and are often not identified until later in life (Scott & Delgado, 2003; Jacob, Snider, & Wilson, 1988; Bowe, 1995). Prospective studies of children in pre-kindergarten who are not participating in special education when they enroll (i.e., do not have severe disabilities) are important for understanding the characteristics of the population with mild disabilities. Such an understanding may help to identify effective strategies to improve outcomes and reduce the need for later special education placement.

The current study aimed to add to the current body of literature by exploring several questions. First, it attempted to identify early academic and social characteristics of children without individualized education plans (IEPs) at entry to pre-kindergarten that serve as predictors of special education referral at the end of kindergarten. Additionally, this study investigated the effects of specific characteristics of state-funded pre-kindergarten programs on child special education status for this group of children. Finally, the study examined whether program characteristics are related to the association between skills of young children and later special education placement.

To answer these questions, this study utilized data from the National Center for Early Development and Learning’s (NCEDL) Multi-State Study of Pre-Kindergarten and the Study of State-Wide Early Education Programs (SWEEP) (Early et al., 2005). Combined, these studies took place in eleven states and followed children longitudinally throughout their pre-kindergarten and kindergarten years. As of 2003, these eleven states served 80% of all pre-kindergartners who were being served in public pre-kindergarten in the U.S. and accounted for 78% of the total state dollars spent on pre-kindergarten (Barnett, Hustedt, Robin, & Shulman, 2003).
Background from the fields of both special education and state-funded pre-kindergarten are relevant to this research, thus this paper reviews both bodies of literature. Next it reviews the effects of high quality early childhood education programs on child outcomes, particularly outcomes related to special education placement. The paper then covers the body of research that examines demographic and child characteristics that have been found to predict later academic and school outcomes, including need for special education services. Finally, this review examines specific aspects of quality early childhood education programs that have been found to improve various school outcomes for children.
CHAPTER II

REVIEW OF THE LITERATURE

State-funded Pre-kindergarten Programs

In the past two decades, states have become more involved in the delivery of education services to three- and four-year-olds. The majority of states fund some form of pre-kindergarten services to at least a subset of their four-year-old children (Bryant et al., 2002; Barnett, Hustedt, et al., 2005). A recent national survey reports that nearly 50 percent of public elementary schools offer pre-kindergarten services for children less than five years of age (Smith, Kleiner, Parsad, & Farris, 2003), though most states use a combination of school-based and community-based programming (Bryant et al., 2002). Eligibility requirements differ significantly across states for these programs, with most states aiming to serve at-risk children. State definitions of at-risk vary, but frequently focus on children from low income families (Bryant, Clifford, Burchinal, Early, & Little, 2005). In addition, some programs target other risk factors including environmental risks such as parent unemployment or limited English proficiency, and biological risk factors such as low birth weight. As of 2002, three state programs (GA, NY, and OK) were also striving to provide universal pre-kindergarten to all four-year-olds in their state. While the majority of the nation’s four-year-old population served in preschool continues to attend private or nonprofit child care programs, recent reports estimate as many as 17 percent of those receiving services are enrolled in state-funded public school preschool programs (Barnett, Hustedt, et al., 2005).
Due to the significant potential impact of these state-funded services on our nation’s youth, further research on these programs is necessary.

**Special Education History and Legislation**

Special education services in our nation have received a great deal of attention over the past few decades. Much of this attention relates to the significant increase in the numbers of students being served by special education since the establishment of the Education for All Handicapped Children Act (EHA, P.L. 94-142) in 1975 (Danaher, Kraus, Arnijo, & Hipps, 2005; Pruslow, 2001). The most recent estimates of special education enrollment indicate that 5.8 million children ages 6 through 21 received special education services in 2001 (U.S. Department of Education, Office of Special Education and Rehabilitative Services [USDE OSERS], 2005). This estimate represents a gradual increase during the last decade of over one million students. Currently a total of 8.9 percent of the general population ages 6 through 21, or 12.1 percent of the public school enrollment, receives special education services.

Furthermore, there has been a significant increase in recent years in special education services provided to young children. As of 2001, there were 620,195 preschoolers, defined as children ages three through five, were being served by special education. This represented a 46.9 percent increase in services for this age group from the previous decade (USDE OSERS, 2005). More recent estimates indicate this growth rate has continued with 680,142 preschoolers ages three through five receiving services as of July 2004 (Danaher, Kraus, et al., 2005). An additional 247,433 infants and toddlers were being served in the nation in 2001, a 31 percent increase from 1998 (USDE OSERS). This recent surge in special education services, particularly for children birth through five, is related to legal mandates
emphasizing the need to provide free and appropriate public education (FAPE) for children with disabilities from birth. The focus of these federal regulations on serving young children is based on the premise that early services for those with disabilities leads to improved developmental outcomes (USDE OSERS).

The EHA legislation and its amendments reflect the shift in the field’s conceptualization of disability and the process of identification and intervention for children with special needs. Early models of evaluation for special education services from the 1970s identified special needs children through a refer-test-place model (Fagan & Wise, 2000). That system relied on waiting for children to begin to fail in their academic attempts before they were eligible to receive services. Research has since consistently demonstrated that intervening earlier in a child’s life provides greater chance for improving developmental outcomes than attempting remediation after problems have already fully developed (see Bowman et al., 2000 for a review). Following this line of thinking, the Regular Education Initiative of the 1980s shifted the focus from remediation for disabilities to prevention efforts (Fagan & Wise). Instead of waiting for children to fail in later grades as problems worsen, this approach aims to prevent problems before they fully develop and negatively impact children’s lives. Pre-referral assessment and intervention models identify children earlier, when they exhibit mild difficulties or risk for developing problems, and intervene with services at this time. Again, federal regulations reflected these theory-based changes to the conceptualization of identification for services by supporting an emphasis on early childhood education and care, which in turn affected practice.

The original 1975 Education for all Handicapped Children Act (EHA, P.L. 94-142) required states to provide special education and services to children with disabilities, ages 3
through 21. The 1986 Reauthorization of EHA (P.L. 99-457) expanded on the original legislation by mandating that states serve all children with disabilities, starting at birth (Danaher, 2005). Additionally, P.L. 99-457 addressed some concerns that arose in the decade following the implementation of P.L. 94-142. Danaher notes that, specifically, the research community expressed concerns about applicability of disability categories for very young children. The community also deemed it difficult to determine a specific category for young children because early delays in different developmental domains are often interrelated (Danaher). The requirement of P.L. 94-142 to assign a disability category in order to receive needed services caused concern that the restriction would result in misidentifying young children with potentially stigmatizing labels.

The 1986 reauthorization accounted for this in two ways. First, states were no longer required to report the number of three- through five-year-olds served by disability category. Similarly, the reauthorization added the eligibility category of developmental delay for children birth through two years old (Ballard, Ramirez, & Zantal-Weiner, 1987). The term developmental delay was to be applied to infants and toddlers experiencing delays in the domains of either physical, cognitive, communication, social-emotional, or adaptive development. The introduction of this term allowed very young children to receive services without qualifying them under a specific diagnosis. The law also gave each state the option of serving infants and toddlers who are deemed at risk for developing developmental delay if services are not provided. At the state’s discretion, children received “at risk” status if they had physical or mental conditions that have a high probability of resulting in delay or if they were considered at risk medically or environmentally for substantial delays. In addition, under this program the infant and toddler's family could receive needed services to help them
in assisting in the development of their child. This added flexibility ensured that infants and
toddlers with special needs could be served through early services without risk of
misidentifying disabling conditions or stigmatizing young children with labels (Danaher,
Kraus, et al., 2005).

Multiple reauthorizations to EHA, now the Individuals with Disabilities Education
Act (IDEA), followed in the subsequent years. Revisions authorized in 1991 (P.L. 102-119)
gave states the option of using developmental delay as a category for children ages three
through five (Danaher, 2005). The 1997 reauthorization of IDEA extended the use of this
optional category to children ages three- through nine-years-old, again at the state’s
discretion (Knoblauch & McLane, 1999). The IDEA Improvement Act of 2004 (P.L. 198-
446) clarified that states could choose to use developmental delay for ages three through
nine, or any subset that included ages three through five. The focus on early education and
care with children birth through five represents the understanding that services during the
first years of life lead to better outcomes than remediation (Sattler, 2001).

Because of the significant amount of control that the federal legislation provides
states to implement early education and care services for children with disabilities, there is
considerable variation in service delivery to young children at both the state and local levels.
Differences exist in terms of the type and number of agencies delivering services, models of
intake, service coordination, and eligibility criteria (Spiker, Hebbeler, Wagner, Cameto, &
McKenna, 2000). As mentioned previously, states determine a portion of eligibility criteria,
including whether or not to serve at risk infants and toddlers and how to define
developmental delay (Danaher, Kraus, et al., 2005). Only a few states opt to include at risk
infants and toddlers in their special education services, though several states do track the
progress of these high risk children (Spiker et al., 2000). States and local jurisdictions may also differ in terms of their use of the developmental delay category. Most states use the developmental delay classification for children ages three through five, but twenty states have extended the age range above age five, and others are considering expanding their age range (Simeonsson et al., 2001). Furthermore, as some states delegate the responsibility of organizing local services to the local jurisdictions, considerable within state variation exists in terms of intake and service coordination (Spiker et al.). It is likely that the effectiveness of the services that children and families are afforded through the special education system may also vary depending on the organization and implementation of these early services (Spiker et al.).

Despite these variations in service delivery, nationwide there is a heightened emphasis on the early identification of those children with disabilities or who are at risk for developing disabilities. Whereas early identification of children with more severe handicaps or medical diagnoses is fairly clear cut, identifying children with mild learning problems early in life proves more difficult. Not surprisingly, research suggests that physical handicaps are more likely to be identified in early childhood than either cognitive or social delays (Bowe, 1995). However, some of these milder categories of disabilities, such as Learning Disabled (LD), Speech/Language Impaired (SLI), Emotional Disabled (ED), and Educable Mentally Disabled (EMD), are also the most prevalent disabilities identified in the school years (USDE OSERS, 2005). Because milder disabilities affect a significant portion of children in our nation, early identification of this population is especially important.

Despite the prevalence of these disabilities, Jacob and colleagues (1988) suggest that preschool aged children with milder disabilities are typically under-referred for evaluations.
They argue that under-referral occurs because more subtle and specific learning problems may not be as readily apparent until children encounter formal academic instruction. Scott and Delgado (2003) point out that referrals for services in these milder categories of disability, particularly for children later classified as EMD and LD, are typically delayed until late elementary school. For example, historically it has been particularly difficult to identify children with learning disabilities early due to eligibility constraints that require discrepancies between measures of intellectual functioning and achievement. Achievement cannot be accurately measured until children have received formal instruction in academic areas, which does not occur until the early elementary years, thereby preventing diagnosis prior to the start of school. The most recent reauthorization of IDEA (2004) allows states to eliminate the discrepancy criteria, but at this stage it is too early to know if these amendments will result in earlier identification of children with learning disabilities.

Despite these difficulties in identification of children experiencing milder learning problems, research suggests that children who are identified as having milder developmental disabilities in preschool may be likely to benefit from early education and care efforts more than those with severe disabilities (Dunst, Trivette, & Cross, 1986; Lerner, Lowenthal, & Egan, 2003). Dunst and colleagues examined children with disabilities served in an early childhood education and care program providing both direct educational services and indirect social support to families. In comparing children by diagnosis they found that the group of children with slight developmental delay or environmentally at risk for developing problems demonstrated greater developmental gains over the course of intervention than groups of children with physical impairments and mental retardation. Because these children with milder delays demonstrate considerable gains from early childhood education and care
efforts, it is likely that children with mild disabilities who are identified later in their school careers would also have benefited from earlier intervention (Dunst, Trivette, & Cross). For this reason, improving methods of early identification for this population is of significant importance.

**Benefits of Early Childhood Education and Care**

Early childhood education programs are a widespread and effective intervention for improving developmental outcomes for young children (Barnett, 1995; Dunst, Snyder, & Mankinen, 1989; Bowman et al., 2000). Research consistently links high quality early childhood care and education efforts with better child outcomes (Peisner-Feinberg et al., 1999; Schweinhart et al., 1993; Campbell & Ramey, 1995). The term “quality” has been used in the field of child care and early childhood education for years, but has been defined in many different ways. However, a commonly accepted conceptualization views quality as the observed instruction in the classroom and the interactions to which children are exposed in the early education setting (Peisner-Feinberg & Burchinal, 1997). Several elements of the classroom including social, emotional, physical, and instructional climate are linked to this concept of quality. High quality early education is characterized by sensitive and responsive interactions between children and their caregivers (Lamb, 1998). Additionally, in high quality classrooms, children are given opportunities for language stimulation and are encouraged to explore their environment to promote learning (Burchinal et al., 2006). Finally, high quality classrooms offer children elevated levels of health and safety routines and practices. In general, research links high quality early child care with improved cognitive, academic, and social outcomes.
Research examining program quality as it relates to child outcomes in early care and education can be divided into two subsets of programs: model programs and large-scale studies of programs attended by typical children. Some of the strongest support for early childhood education comes from the model programs (Barnett, 1995; Brown & Scott-Little, 2003). Model programs refer to exemplary programs that are developed by researchers in order to evaluate the potential effects of such programs on child development. These programs typically involve intensive single-site interventions with fairly strong experimental designs. Model programs often are better funded and include expert involvement and, as a result, possess higher quality characteristics (Barnett) than programs selected by typical parents and attended by typical children. Many of the model programs studied in the research literature specifically investigate the impact of intervention on the learning and developmental outcomes of disadvantaged children. Additionally, some programs are aimed at preventing the need for future special education services for their participants. For example, one well-known study, the Carolina Abecedarian Project, set out to reduce the incidence of mental retardation for children considered to be at risk for developing the need for special services (Campbell & Ramey, 1995).

Model programs. Research from model programs has demonstrated that exemplary early education efforts produce both immediate and longer term gains in cognitive abilities. Reviews of research in this area have found that model programs that track cognitive outcomes generate immediate cognitive boosts of half of a standard deviation, on average, among children who are not receiving special education services (White & Casto, 1985). In addition to gains in IQ, the tracking of child academic achievement demonstrates improved academic outcomes in both reading and math at the end of intervention. Such increases in
intellectual and academic functioning represent clinically significant improvements. Whereas some studies find that these gains decline over time, most model programs report the positive cognitive and academic effects are maintained in the short-term, for example one and two years post-intervention (Barnett, 1995). Reviews of early model programs find significant cognitive gains persisting into the first few years of school (White & Casto). Additionally, the most intensive longitudinal studies of model programs found long-term gains for their experimental groups well into adulthood. Two well-known rigorously constructed longitudinal research projects, the Abecedarian Project and the Perry Preschool Project, followed their participants’ cognitive and academic outcomes throughout their school careers and beyond (Campbell, Ramey, Pungello, Sparling, & Miller-Johnson, 2002; Schweinhart, 2003). Both found clinically and statistically significant improvements that persisted into adulthood, with results from the Abecedarian Project suggesting participants maintained gains in cognitive ability, reading, and math at 21 years (Campbell, Ramey et al., 2002). Similarly, Perry Preschool program participants demonstrated similar persistent gains at 27 years of age (Schweinhart).

Research on model programs has also provided evidence of improved social-emotional outcomes. Children who participated in these high quality comprehensive model programs demonstrated improved social and emotional functioning, including higher ratings of self-esteem and academic motivation, at the end of intervention (Yoshikawa, 1995). Children’s perceived scholastic competence and global self-worth have been linked to involvement in early childhood education programs (Campbell, Pungello, & Miller-Johnson, 2002). Similarly, participants in such programs evidence an increased commitment to school that persists over the remainder of schooling (Schweinhart, 2003). Overall social
competence appears to improve with better interpersonal relationships with peers and adults following intervention (Schweinhart). Several comprehensive longitudinal studies also evidence decreased anti-social and delinquent behaviors for participants that persist into adulthood (Yoshikawa).

The significant influence of model early education programs on child outcomes demonstrates the potential for long-term positive effects of comprehensive early childhood education and care efforts for disadvantaged children or children at risk for poor school performance. This body of research highlights the power of intensive, highly structured, expert-guided, and well-funded programs. Because not all programs provide services that are as comprehensive as these model programs, it is important to also consider the results from large-scale studies of publicly and privately funded programs, as this research provides a more accurate depiction of the early childhood education received by a large and growing number of young children in the nation.

Large-scale studies. The other major source of research of early childhood education comes from large-scale studies of public and private programs. These studies are often observational or quasi-experimental in nature and investigate how variations in on-going services correlate with outcomes. In contrast to the model programs, these studies depict services provided by federal, state or local programs and in general, are more representative of services received by the majority of children enrolled in early care and education (Reynolds, Temple, & Ou, 2003). As such they have increased generalizability to the public school environment as compared with the studies of model programs. However, the lack of experimental designs and appropriate controls prevent using them to make causal inferences about how programming affects children’s outcomes. As funding is lower in these programs,
and interventions are often less rigorous, large-scale studies of public and private programs typically indicate lower and more varied quality and less comprehensive services than those found in model program studies. Further, they generally show smaller improvements in child outcomes.

Several longitudinal large-scale studies of publicly and privately funded programs have demonstrated associations between quality of early education and care and child cognitive and academic outcomes. In general, quality of early childhood programming is modestly related to children’s development in these observational studies (National Institute of Child Health and Human Development Early Child Care Research Network [NICHD ECCRN] & Duncan, 2003). Multi-site observational studies find larger immediate and lasting cognitive effects for participants in high quality preschool programs as compared to lower quality programs (Peisner-Feinberg & Burchinal, 1997; NICHD ECCRN & Duncan). In addition, when preschool classroom quality is higher, children exhibit more advanced skills in both language and math through the second grade (Peisner-Feinberg et al., 1999).

One specific facet of good quality, a closer teacher-child relationship, predicts better language and reading outcomes for children at-risk for school failure (Burchinal, Peisner-Feinberg, Pianta, & Howes, 2002). Again, when considering the positive results of these correlational studies, it is important to remember that the lack of experimental designs in these analyses mean causal conclusions cannot be drawn about how programming affects children’s outcomes.

Large-scale studies of state funded pre-kindergarten programs also find statistically significant gains in academic skills for children attending such programs (Barnett, Lamy, & Jung, 2005; Gormley, 2005; Howes, et al., 2006, Burchinal et al. 2006). Using a regression-
discontinuity design, Barnett and colleagues found that high quality preschool classes improve children’s language, early literacy, and math skills. Using a similar design, Gormley and colleagues (2005) found that children who attended Oklahoma’s universal pre-kindergarten programs in Tulsa experienced significant gains in early reading and math skills. Notably, these gains were found across diverse racial-ethnic groups and socioeconomic brackets.

Large-scale studies have also demonstrated an association between quality and social outcomes. Children attending high quality programs with more positive activities and interactions achieve better social skills (Peisner-Feinberg et al., 1999). Quality is linked to a variety of aspects of children’s social competence and adjustment. Teachers and parents rate children who attended high quality early education programs as more considerate and sociable than those in lower quality programs (Phillips, McCartney, & Scarr, 1987). Additionally, teachers note more socially competent and happier behavior and less shyness in children who attended high quality early education programs (Vandell, Henderson, & Wilson, 1988). Increased compliance and self-regulation is also evidenced in children from such programs (Howes & Olenick, 1986). Children enrolled in early childhood education classrooms with responsive and sensitive teachers develop enhanced social skills (Peisner-Feinberg et al., 2001). In addition, children in these high quality programs have fewer behavior problems, as rated by their kindergarten teachers. Conversely, children emerging from low-quality preschool programs demonstrate more hostile behaviors and less social competence according to kindergarten teachers (Howes, 1990).
**Early Childhood Education and Care and Placement in Special Education**

In addition to cognitive and social outcomes, research also suggests that early childhood education and care decreases the likelihood of a later special education placement. Both studies of model programs and large-scale public and private programs have consistently demonstrated significant decreases in later special education rates (Barnett, 1995). The Carolina Abecedarian Project reported that at age 14, participants demonstrated a significantly reduced tendency to be placed in special education, with 12 percent of the preschool experimental group in special education compared to 47 percent of the control group (Campbell & Ramey, 1995). The Perry Preschool study, similarly, found decreased rates of special education placement throughout schooling, with only 19 percent of the experimental group receiving at least a year of special education compared to 39 percent of the control participants. In addition, their study evidenced significant effects for the total number of years participants spend in special education (Schweinhart et al., 1993).

Many studies of large scale program interventions also report improved special education status (Barnett, 1995). Though, in general, large-scale studies produce smaller effects for special education, one study, the Chicago Child-Parent Center (CPC) study, used a quasi-experimental design and found children in the intervention group had a 32 percent lower rate of special education than the comparison group during the elementary grades (Conyers, Reynolds, & Suh-Ruu, 2003). Examination of special education status by category of disability indicates trends favoring the CPC preschool group for all domains of disability, although only the learning disabilities category achieved statistical significance. Furthermore, comparing rates of special education placement by grade revealed that significant group differences between children in the CPC preschool group and the
comparison group who did not receive CPC intervention services were already evident by school entry and lasted throughout the elementary years. The early effects of intensive early education and care are important as they suggest need for special education can be decreased immediately and maintained (Conyers et al.).

Whereas much of the research pointing to improved child outcomes targets disadvantaged children, this finding of reduction in later special education placement across several studies suggests that, more specifically, children at-risk for requiring special education services later in life are likely to benefit considerably from early childhood education and care. Improvements are sufficiently large that needs for special education services at school age are often eliminated for some children (Schweinhart et al., 1993; Conyers et al., 2003; Campbell & Ramey, 1995). Similarly, research also indicates that early childhood education programs are valuable for children identified as having disabilities (Dunst et al., 1989; Guralnick, 1997; Greenspan & Wieder, 1998). Children with disabilities or who are at risk for developing disabilities demonstrate significant cognitive and behavioral gains when enrolled in high quality early childhood education programs (Dunst et al., 1989). Early childhood education and care of this type has been found to be more effective for children with disabilities than intervention at later ages (Bowman et al., 2000). Children with milder disabilities at entry into early education programs display greater developmental gains than those with more severe disabilities (Dunst et al., 1989).

As a whole, the evidence from experimental model program studies, large-scale studies, and studies targeting children with disabilities, suggests that high quality early education and care promotes positive child outcomes across various domains. Groups that are at high risk for later school difficulty, including disadvantaged children and those with
mild delays or disabilities, may benefit most from high quality care (Burchinal et al., 2002; Dunst et al., 1986; Lerner et al., 2003).

**Predicting Later Special Education Placement**

Because children with milder delays or at-risk status for such delays are most likely to gain from early services, it is important that they receive quality education and care prior to kindergarten. Many developmental disabilities are not detected before school entry (Palfry, Singer, Walker, & Butler, 1986). However, there has been a good deal of recent research investigating which young children are at-risk for eventual placement in special education. Referral for evaluation is the first step in determining need for special education, so some research has explored which children get referred and why.

Classroom teachers make the majority of child referrals for special education evaluation (Bay & Bryan, 1992). In general, a teacher referral for special education evaluation represents the teacher’s perception that the child is struggling in the classroom. Specifically, a referral is indicative of a mismatch between the child’s ability and behavior and the instruction in the classroom (Skiba, McLeskey, Waldron, & Grizzle, 1993). Algozzine, Christenson, and Ysseldkye (1982) estimated that 73 percent of children who are referred are found to be eligible for special education services. Given the importance of the referral in special education decision-making, some research has considered what child and teacher characteristics are associated with teacher referrals. Much of this work has investigated the student characteristics that differentiate between children at-risk for special education referral from their peers. Early research in this area found that low student achievement was the primary reason for referral for evaluation (Ysseldyke, Christenson, Pianta, & Algozzine, 1983; Lietz & Gregory, 1978). Cooper and Speece (1988) found that in
addition to low achievement, student work-related behaviors including inattentiveness, noncompliance, and disorganization also contribute to the prediction of special education referral. Additionally, Bay and Bryan found that among low achieving students, those that verbally participate less frequently in the classroom were more likely to receive referrals.

As the decision to refer requires subjectivity, some research has also examined how specific teacher attributes relate to student referrals. This work finds that certain teacher characteristics and biases may affect decisions to refer children to special education. Teachers with a greater sense of self-efficacy are less likely to refer students with mild learning and behavior problems than teachers with lower personal efficacy (Podell & Soodak, 1993). Research looking at kindergarten teachers’ views of student characteristics that are predictive of school failure suggests that teachers vary widely in their perceptions of child descriptors that warrant referral for special services (Fedoruk & Norman, 1991). Teacher biases may lead to irrelevant factors such as ESL status, familial structure, age, and personality, playing a significant role in the determination of whether or not to refer a student (Johnson-Fedoruk, 1991; Fedoruk & Norman). However, teachers with a greater sense of personal efficacy are less likely to be affected by bias when making judgments regarding referral (Podell & Soodak). In general, these findings suggest that given that the referral process is not entirely objective or scientific; referrals are subject to error and irregularities (Wallingford & Prout, 2000).

In addition to examining characteristics associated with being referred for special education evaluation, a considerable amount of research has also investigated which children are eventually placed in special education. Much of this research identifies demographic indicators associated with special education status.
Demographics. Various demographic variables have been linked to special education placement. Ethnicity is one demographic factor consistently identified. Disproportionate representation of minority students, particularly African Americans, has been the target of much attention and debate over past decades. Donovan and Cross (2002) document that national patterns of overrepresentation of minority groups have been consistent over time, with African Americans being represented in special education at a higher rate than would be expected based on their percentage in the general population. Most recent estimates suggest that African American students are overrepresented in this way across many classifications, most significantly in the categories of mental retardation (MR), emotional disturbance (ED), and learning disability (LD) (USDE OSERS, 2005). This finding is notable as these same categories require the most subjective judgment on the part of those determining eligibility (Hosp & Reschly, 2004). Further, the US Department of Education (2005) found that children receiving services under IDEA are more likely to be poor than those in the general population (USDE OSERS). Oswald, Coutinho, Best, and Singh (1999) argue that because of the overlap between the demographic variables of race and poverty, some of the disproportionality by race can be explained by poverty effects. Skiba, Poloni-Studinger, Simmons, Feggins-Azziz, and Chung (2005), however, found that race predicts special education referral, independent of socioeconomic status.

In addition, gender has consistently been associated with disparity in special education, with males being more likely to receive services than females (Oswald, Best, Coutinho, & Nagle, 2003). Most recently, the Office of Special Education Program’s (OSEP) national assessments, the Special Education Elementary Longitudinal Study (SEELS) and the National Longitudinal Transition Study-2 (NLTS2), report that males make
up two thirds of the children ages 6 through 17 served by IDEA (USDE OSERS, 2005). Additionally, maternal education is linked to special education, with lower levels of education associated with increased referrals (Pianta & McCoy, 1997; Holloman, Dobbins, & Scott, 1998).

In addition to family and child demographics associated with special education placement, several skills of young children have been linked to later academic problems, including special education services. In research reviewing early child traits, language ability and social emotional competence are repeatedly identified as influential.

**Language Skills.** Various aspects of oral language skills relate to later academic outcomes. Delays in language and communication lead to poor academic and language performance in school (Huffman, Mehlinger, & Kerivan, 2000). Specifically, language ability of young children is associated with later language and reading skills and serves as a predictor of special education placement. One specific area of language that often predicts later school difficulties and need for special services is vocabulary. As Baker and colleagues (1995) suggest, this link is not surprising as learning is often a language based activity and is highly dependent on vocabulary. Delays in receptive vocabulary in early childhood are associated with need for special services in the school years (Keogh, Coots, & Bernheimer, 1995). Research correlating preschool screening assessments with later educational placement also points to language abilities, and specifically vocabulary, as a predictor of special education referral (Pianta & McCoy, 1997). Standardized measures of preschool receptive and expressive vocabulary contribute significantly to the prediction of special education placement (Roth, McCaul, & Barnes, 1993; Pianta & McCoy).
In addition to predicting special education placement, early vocabulary also predicts later reading skills. There is considerable agreement that vocabulary is essential for early literacy. Recently, The National Early Literacy Panel identified early oral language development as one of the five early child characteristics most closely linked to later reading achievement (Strickland & Shanahan, 2004). Similarly, early language delays in the preschool years, including receptive vocabulary delays, correlate with later problems in word recognition and phonics (Catts, 1997). Even mild language impairment in the early years is associated with greater risk for reading difficulties in the school years (Snow, Burns, & Griffin, 1998). Early delays in language and vocabulary skills are consistently linked to reading disability in the school years (Lowenthal, 1998; Scarborough, 1990; Fewell & Deutscher, 2002; Dickinson, McCabe, Anastasopoulos, Peisner-Feinberg, & Poe, 2003; Poe, Burchinal, & Roberts, 2004).

Early vocabulary skills are also related to later language impairment. In their review of the research, Huffman and colleagues (2000) found that language delays in the preschool years often persist into the school years. Specifically, poor vocabulary scores in preschool have distinguished between children who receive special education services at school-entry in the area of speech language impairment (SLI) from those who do not (Fazio & Naremore, 1996). Similarly, receptive vocabulary scores at age three predict verbal abilities at school entry (Fewell & Deutscher, 2002).

**Social-emotional Competence.** Delays in social-emotional development also predict school outcomes including special education referral at school entry and beyond. Ratings of social competence, including assertiveness, leadership, and independence are associated with a range of definitions of school success (Pianta & McCoy, 1997). Social and behavioral
skills in young children are indicators of later social competences (La Paro & Pianta, 2000; Howes, 2000). Behavior problems in young children are linked to later peer relationships, including fewer friends and more peer victimization (Huffman et al., 2000). Discipline problems and oppositional behavior in the early years predict later externalizing problems that may significantly impair school functioning in later grades (Merrell, 1996). Similarly, early social-emotional delays are associated with later need for special services for emotional disturbance (Wagner, Kutash, Duchnowski, Epstein, & Sumi, 2005).

In addition to the array of negative social and behavioral outcomes that impact school adjustment and performance, social-emotional problems in young children also predict poor academic outcomes in later grades. Social and behavioral delays are associated with later learning problems as indicated by poorer performance on standardized tests and placement in special education programs (Steele, 2004). Poor social-emotional development is linked to language development, which in turn affects early literacy (Espinosa, 2001). It follows then, that poor social skills observed in preschool predict learning disabilities in the school years (Lowenthal, 1998) and, in particular, reading ability and disability are associated with these early social delays (Steele).

Past research suggests that early delays in the areas of social-emotional and language development are associated with later child school outcomes, including special education. Much of that research, however, investigates this relationship in young children already being served by special education in their early years. The current study investigates how these two areas of competence predict later special education referral and placement in children not yet identified at entry to preschool. In looking at this population, the current study attempts to be able to further examine outcomes of children with mild delays that are
often not identified until the end of kindergarten. Identification of these children with mild delays allows for the examination of the specific characteristics of pre-kindergarten programs that might prevent eventual special education placement. This work may be particularly important as research suggests those with milder delays may benefit most from intensive prevention and early education efforts (Dunst et al., 1986; Lerner et al., 2003).

**Effects of Program Characteristics on Child Outcomes**

As noted previously, improvements in child outcomes, including special education placement, have been consistently linked to high quality early childhood education (Barnett, 1995). There is little to no research, however, that examines how different aspects of quality affect later special education status. Nevertheless, different types of quality, including emotional and instructional support, have been linked to differential academic and social-emotional outcomes for children with delays.

Studies of classroom quality often identify instructional and emotional support as two separate, but related, ways of conceptualizing classroom quality. Instructional support refers to the nature and quality of the instruction in the classroom. Teachers offering high instructional quality monitor children’s progress and attend to their academic needs by offering educational supports as needed (Meyer, Wardrop, Hastings, & Linn, 1993). Emotional support refers to the aspects of the classroom such as overall warmth, child-centeredness, teacher sensitivity and responsivity to child needs, and negativity (NICHD ECCRN, 2002). Both factors appear to be important in determining social and academic outcomes.

Instructional support has been linked to a variety of cognitive and social outcomes. Howes et al., (2006) found that high quality of instruction leads to improved language
abilities on both standardized assessments and teacher-rated language and literacy. Hamre and Pianta (2005) found that high instructional quality served as a protective factor for children, specifically those at-risk for academic failure in the early school years. Sociocultural developmental theory suggests these gains result because children’s problem solving and learning occurs when they engage in activities with adults who model and structure the problem solving process (Bowman et al., 2000). When adults guide children through tasks that are novel and just beyond their capacities, they enable children to advance their independent and autonomous thinking (Vygotsky, 1978). When instructional support is high, teachers are aware of children’s individual abilities and current levels of development, and are better able to structure instruction in order to help advance children to higher levels of thinking. Furthermore, adults, such as teachers, provide young children with mental tools to help them restructure their thinking and build upon their current knowledge base (Bowman et al.). It follows that the nature and quality of instruction in the classroom predicts academic functioning of children, particularly in the areas of literacy and general knowledge (NICHD ECCRN, 2004). This work suggests these child academic gains may also be related to increased child engagement in the activity. When the effects of instructional support are compared to those of emotional support, instructional support for learning more strongly predicts academic achievement outcomes (Howes et al.).

Children’s social and cognitive outcomes are also improved when classroom emotional climate is positive. Emotional support from a non-parental caregiver is considered to be a protective factor, guarding against school failure, for those at-risk (Huffman et al., 2000). Teacher-child attachment literature suggests that when teachers provide consistent, attentive, sensitive, and responsive care, children form secure attachments to them (Howes,
Emotional security allows children to feel comfortable using their teacher as a secure base from which they can more effectively explore learning opportunities (Howes, Matheson, & Hamilton, 1994; Raikes, 1996; Howes & Smith). This exploration leads them to become active learners and, as a result, more socially and cognitively competent (Howes & Smith). When teachers are responsive and sensitive, they tend to be more aware of children’s individual needs (Helmke & Schraeder, 1988). These teachers produce enhanced cognitive and social skills for children (Burchinal et al., 1996, 2000; NICHD ECCRN, 2000). Teachers who interact with children in a warm and positive fashion are providing the children with a model of appropriate behavior which they learn to imitate in their own relationships. As a result, positive classroom climates in pre-kindergarten predict greater social competence in kindergarten and during the early elementary years (Howes, Matheson, & Hamilton, 1994; Burchinal et al., 2006; Howes, 2000). These more socially competent children are more sensitive and empathetic with peers and are more likely to make friends and to engage in complex play (Howes, Matheson, & Hamilton, 1994). Additionally, for children who display significant behavior problems early on, conflict in the classroom is a predictor of later problems (Hamre & Pianta, 2005).

Emotional support from teachers also fosters motivational processes related to learning and academics (Pianta, La Paro, Payne, Cox, & Bradley, 2002). Specifically, a more child-centered climate predicts the amount of time children spend on-task and engaged in learning. Studies that consider the impact of emotional support above and beyond that of instructional support suggest that emotional classroom quality more strongly predicts both social and task-oriented competencies (Howes et al., 2006).
Purpose of Study

The purpose of the current study was threefold. First, the study aimed to identify early predictors of special education referral and placement at the end of kindergarten for children who were not in special education at the beginning of pre-kindergarten. Next, it investigated whether global classroom quality in the pre-kindergarten classroom is linked to these special education status. It examined whether preschool global classroom quality is related to the association between early academic skills and special education placement at the end of kindergarten. It attempted to go beyond general classroom quality to see if specific types of quality, including emotional and instructional support, produce differential effects, depending on the child ability levels. Specifically, the study posed the following hypotheses.

**Hypothesis 1.** Language ability and social skills at entry to pre-kindergarten will predict special education status at the end of kindergarten. Lower levels of either social-emotional skills based on teacher judgment or language competence at entry to pre-kindergarten will be associated with higher rates of special education referral and placement at the end of kindergarten.

**Hypothesis 2.** Pre-kindergarten classroom quality will be associated with special education status at the end of kindergarten. Higher pre-kindergarten classroom quality will be associated with lower incidence of special education referral and placement above and beyond the effects of language and judgments of social skills.

**Hypothesis 3.** There will be an interaction between skills of young children and classroom quality in predicting special education status. The association between young children’s social-emotional and/or language competence and special education
referral at the end of kindergarten will be weaker when pre-kindergarten classroom quality is higher. In addition, there will be an interaction between child ability and type of quality, with weaker associations between social-emotional skills and referral rate when emotional support is higher, and weaker association between language skills and referral when instructional support is higher.
Participants

Data for these analyses were drawn from the National Center for Early Development and Learning’s (NCEDL) (a) Multi-State Study of Pre-Kindergarten and (b) Study of State-Wide Early Education Programs (SWEEP). Several manuscripts have utilized these data and are under review, in press, or published (Clifford et al., 2005; Pianta et al., 2005; Burchinal et al., 2006; LoCasale-Crouch et al., in press; Hamre, Pianta, Downer, & Mashburn, 2006; Howes et al., 2006; Bryant et al., in press; Early et al., 2005). With funding from the Institute of Education Sciences, data for the Multi-State Study of Pre-Kindergarten were collected in six states (CA, IL, GA, KY, NY, and OH), starting in the fall of 2001. All of these states were serving more than 15% of their four-year-old children in state funded pre-kindergarten programs. States were selected to maximize diversity with regard to geography, program settings, program intensity, and educational requirements. In each state, the aim was to collect a stratified random sample of 40 centers/schools from the list of all the school/centers or programs provided by each state’s department of education. The centers/schools were stratified to maximize diversity on the variables of (1) teacher education, (2) program location, (3) program length (see Early et al. for a more detailed description of stratification procedures). To achieve this sample, a total of 335 sites were contacted. Of these contacted sites, 26 were deemed ineligible for the study (i.e. no state
funds or did not serve 4-year olds), 58 declined to participate, and 11 did not respond. This response led to a total sample of 238 sites participating in the Fall of 2001 with two additional sites joining the study in the Spring of 2002, for a 78 percent consent rate of the eligible sites in the Multi-State Study.

In 2003 the National Institute for Early Education Research, through the Pew Charitable Trusts, provided additional funds to collect comparable data using largely the same measures and procedures in five more states (MA, NJ, TX, WA, and WI). These states were selected to complement the original six states by representing different funding and program models. The sample was stratified with regard to program size. In each of the five states, the aim was to recruit 100 randomly selected state-funded pre-kindergarten sites for participation in the study from a list of all sites provided by the state. To achieve this sample, 680 sites were contacted. Of the contacted sites, 79 were ineligible for the study and 136 either declined or never responded. This response resulted in a total sample of 465 sites participating in the SWEEP Study in the Fall of 2003 and Spring of 2004 for a 77 percent consent rate of the eligible sites.

As of 2003, these eleven states (six in sample 1, five in sample 2) served 80% of all pre-kindergartners who were being served in public pre-k in the U.S. and accounted for 78% of the total state dollars spent on pre-k (Barnett et al., 2003).

In both studies, one classroom in each site was selected at random for participation and observation. In cases where teachers declined, alternate classrooms from the same site were randomly selected for participation. In the Multi-State Study, of the 240 teachers from the initial random selection, 16 declined to participate, for a 94 percent teacher participation
rate. In the SWEEP Study, of the 465 teachers that were originally contacted in the random sampling, 26 declined to participate, for a 94 percent rate of teacher participation.

Study teachers assisted data collectors to recruit children into the studies. In each participating classroom, four children were randomly selected from among those who: (1) had parental consent, (2) met the age criteria for kindergarten eligibility in fall of the following year, and (3) spoke English or Spanish well enough to understand simple instructions. Whenever possible, two girls and two boys were selected in each classroom. An additional criterion was that only children who did not have an Individualized Education Plan (IEP) were included in the random selection process. These children were excluded for two reasons. First, the data collectors did not have the necessary training to administer assessments to children with disabilities or to make judgments about whether or not children were able to be assessed with the standard battery. Second, this allows the study to look at the incidence of receiving IEPs in the early years of education, specifically pre-kindergarten and kindergarten. In the Multi-State Study, on average 61 percent of eligible children received parental consent. In the SWEEP Study, 55 percent of parents of eligible children gave consent for participation. The teacher and child consent rates in this study are comparable to rates reported in other large studies of young children, such as the NICHD Study of Early Child Care (NICHD ECCRN, 1998) and the National Early Intervention Longitudinal Study (Bailey, Scarborough, Hebbeler, Spiker, & Mallik, 2004).

In the Multi-State Study, this strategy led to a sample of 940 children enrolled in 238 classrooms in the fall of the pre-kindergarten year. Of these, 56 of the original children disenrolled from the pre-kindergarten program in the spring. These children were replaced by other children in their classes, and additional children were recruited in classrooms that
had less than four participants. For these replacement children, initial data had already been collected in the fall of pre-kindergarten. This process led to a total sample of 960 in the spring. In the fall, the SWEEP study had a total sample of 1,775 children in 465 classrooms. In the spring, 176 children joined the study in order to replace children who disenrolled from the pre-kindergarten program \( n = 111 \) and to add participants to classrooms with fewer than four participating children. This procedure led to a total of 1,840 students in the spring of the pre-kindergarten year. Combined, in the spring of the pre-kindergarten year the two studies had a total sample of 2,800 children enrolled in 705 pre-kindergarten classrooms in 11 states. A total of 2,967 children participated in the study at some point during the pre-kindergarten year, with 2,548 children participating in both the fall and spring of pre-kindergarten data collection.

**Kindergarten Follow-up.** In the Multi-State Study, in kindergarten researchers obtained spring teacher questionnaire data for 824 of the 884 children (93 %) who participated in both fall and spring of pre-k data collection. For the SWEEP Study, teachers completed spring teacher questionnaires data for only 1,098 of the 1,664 children (67 %). This difference in response rates is attributed to the different methodologies employed in the two studies. In the Multi-State Study data collection was more intensive in the kindergarten year with direct assessments, classroom observations, and teacher questionnaires collected in both the fall and spring. Thus, the data collectors were on-site and had on-going relationships with the teachers. The SWEEP Study, on the other hand, collected only questionnaire data by mail and only in the spring of the kindergarten year. Thus, the teachers knew less about the study and had more limited contact with the researchers. Combined the
kindergarten response rates of the two studies made for a 75% effective rate of the 2,548 children who participated in both fall and spring of pre-k data collection.

Table 1 presents descriptive characteristics of the children participating in this study. As can be seen, the participating children were diverse in terms of racial/ethnic background and were from families with widely differing education and resources. The average age of the children at the fall child assessments in the pre-kindergarten year was 4.62 years (SD=.32). Table 2 presents demographics of the participating pre-kindergarten and kindergarten teachers as well as descriptive information for the pre-kindergarten classrooms. As shown, both the pre-kindergarten and kindergarten classrooms varied widely in terms of teacher characteristics such as teacher racial/ethnic background and years of teaching education. In addition, pre-kindergarten classrooms varied by classroom level variables such as child to teacher ratio and classroom quality.
Table 1
Characteristics of Children

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<th></th>
<th>n</th>
<th>%</th>
<th>M</th>
<th>SD</th>
<th>Possible Range</th>
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Table 2

Characteristics of Teachers and Classrooms

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<td>SD</td>
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<td>Max</td>
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<tr>
<td>White</td>
<td>1247</td>
<td>77</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Latino</td>
<td>166</td>
<td>10</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Multi-racial/Other Race</td>
<td>76</td>
<td>5</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Procedure and measures

During the fall and spring of the pre-kindergarten years, direct assessments of the children’s language skills were conducted and extensive classroom observations were made. Teachers also completed fall and spring questionnaires about the study children, including ratings of child social skills. In the spring of the kindergarten year, teachers completed spring questionnaires for each study child.

Classroom quality

Two observational measures of classroom quality were used, the Early Childhood Environmental Rating Scales-Revised (ECERS-R; Harms, Clifford, & Cryer, 1998) and the Classroom Assessment Scoring System (CLASS; La Paro & Pianta, 2003). For both measures, observation days lasted from the time children arrived until they started nap (in full-day programs) or left for the entire school-day day (in half-day programs).

Early Childhood Environment Rating Scale-Revised (ECERS-R). ECERS-R is a well-documented measure of global classroom quality (Vandell & Wolfe, 2000; Peisner-Feinberg et al., 2001; Cassidy, Hestenes, Hedge, Hestenes, & Mims, 2005; Holloway, Kagan, Fuller, Tsou, & Carroll, 2001; Perlman, Zellman, & Le, 2004; Bowman et al., 2000). The ECERS-R is specifically designed for use in classrooms serving children 2 ½ -5 years of age. Scores on the ECERS-R range from 1-7 with 1 indicating “inadequate” quality, 3 indicating “minimal” quality, 5 indicating “good” quality, and 7 indicating “excellent” quality.

In addition to the Total Score, factor analysis with varimax rotation of the ECERS-R scores from pre-kindergarten classrooms in the first six states yielded two factors. Confirmatory factor analysis using data from the additional five states confirmed this factor solution. The first factor, labeled Teaching and Interactions, is a composite of 11 indicators:
greeting/departing, encouraging children to communicate, using language to develop reasoning skills, informal use of language, supervision of gross motor activities, general supervision of children, discipline, staff-child interactions, interactions among children, free play, and group time (α = .86). The second factor, labeled Provisions for Learning, is a composite of 12 indicators: furniture for relaxation, room arrangement, gross motor equipment, fine motor, art, blocks, sand/water, dramatic play, nature/science, schedule, free play and group time (α = .84). The correlation between the two factors was 0.54, \( p < .0001 \).

These two factors are similar to factors found in previous factor analytic studies of the ECERS (Clifford, Burchinal, Harms, Rossbach, & Lera, 1996).

**Classroom Assessment Scoring System (CLASS)** (La Paro & Pianta, 2003). The CLASS provides an assessment of the classroom quality as indicated by measures of social and emotional climate and instructional supports for learning. Each of nine dimensions is rated from 1-7 with 1 or 2 indicating the classroom is low on that dimension, and 3, 4, or 5 indicating that the classroom is in the mid-range, and a 6 or 7 indicating the classroom is high on that dimension.

Social and emotional climate measures include five scales: Positive Climate, Negative Climate, Teacher Sensitivity, Over-control and Behavior Management. Positive Climate reflects the enthusiasm, enjoyment, and respect displayed during interactions between the teacher and children and among children. Negative Climate is the degree to which the classroom has a negative emotional and social tone (displays of anger, aggression, and/or harshness). Teacher Sensitivity is the extent to which teachers provide comfort, reassurance, and encouragement. Over-control reflects the extent to which classroom
activities are rigidly structured or regimented. Effective Behavior Management encompasses the teacher’s ability to use effective methods to prevent and redirect children’s misbehaviors.

Instructional Quality dimensions are measured on four scales: Productivity, Concept Development, Instructional Learning Format and Quality of Feedback. Productivity reflects how well the teacher manages instructional time and routines so that children learn and make progress. Concept Development considers the strategies teachers employ to promote children’s higher order thinking skills and creativity through problem-solving, integration, and instructional discussions. Instructional Learning Formats includes the availability of activities, method of presentation, use of groupings, and range of materials that teachers use to maximize children’s engagement. Finally, Quality of Feedback focuses on the quality of verbal evaluation provided to children about their work, comments, and ideas.

The observer rated the pre-kindergarten classroom and the teacher on the nine dimensions roughly every 30 minutes. In the Multi-State Study of Pre-Kindergarten, the CLASS was conducted on two days in the spring. Each classroom’s score is the average of its scores across the two days. In the SWEEP Study, the CLASS was collected on a single day and each classroom’s score is the average of its scores throughout that day.

Factor analysis with varimax rotation of the CLASS yielded two factors, Emotional Climate and Instructional Climate, consistent with the findings in a study of 223 kindergarten classrooms (Pianta et al., 2002). Emotional Climate is a mean of positive climate, negative climate (reversed), teacher sensitivity, over-control (reversed), and effective behavior management ($\alpha = .84$). The second factor, termed Instructional Climate, is a composite of concept development and quality of feedback ($\alpha = .78$). The CLASS factors of emotional and instructional support both show moderate associations with the ECERS-R ($r=.52$, and
\( r = .40, \) respectively), and higher scores on CLASS indicators are related to children’s concurrent level of engagement as measured by the Teacher-Child Engagement Scale on the Snapshot (Ritchie, Howes, Kraft-Sayre, & Weiser, 2002; La Paro, Pianta, & Stuhlman, 2004).

**Global Classroom Quality Composite.** A global quality composite was created by taking the mean of the overall ECERS-R rating and the overall CLASS rating, as preliminary analyses revealed moderate to high correlations between the measures (see Table 3). Given the level of correlation between these measures, creating the global quality composite reduced outcome variables while also increasing reliability (Howes et al., 2006). Although in combining these measures some of the unique factors measured by the two quality measures were lost, it was determined that the perceived benefits of the quality composite outweigh the disadvantages.

Table 3

Correlations between Measures of Pre-kindergarten Classroom Quality

<table>
<thead>
<tr>
<th></th>
<th>ECERS-R Total Score</th>
<th>ECERS-R Teaching/Interactions</th>
<th>ECERS-R Provisions of Learning</th>
<th>CLASS Instructional Climate</th>
<th>CLASS Emotional Climate</th>
</tr>
</thead>
<tbody>
<tr>
<td>ECERS-R</td>
<td>1.000</td>
<td>.883*</td>
<td>.884*</td>
<td>.593*</td>
<td>.437*</td>
</tr>
<tr>
<td>Teaching &amp;</td>
<td>1.000</td>
<td>.673*</td>
<td>.663*</td>
<td>.446*</td>
<td>.644*</td>
</tr>
<tr>
<td>Interactions</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Provisions of</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Learning</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CLASS</td>
<td>1.000</td>
<td>.695*</td>
<td>.365*</td>
<td>.324*</td>
<td></td>
</tr>
<tr>
<td>Instructional</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>.905*</td>
</tr>
<tr>
<td>Climate</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Emotional</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Climate</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* \( p < .001 \)
Observer Training and Reliability

Prior to data collection for each of the two studies, each data collector’s reliability on the ECERS-R was tested during a visit to a practice classroom with one of four project staff who were experts in this measure. Data collectors’ mean weighted kappa with the expert trainer was .69 ($n = 44$, $SD = .07$, range = .59 to .83) on their final test. On average, 84% of data collector responses were within one scale-point of the trainer’s codes. These levels of agreement are consistent with the use of the ECERS-R in other studies (e.g., Burchinal et al., 2000, 2002; Peisner-Feinberg et al., 1999, 2001). Landis and Koch (1977) indicate that kappas between .60 and .80 represent substantial inter-rater agreement.

Data collector reliability was tested on the CLASS using visits to pre-kindergarten classrooms with one of the measure’s authors or a combination of videotaped segments of classrooms and visits with the measure’s authors or expert coders. Data collectors’ mean weighted kappa was .66 ($SD = .04$, $n = 43$) on their final test. On average, 86% of data collector responses were exactly the same or within one scale-point of the expert’s responses. This level of agreement was equal to or higher, on average, than that obtained in studies using these scales in kindergarten (Pianta et al., 2002) and first grade (NICHD ECCRN, 2002) in which the scales were significantly related to children’s social and academic functioning.

Teacher and Classroom Attributes

Teachers completed questionnaires that provided information on their demographic characteristics, such as their years of education, pre-kindergarten teaching experience, and credentials in early childhood. In addition, during the course of selecting the sample of children, a very brief demographic questionnaire went home to the families of all the children.
in the selected classrooms. One question assessed the family’s income level, which was then categorized as above or below 150 percent of the poverty line for their family size. Then for each classroom the percentage of children at or below 150 percent of poverty was calculated. Another question provided information on maternal education; the mean number of years of maternal education for each classroom was calculated.

**Child Predictors: Individual Child Assessments**

A trained data collector assessed each participating child during the fall of the pre-kindergarten year. The entire battery took between 45 minutes and one hour and was conducted during the school day, outside the classroom. Data collectors were trained on all measures in a group training session during the summer prior to data collection. After training they practiced the child assessments with volunteer children. Prior to data collection, in order to ensure that the child assessment battery was being correctly administered, data collectors submitted videotapes of themselves conducting the assessment or conducted an assessment that was observed by one of the study supervisors.

**Pre-LAS English Proficiency Screener** (Duncan & De Avila, 1998). The Pre-LAS English proficiency screener is a portion of the Pre-LAS test used to determine English proficiency levels. The Pre-LAS screener was administered during the fall of pre-kindergarten to children who did not speak English in the home as a means of determining in which language they would be tested (i.e., English vs. Spanish). Limited English proficiency (LEP) status was determined based on children’s scores on the Pre-LAS screener, with failing scores on this measure (less than 31 out of a possible 40) indicating Limited English Proficient (LEP) children. English proficient children included both those that passed the
Pre-LAS screener and those that did not take the Pre-LAS because they spoke English at home.

Children were tested in English if they spoke English at home or passed the initial English proficiency screener. Spanish speaking children who did not pass this screener were given the Spanish assessment battery. For the purposes of this analysis only those children who received the assessments in English are included because the English and Spanish tests cannot be calibrated and therefore cannot be included in the same analyses. Children who did not pass the screener and did not speak Spanish at home were not given an assessment, thus they are not included in these analyses.

**Peabody Picture Vocabulary Test- 3rd edition (PPVT-III)** (Dunn & Dunn, 1997). The PPVT-III is a test of receptive vocabulary and has shown to relate to other measures of language, literacy, and academic achievement (Chow & McBride-Chang, 2003; Dunn & Dunn, 1997). Children are shown a set of 4 pictures and are asked to select the picture that best represents the meaning of a word spoken by the examiner. A standard score is computed for this scale. According to the scale’s authors, the alpha coefficient of all the items on this scale range from .92 to .98 with a median reliability of .94.

**Oral & Written Language Scale (OWLS) (Oral Expression Scale)** (Carrow-Woolfolk, 1995). The Oral Expression Scale is a standardized measure designed to assess the understanding and use of spoken language. The measure’s authors report correlations between the OWLS and achievement tests that range from .44 to .89. During the assessment, the examiner reads a verbal stimulus aloud while the child looks at a stimulus board containing one or more pictures. Children are required to respond orally by answering a question, completing a sentence, or generating a new sentence (or sentences). A standard
score is computed on this scale. According to the measure’s authors, test-retest reliability for
the 4-to 6-year-old age range on the Oral Expression Scale is .86.

**Language Composite.** A composite score was created combining scores of the two
language measures, the PPVT-III and the OWLS (α = .78), as a measure of language skills
(Dunn & Dunn, 1997; Carrow-Woolfolk, 1995). The large correlation (r = .677) between
these two language measures suggests the composite score creates a more reliable measure of
ability while reducing the number of predictor variables (Burchinal et al., 2006; see Table 4).

Table 4

Correlations between Measures of Child Predictor Variables

<table>
<thead>
<tr>
<th></th>
<th>Language</th>
<th>Behavior Ratings</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>PPVT-III</td>
<td>OWLS</td>
</tr>
<tr>
<td>Language</td>
<td></td>
<td>1.000  .677*</td>
</tr>
<tr>
<td>PPVT-III</td>
<td>1.000</td>
<td></td>
</tr>
<tr>
<td>OWLS</td>
<td></td>
<td>1.000</td>
</tr>
<tr>
<td>Behavior Ratings</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Social Competence</td>
<td>1.000</td>
<td>-.690*</td>
</tr>
<tr>
<td>Behavior Problems</td>
<td></td>
<td>1.000</td>
</tr>
</tbody>
</table>

* p <.001

**Child Predictors: Teacher Ratings**

Teachers rated study children on scales measuring social skill and behavioral
adjustment during the fall of the pre-kindergarten year.

**Social skills.** Teachers completed the Teacher-Child Rating Scale (TCRS)
concerning children’s social and behavior problems (Hightower et al., 1986). In the fall of
the pre-kindergarten year, teachers rated children on 20 social competence items and 18
behavior problem items. Teachers rated children individually using a scale from 1-5 on how
well statements described the child. Examples of social competence items include:
“participates in class discussions,” “completes work,” and “well-liked by classmates.” The social competence scale is the mean of the 20 social competence items and has a Cronbach’s alpha of .95 in the fall of the pre-k year. Examples of behavior problem items include: “disruptive in class,” “anxious,” and “difficulty following directions.” The behavior problems scale is the mean of the 18 behavior problem items and has a Cronbach’s alpha of .92 in the fall of the pre-k year.

**Social Skills Composite.** A composite score was created by combining the social competence and behavior problems ratings (reverse coded) from the TCRS ($\alpha = .80$) (Hightower et al., 1986). Again, the highly correlated relationship between these two scales ($r = -.690$) suggested that the composite score creates a more reliable measure of ability while reducing the number of predictor variables (Burchinal et al., 2006; see Table 4).

**Special Education Status**

Data on special education placement for each study child was collected from teacher questionnaires during the spring of the kindergarten year (see Appendix). For each study child, teachers were asked if the child has “ever been referred for evaluation for an Individualized Education Plan (IEP),” (question 16) and “does this child have an IEP” (question 17). Additionally if the child did have an IEP they were asked, “what type of disability is described on this child’s IEP” (question 19). They were asked to select all options that applied from the following: “speech,” “physical/sensory,” “cognitive/language,” “social/emotional,” and “other.” Teachers who selected “other” were provided a space to specify the disability. In addition, if the child did not already have an IEP, kindergarten teachers answered, “by the end of the year do you think you will recommend this child be evaluated for an IEP” (question 20), and “do you think you will recommend this child be
evaluated for an IEP when s/he begins the first grade” (question 21). Table 5 reports the special education status for the children participating in the study. Lines on that table represent all possible combinations of teacher responses to the questions. Categories are not mutually exclusive. For example, children counted in the category of “does not have a past referral or IEP, but teacher plans to refer by the end of K” may also fall in the category of “does not have a past referral or IEP, but teacher plans to refer before 1st” as teachers may report that they plan to refer the child both by the end of the year and before first grade. Additionally, Figure 1 provides a visual depiction of the various patterns of special education status and the missing data. Because preliminary analyses revealed a small percentage of children had IEPs (3.37 % of total), the present study does not analyze the five categories of disability as separate outcomes (see Table 6).

Table 5

<table>
<thead>
<tr>
<th>Special Education Status1</th>
<th>N</th>
<th>% of non-missing (n = 2024)</th>
<th>% of total (N = 2966)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spring of Kindergarten non-missing (n = 2024)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Has past referral and has an IEP</td>
<td>100</td>
<td>4.94</td>
<td>3.37</td>
</tr>
<tr>
<td>Has past referral, does not have an IEP, but teacher plans to re-refer by the end of K</td>
<td>23</td>
<td>1.14</td>
<td>.78</td>
</tr>
<tr>
<td>Has past referral, does not have an IEP, but teacher plans to re-refer before 1st</td>
<td>28</td>
<td>1.38</td>
<td>.94</td>
</tr>
<tr>
<td>Has past referral, does not have an IEP, no teacher plans to re-refer at this time</td>
<td>29</td>
<td>1.43</td>
<td>.98</td>
</tr>
<tr>
<td>Does not have a past referral or IEP, but teacher plans to refer by the end of K</td>
<td>39</td>
<td>1.93</td>
<td>1.31</td>
</tr>
<tr>
<td>Does not have a past referral or IEP, but teacher plans to refer before 1st</td>
<td>84</td>
<td>4.15</td>
<td>2.83</td>
</tr>
<tr>
<td>Does not have a past referral or IEP, no teacher plans to refer before at this time</td>
<td>1774</td>
<td>87.65</td>
<td>59.81</td>
</tr>
</tbody>
</table>

1Note. Categories on this table are not mutually exclusive.
Figure 1. Special Education Status Flow Chart

Has child been referred in the past?  
N = 2966

- Yes- Received referral  
  $n = 161$
  - Have IEP?  
    - Yes  
      $n = 100$
    - No  
      $n = 61$
    - Plan to refer?  
      - Yes  
        $n = 32$
      - No  
        $n = 29$
      - By end of K$^3$  
        $n = 23$
      - By First$^3$  
        $n = 28$

- Missing$^i$  
  $n = 942$

- No- No past referral  
  $n = 1863$
  - Plan to refer?  
    - Yes  
      $n = 89$
    - No  
      $n = 1774$
    - By end of K$^2$  
      $n = 39$
    - By First$^2$  
      $n = 84$

Notes:  
$^i$ These missing values were imputed using the approach described on p. 49, but the overall pattern stayed the same  
$^2$ Categories are not mutually exclusive  
$^3$ Categories are not mutually exclusive  

Special Education Status Variable
Table 6

Children with IEPs by Disability Category

<table>
<thead>
<tr>
<th>Type of Disability (n = 2966)</th>
<th>n</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Speech</td>
<td>84</td>
<td>2.8</td>
</tr>
<tr>
<td>Physical/Sensory</td>
<td>6</td>
<td>.2</td>
</tr>
<tr>
<td>Cognitive/Language</td>
<td>21</td>
<td>.7</td>
</tr>
<tr>
<td>Social/Emotional</td>
<td>8</td>
<td>.3</td>
</tr>
<tr>
<td>Other</td>
<td>8</td>
<td>.3</td>
</tr>
</tbody>
</table>

Note. Categories are not mutually exclusive.

*Other categories reported included: attentional issues, auditory training, developmental delay, low academic ability, motor, preschooler with disability, reading.

The current analyses consider special education status as a dichotomous variable. Category 1 includes children who either have an IEP (question 17) or teachers plan to recommend for evaluation either by the end of kindergarten (question 19), or the beginning of first grade (question 20). They are compared to Category 2 which includes children who do not fall into any of those groups. The children that teachers indicated had been referred for evaluation of an IEP (n = 61) but do not currently have an IEP are excluded from the special education status variable. This exclusion was made because children who were referred in the past fall into one of three groups: (1) children who were referred and received an IEP, (2) children who were referred and determined not to need services at the time of evaluation, and (3) children who were referred and have not yet completed the evaluation process. Ninety-nine children fall into this first group, children who were referred in the past and received an IEP. These 99 children are accounted for by a positive response to question 17. Unfortunately, the way the questions were worded, it is not possible to know when the original referral was made and how many children fall into the second versus the third group.
In cases where children were evaluated and determined to be ineligible for services (the second group), if teachers continue to have concerns at the end of kindergarten they will recommend them for reevaluation. These children are captured by questions 19 and 20. If the teachers no longer have concerns, omitting them from the special education group for these analyses is appropriate. This leaves only the group that has not yet completed the evaluation process (the third group). Omitting them from the special education group was the most conservative approach because, given the wording of the questions, it is impossible to distinguish between these children and those that have been evaluated and deemed ineligible for services. As such, including this group of children would also require the inclusion of children who were already determined to be ineligible for special education. Doing so would essentially result in including a number of false positive responses. The alternative involves excluding both groups of children, those that have not yet completed the referral process and those that were found to be ineligible. Whereas this option is also not ideal as it eliminates children who have not yet undergone evaluation from the analyses, it was preferable to create this more conservative estimate than to include a group of children that have been determined not to meet special education criteria.

Thus, the outcome variable that compares children who either have an IEP or will be recommended for evaluation, versus children that do not fall into either category, should capture the special education status (see Table 7).
Table 7

Special Education Status Variable

<table>
<thead>
<tr>
<th></th>
<th>n</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Total for Special Education Status Variable</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Children with IEP</td>
<td>100</td>
<td>3.4</td>
</tr>
<tr>
<td>Teachers Plan to Recommend by End of Kindergarten or Beginning of 1st Grade</td>
<td>121</td>
<td>4.1</td>
</tr>
<tr>
<td><strong>Total Children with IEP or Teachers Plan to Recommend</strong></td>
<td>221</td>
<td>7.5</td>
</tr>
</tbody>
</table>

Data Analysis Plan

**Multiple Imputation**

To account for missing data, Bayesian multiple imputation (MI) using the Marco Chain Monte Carlo (MCMC) method was applied. Multiple imputation is considered the state of the art technique for accounting for data that are missing (Schafer & Graham, 2002). The type of multiple imputation method applied to a dataset is determined based on the type of missing data pattern. Data may be missing in either a monotone or arbitrary missing data pattern. Data are considered to have a monotone missing data pattern when missing data for a particular individual on one variable means that all subsequent variables are also missing (i.e., after participants leave the study) (Rubin, 1987). A random or arbitrary missing data pattern may include this type of missing data as well as other randomly occurring missing variables. The current dataset can be characterized as having an arbitrary missing data pattern because it contains occurrences of both monotone and arbitrary missing data. For example, while a few children left the study causing monotone missing data for these participants, at times data was randomly missing only on certain variables due to issues such as respondent error.
The MCMC approach is a highly recommended approach that is well-suited to dealing with datasets in which data are missing in arbitrary patterns (Little & Rubin, 2002). This MI process uses data from all available variables, not just those included in the models, to estimate missing values based on simulations from a prediction distribution for normal data. Each missing value in the dataset is replaced by a simulated value to create a complete data set. This process is completed \( m \) times to form a total of \( m \) complete sets of data. Statistical analyses investigating the research questions are then performed on each of the \( m \) datasets and then estimated results from each are averaged for an overall estimate. The number \( m \) is determined based on the percentage of missing data in the sample using the following expression: 
\[
(1 + \lambda/m)^{-1},
\]
where \( \lambda \) is the rate of missing information (Rubin, 1987). Multiple imputation has been shown to be a powerful method that can efficiently be applied to even small to moderate size samples and it is able to account for large portions of missing data (Rubin, 1987). Given the large sample size in the current dataset and the moderate rate of missing values, with never more than 22 percent missing data per variable, multiple imputation is considered a valid and appropriate method for accounting for missing data. See Table 8 for information on missing data for each variable, as well as means and standard deviations before and after imputation. Note that imputation had very little effect on variable means and standard deviations.
Table 8

Participant Characteristics Before and After Multiple Imputation

<table>
<thead>
<tr>
<th></th>
<th>Before Imputation</th>
<th>Possible Range</th>
<th>After Imputation</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n</td>
<td>M</td>
<td>SD</td>
</tr>
<tr>
<td>Child Characteristics and Skills (n = 2966)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maternal Education</td>
<td>2885</td>
<td>12.64</td>
<td>2.39</td>
</tr>
<tr>
<td>Age in Fall</td>
<td>2700</td>
<td>4.62</td>
<td>0.32</td>
</tr>
<tr>
<td>Language Ability in Fall of PreK</td>
<td>2298</td>
<td>92.71</td>
<td>12.91</td>
</tr>
<tr>
<td>Social Skills in Fall of PreK</td>
<td>2574</td>
<td>3.98</td>
<td>.60</td>
</tr>
<tr>
<td>PreK Classrooms (n = 704)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Child to teacher ratio</td>
<td>703</td>
<td>7.66</td>
<td>3.40</td>
</tr>
<tr>
<td>Percent Below 150% Poverty</td>
<td>704</td>
<td>.58</td>
<td>.32</td>
</tr>
<tr>
<td>Hours per week</td>
<td>663</td>
<td>22.53</td>
<td>12.06</td>
</tr>
<tr>
<td>Quality Composite</td>
<td>704</td>
<td>4.16</td>
<td>.65</td>
</tr>
<tr>
<td>PreK Teachers (n = 704)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Years of experience</td>
<td>672</td>
<td>13.40</td>
<td>9.38</td>
</tr>
<tr>
<td>Years of education</td>
<td>689</td>
<td>16.06</td>
<td>1.75</td>
</tr>
</tbody>
</table>

**Descriptive Analysis**

Preliminary analyses were conducted to describe the sample. First, to examine whether children differed across four levels of special education status Analyses of Variance (ANOVAs) and chi-square analyses were conducted to compare children across the four mutually exclusive groups: (1) children who had an IEP, (2) children who did not have an IEP but had received a referral for evaluation, (3) children who did not have an IEP or a past referral, but whose teachers planned to recommend for future evaluations, and (4) children who did not fall into any of the three categories. Specifically, chi-square analyses compared...
children across the four special education status on the categorical variables of gender and race (Black, White, Latino, and Multi-racial/Other). Additionally, to make certain that the limited English proficient (LEP) children were not being referred to special education at significantly higher rates than English speakers, analyses were conducted comparing special education status for the LEP and non-LEP children. ANOVAs compared children across the four categories on child level variables such as age and maternal education. Finally, children were compared across the four groups on child ability at entry to pre-kindergarten, including language and social skills.

Next, analyses were conducted to compare the children across the dichotomous special education status variable: (1) children that either had an IEP or were expected to be referred, and (2) children who did not have IEPs and were not expected to be referred. Specifically, ANOVA and chi-square analyses were used to compare these groups of children across the child level demographic variables of gender, race, LEP status, age, and maternal education, as well as child language and social skill ability at entry to pre-kindergarten.

**Hypothesis 1. Abilities of Young Children Predict Kindergarten Special Education Status**

To investigate the predictive power of early childhood characteristics, the analysis used a general linear model (GLM), which takes the clustering of children by classroom into account. As mentioned previously, the outcome variable of special education at the end of kindergarten was treated as the dichotomous outcome: child has IEP or will be referred versus child does not have IEP. Performance on the child assessments during the fall of pre-kindergarten were treated as independent variables in the two GLM analyses. Specifically,
the first analysis used the composite score of the two language measures, the PPVT-III and the OWLS, as a measure of language skills at entry to pre-kindergarten (Dunn & Dunn, 1997; Carrow-Woolfolk, 1995). Similarly, the second analysis used the composite score for behavior which was created by combining the social competence and behavior problems ratings (reverse coded) from the TCRS (Hightower et al., 1986). Both the language and behavior composite scores functioned as continuous variables in the GLM models. In order to consider the predictive power of these child characteristics above and beyond child demographic characteristics that are linked to academic outcomes, analyses included child-level covariates of gender, ethnicity, maternal education, and family income. It was predicted that lower scores on each composite scale would be associated with increased probability of special education placement, even when taking child socio-demographics into account. Given the dichotomous categorical outcome variable, for all significant findings, estimates of odds ratios (OR) were calculated to determine the effect size of the outcome. Odds ratio estimates are reported in terms of the increase in odds for one unit change of the independent variable. For instance, an odds ratio of 1.05 for the association between language skills and special education status would indicate that for every unit decrease in language ability score, the odds of a child having an IEP or a planned referral for evaluation at the end of kindergarten are 1.05 times higher.

**Hypothesis 2. Association Between Class Quality and Kindergarten Special Education**

Next, for each model, variables of quality were added to the GLM analyses to investigate the effects of pre-kindergarten classroom quality on later special education status for each predictor variable. Specifically, the global quality composite, which combined the mean of the overall ECERS-R rating and the overall CLASS rating as described previously,
was added to the analyses. It was expected that higher global quality would be associated with lower special education placement over and above the effects of language and social skills.

As follow-up, analyses were re-run including the four individual factor scores of the two quality measures in place of the quality composite: (1) ECERS-R Provisions for Learning, (2) ECERS-R Teaching and Interactions, (3) CLASS Instructional Climate, and (4) CLASS Emotional Climate. These analyses were conducted to ensure that the effects of different dimensions of quality assessed by the ECERS-R and CLASS were not lost in the overall composite.

**Hypothesis 3. Interaction Effects Between Child Skills and Classroom Quality**

Finally, analyses were conducted to examine interactions between class quality and child skills at entry to pre-kindergarten in predicting special education referral. Separate analyses were run for the two child predictors, language ability and behavior ratings. In both analyses the dichotomous variable of special education placement was used as the dependent outcome variable. The model included the global quality composite and the language ability composite, each as a continuous independent variable. To investigate the interaction between quality and language ability, these two variables were multiplied together. It was predicted that there would be a significant quality by language ability interaction with stronger association between language ability and special education placement when quality is lower.

To investigate the interaction between quality and behavior ratings at entry to pre-kindergarten, a model was tested that included the composite score for behavior ratings, the composite score for quality and the product of the two. An interaction effect for quality and behavior ratings was predicted. Specifically, it was expected that the association between
behavior ratings and special education referral would be stronger in lower quality classrooms.

For both language and behavior ratings, follow-up analyses were conducted with the four individual factors of classroom quality and the interactions between the individual factors of classroom quality and the child score, in order to assess the differential impact of the various aspects of classroom quality. Interaction effects were expected for language ability and the individual quality factors of ECERS-R Teaching and Interaction and CLASS Instructional Climate and Emotional Climate. As these factors have been associated with greater child gains in language and literacy, it was expected that high scores on each factor would be associated with reduced rates of special education in children with language delays at entry to pre-kindergarten (Burchinal et al., 2006). For behavior ratings at the entry to pre-kindergarten, interactions are expected with the individual quality factor of the CLASS Emotional Climate. Specifically, it was predicted that higher ratings of Emotional Climate are associated with reduced special education placement for children with delays in behavior at entry to pre-kindergarten.
CHAPTER IV

RESULTS

Multiple Imputation

As described above, all analyses were derived from the multiply imputed datasets. All statistical analyses were conducted on each of five imputed datasets and results were combined across them. Table 8 displays descriptive data for the combined imputed variables used in the following analyses including means, standard deviations, and the percent of values that were imputed per variable.

Descriptive Analysis Using Four-Level IEP Status

Preliminary analyses of variance (ANOVAs) and chi-square analyses compared children in the different groups of special education status at the end of kindergarten. Specifically, comparisons were first made between four mutually exclusive groups: (1) children who had an IEP, (2) children who did not have an IEP but had received a referral for evaluation, (3) children who did not have an IEP or a past referral, but whose teachers planned to recommend for future evaluations, and (4) children who did not fall into any of the three categories. Table 9 details these group comparisons.
Table 9

Child Characteristics by Four Levels of Special Education Status (N= 2966)

<table>
<thead>
<tr>
<th></th>
<th>Have IEP (n=117-127)</th>
<th>Referred for Evaluation (n=97-117)</th>
<th>Teacher Plans to Refer (n=126-130)</th>
<th>No IEP or Referral (n=2603-2623)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Categorical</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td><strong>Demographic Characteristics</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gender</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Boys</td>
<td>89</td>
<td>6.10</td>
<td>69</td>
<td>4.73</td>
</tr>
<tr>
<td>Girls</td>
<td>38</td>
<td>2.52</td>
<td>36</td>
<td>2.39</td>
</tr>
<tr>
<td>Race/ethnicity</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Black</td>
<td>13</td>
<td>2.44</td>
<td>24</td>
<td>4.50</td>
</tr>
<tr>
<td>White</td>
<td>67</td>
<td>5.58</td>
<td>45</td>
<td>3.75</td>
</tr>
<tr>
<td>Latino</td>
<td>16</td>
<td>2.09</td>
<td>25</td>
<td>3.27</td>
</tr>
<tr>
<td>Multi-racial/Other Race</td>
<td>15</td>
<td>3.74</td>
<td>9</td>
<td>2.24</td>
</tr>
<tr>
<td>English proficiency</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Limited English proficient</td>
<td>12</td>
<td>2.77</td>
<td>26</td>
<td>6.00</td>
</tr>
<tr>
<td>English proficient</td>
<td>105</td>
<td>4.15</td>
<td>91</td>
<td>3.59</td>
</tr>
<tr>
<td><strong>Continuous</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Demographic Characteristics</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maternal Education (years)</td>
<td>12.79</td>
<td>.23</td>
<td>12.39</td>
<td>.26</td>
</tr>
<tr>
<td>Child’s Age in Fall (years)</td>
<td>4.64</td>
<td>.03</td>
<td>4.58</td>
<td>.04</td>
</tr>
</tbody>
</table>

Skills of Young Children

<table>
<thead>
<tr>
<th></th>
<th>Language in Fall of PreK</th>
<th>Social Skills in Fall of PreK</th>
</tr>
</thead>
<tbody>
<tr>
<td>M</td>
<td>87.05</td>
<td>3.63</td>
</tr>
<tr>
<td>SD</td>
<td>1.53</td>
<td>.06</td>
</tr>
<tr>
<td>M</td>
<td>86.28</td>
<td>3.60</td>
</tr>
<tr>
<td>SD</td>
<td>1.63</td>
<td>.10</td>
</tr>
<tr>
<td>M</td>
<td>83.58</td>
<td>3.58</td>
</tr>
<tr>
<td>SD</td>
<td>1.50</td>
<td>.06</td>
</tr>
<tr>
<td>M</td>
<td>91.30</td>
<td>4.03</td>
</tr>
<tr>
<td>SD</td>
<td>.32</td>
<td>.01</td>
</tr>
</tbody>
</table>

Note. Special education groups are mutually exclusive. Median values from the five imputations are reported for $\chi^2$ tests. n values for the overall categories are expressed by range because they vary by variable. Single df post hoc analyses were conducted when $\tilde{\chi}^2$ tests were significant and these results are presented in the text.
Associations between the categorical independent variables (i.e., gender, race, English proficiency status) and the four-level IEP status variable were first tested using multiple degree of freedom chi-square tests (see Table 9). When these chi-squares revealed significant between group differences for the categorical variables follow-up single degree of freedom chi-square tests were completed comparing each of the four special education groups to the other three groups on each level of the demographic variable. For example, for follow up testing on the variable of gender, first the proportion of boys versus girls in the group of children with an IEP (group 1) was compared to the proportion of boys versus girls for those who had been referred (group 2). Next, gender proportions were compared for children with an IEP (group 1) to those who had been recommended for an evaluation (group 3). Then children with an IEP (group 1) were compared to those without an IEP, referral, or recommendation (group 4) on gender. Individual group comparisons were made in the same way across the other IEP groups for a total of six separate single degree of freedom chi-square tests (i.e., IEP groups 1 vs. 2, 1 vs. 3, 1 vs. 4, 2 vs. 3, 2 vs. 4, and 3 vs. 4).

Results from the single degree of freedom chi-square tests of gender indicated that there was a significantly higher proportion of boys than girls that had an IEP (group 1; $\chi^2(1, N=2966) = 26.52, p<.001$), a referral (group 2; $\chi^2(1, N=2966) = 20.27, p<.001$), or a recommendation for evaluation (group 3; $\chi^2(1, N=2966) = 11.15, p<.001$), compared to those that had no IEP, referral, or recommendation (group 4). The other three tests for gender were non-significant.

Comparison across the different racial/ethnic groups of Black, White, Latino, and Multi-racial/Other indicated several significant between group differences. First, four separate multiple degree of freedom chi square tests were conducted (one for each
racial/ethnic group) to see if the proportions of the racial/ethnic group differed between special education groups. For each racial/ethnic group with a significant multiple degree of freedom chi-square, post-hoc analyses were conducted comparing children in that racial/ethnic group to the children in the other three racial/ethnic groups combined on each of the four IEP groups, resulting in six single degree of freedom tests for each racial group with a significant multiple degree of freedom test. Post-hoc analyses were not conducted for the Black and multi-racial groups because the overall chi-square was non-significant.

A higher proportion of White children than non-White children had an IEP (group 1) compared to children with a referral (group 2; \( \chi^2(1, N=2966) = 6.61, p<.05 \)), children with a recommendation (group 3; \( \chi^2(1, N=2966) = 12.60, p<.001 \)), and children with no IEP, referral, or recommendation (group 4; \( \chi^2(1, N=2966) = 12.53, p<.001 \)). This result means that, contrary to expectations, White children were more likely than non-White children to have an IEP. The other three tests for White versus non-White were non-significant.

Significant differences were found for Latinos compared to the other three racial groups, with a higher proportion of non-Latinos than Latinos having an IEP (group 1) compared to those not having an IEP, referral, nor recommendation for evaluation (group 4; \( \chi^2(1, N=2966) = 9.46, p<.01 \)). There were no other significant between group differences in the five other tests.

No post hoc analyses were conducted for English proficiency status (LEP vs. English proficient) because the multiple degree of freedom test was not significant.

Associations between the continuously measured independent variables (i.e., maternal education and child age) and the four-level IEP outcome variable were first tested using multiple degree of freedom ANOVAs (see Table 9). These ANOVAs revealed significant
between group differences for both variables, so follow-up independent t-tests were completed comparing each of the four special education groups to the other three groups on each of the two variables (i.e., six tests of maternal education and six tests of child age). For example, first children with an IEP were compared to those who had been referred on maternal education. Next, children with an IEP were compared to those who had been recommended for an evaluation. Then children with an IEP were compared to those without an IEP, referral, or recommendation. Individual group comparisons were made in the same way across the other IEP groups for a total of six tests (i.e., IEP groups 1 vs. 2, 1 vs. 3, 1 vs. 4, 2 vs. 3, 2 vs. 4, and 3 vs. 4). After completing the six maternal education tests, the same comparisons were conducted for child age.

For maternal education these post-hoc analyses indicated that children with a recommendation for evaluation (group 3) had mothers with less education than children without IEP, referral, or recommendation for evaluation (group 4; F(3, 2962) = 2.84, p < .05). The other five tests were non-significant.

Similarly, analyses comparing groups across child age found significant between-group differences. Follow up testing suggests that children recommended for future evaluations (group 3) were younger than those who had no IEP, referral or recommendation (group 4; F(3, 2962) = 2.75, p < .05). None of the other groups differed with regard to child age.

In addition, the special education groups were compared on child level assessment scores including measures of language ability and social skills at the entry to pre-kindergarten, using the same analyses strategy described above for the continuously measured demographic characteristics. Between group differences were noted in language
ability and social skills. Post-hoc testing for language ability found the group of children without IEP, past referral, or recommendation for future evaluation (group 4) had significantly higher language skills than those with IEPs (group 1; F(3, 2962)= 3.13, p<.05), those with past referral (group 2; F(3, 2962)=4.04, p<.01), and those with recommendation for future evaluation (group 3; F(3, 2962)=10.76, p<.001). The other three tests on language ability were non-significant.

Similarly, follow up testing for social skills found the group of children without IEP, past referral, nor recommendation for future evaluation (group 4) had significantly higher social skills than those with IEPs (group 1; F(3, 2962)=15.79, p<.001), those with past referral (group 2; F(3, 2962)=11.76, p<.001), and those with recommendation for future evaluation (group 3; F(3, 2962)=22.92, p<.001). The other three tests on social skills were non-significant.

**Descriptive Analysis Using Two-Level IEP Status**

Descriptive analyses were next completed comparing children across the dichotomous special education variable that served as the dependent variable for the three research questions. Specifically the group of children who either have IEPs or will be referred were compared to the group of children that did not have an IEP or a planned referral. Children with a past referral but no current IEP or planned referral were included in the second group. Results for comparisons across the dichotomous special education variable can be found in Table 10. Comparisons on child level demographic variables revealed some significant differences between groups. Specifically, gender produced differential effects with boys being more likely to have IEPs or referrals than girls. Comparisons across the four racial/ethnic groups (Black, White, Latino, Multi-racial/Other)
revealed only one difference based on race/ethnicity with Latino children being less likely to have an IEP than non-Latino children. Children across special education groups did not differ based on English proficiency status. Comparisons across the variable of child age indicated children were more likely to have an IEP or be referred for special education when they were younger. Furthermore, children were more likely to be referred for special education when maternal education was lower.

Table 10
Child Characteristics by Dichotomous Special Education Status (N = 2966)

<table>
<thead>
<tr>
<th>Categorical Demographic Characteristics</th>
<th>Have IEP or Referred (n=334-374)</th>
<th>No IEP and No Referral (n=2592-2632)</th>
<th>( \chi^2 )</th>
<th>( p )</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Boys</td>
<td>247</td>
<td>1212</td>
<td>48.63</td>
<td>.000</td>
</tr>
<tr>
<td>Girls</td>
<td>127</td>
<td>1380</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Race/ethnicity</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Black</td>
<td>69</td>
<td>464</td>
<td>.91</td>
<td>.337</td>
</tr>
<tr>
<td>White</td>
<td>139</td>
<td>1061</td>
<td>.21</td>
<td>.647</td>
</tr>
<tr>
<td>Latino</td>
<td>73</td>
<td>691</td>
<td>4.71</td>
<td>.030</td>
</tr>
<tr>
<td>Multi-racial/Other Race</td>
<td>45</td>
<td>356</td>
<td>.117</td>
<td>.732</td>
</tr>
<tr>
<td>English proficiency</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Limited English proficient</td>
<td>53</td>
<td>380</td>
<td>.126</td>
<td>.723</td>
</tr>
<tr>
<td>English proficient</td>
<td>295</td>
<td>2238</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Continuous Demographic Characteristics</th>
<th>( M )</th>
<th>( SE )</th>
<th>( M )</th>
<th>( SE )</th>
<th>( t )-test</th>
<th>( p )</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maternal Education (years)</td>
<td>12.30</td>
<td>.14</td>
<td>12.70</td>
<td>.05</td>
<td>-2.92</td>
<td>.004</td>
</tr>
<tr>
<td>Child’s Age in Fall (years)</td>
<td>4.58</td>
<td>.02</td>
<td>4.63</td>
<td>.01</td>
<td>-2.21</td>
<td>.041</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Skills of Young Children</th>
<th>( M )</th>
<th>( SE )</th>
<th>( M )</th>
<th>( SE )</th>
<th>( t )-test</th>
<th>( p )</th>
</tr>
</thead>
<tbody>
<tr>
<td>Language in Fall of PreK</td>
<td>84.5</td>
<td>1.13</td>
<td>91.4</td>
<td>.33</td>
<td>-5.46</td>
<td>.000</td>
</tr>
<tr>
<td>Social Skills in Fall of PreK</td>
<td>3.59</td>
<td>.03</td>
<td>4.03</td>
<td>.01</td>
<td>-12.92</td>
<td>.000</td>
</tr>
</tbody>
</table>

Note. Special education groups are mutually exclusive. Median values from the five imputations are reported for \( \chi^2 \) tests. \( n \) values for the overall categories are expressed by range because they vary by variable.
Comparisons across child ability variables found significant differences in special education status based on child ability at entry to pre-kindergarten. Children with either lower levels of language or social skills were more likely to have an IEP or referral for special education.

**Hypothesis 1. Abilities of Young Children Predict Kindergarten Special Education Status**

The first analyses aimed to examine whether language and social skills in young children predict later special education status. Lower levels of early fall pre-k child ability were expected to be linked to higher incidence of end of kindergarten special education placement. General linear modeling (GLM) analyses, accounting for clustering of children at the classroom level, examined the child-level assessments as predictors of later special education status. As explained previously, for all analyses, the outcome variable of special education at the end of kindergarten was treated as the dichotomous dependent variable: child has IEP or will be referred versus child does not have IEP or planned referral. Children with a past referral but no current IEP or planned referral were included in the second group. Analyses controlled for the child-level covariates of gender, ethnicity, maternal education, and family income.

**Language.** The first analysis considered the predictive power of language skills based on the composite score of the two language measures, the PPVT-III and the OWLS. Findings from this analysis lent support for the first hypothesis. As predicted, lower language skills at the start of pre-kindergarten were associated with increased probability of special education placement at the end of kindergarten, even when taking child socio-demographic characteristics into account ($\beta = -.05$, $SE = .01$, $p = .000$, $OR = 1.05$).
**Social Skills.** The second analysis considered the predictive power of social skills at entry to pre-kindergarten, using the composite score combining the social competence and behavior problems ratings (reverse coded) from the TCRS. Findings from this analysis provided support for the first hypothesis. As expected, poorer social skills at the start of pre-k were associated with increased probability of special education placement at the end of kindergarten, above and beyond the effects of the child-level covariates ($\beta = -1.02$, $SE = .10$, $p = .000$, $OR = 2.79$).

**Hypothesis 2. Association Between Class Quality and Kindergarten Special Education**

The second set of analyses explored whether preschool classroom quality was related to special education status at the end of kindergarten. It was hypothesized that higher pre-kindergarten classroom quality would be associated with lower incidence of kindergarten special education placement over and above the effects of language and social skills at entry to pre-kindergarten. To investigate these hypotheses, the global quality composite, which combined overall ECERS-R and CLASS ratings, was added to each of the GLM models specified above.

The quality composite was first added to the GLM analysis examining the predictor variable of language skills. Contrary to my hypotheses, non-significant results from this analysis indicate that classroom quality does not predict special education status above and beyond the effects of language skills ($\beta = .11$, $SE = .12$, $p = .340$). To investigate the effects of classroom quality on special education status above and beyond the effects of social skills, the quality composite was added to the social skills model. Results from this analysis were also non-significant indicating that classroom quality did not account for a significant amount of the variance in special education status beyond the effects of the social skills predictor.
variable ($\beta = .08, \ SE = .13, \ p = .516$). Follow-up analyses re-running each model with the individual factor scores of the quality measure were conducted to ensure that effects of the different dimensions of quality were not lost in the composite score. All of these follow-up analyses were non-significant.

**Hypothesis 3. Interaction Effects Between Child Skills and Classroom Quality**

The final analysis explored whether there were interaction effects between abilities of young children and classroom quality levels in predicting kindergarten special education status. An interaction between child ability and classroom quality was predicted; the association between children’s language or social skills at entry to pre-kindergarten and special education status at the end of kindergarten would be weaker when pre-kindergarten classroom quality was higher. Separate analyses were conducted for each of the two child predictor variables, language ability and social skills. These models included the global quality composite (measured continuously), the fall of pre-kindergarten score (language composite or social skills composite, also measured continuously), the interaction term (the product of quality and fall score) and the covariates of gender, ethnicity, maternal education, and family income. The dichotomous special education variable -- comparing the group of children who have an IEP or will be referred versus children who do not currently have an IEP or planned referral -- was used as the dependent variable for both analyses.

**Quality x Language.** In the first interaction analysis, the independent continuous variables of the classroom quality composite and the language ability composite were multiplied together to examine interaction effects on special education status at the end of kindergarten. The hypothesis was not supported as results of this analysis suggest that the interaction between classroom quality and language skills was non-significant in predicting
special education status ($\beta = .01, SE = .01, p = .627$). The expected stronger association between language at entry to pre-kindergarten and later special education placement when classroom quality was lower was not found. All follow-up analyses with language ability and the four individual quality factors also were non-significant.

**Quality x Social Skills.** For the second interaction analysis, the independent continuous variables of the classroom quality composite and the social skills composite were multiplied to investigate interaction effects on special education placement. Results of this analysis did not support the hypothesized interaction between social skills and classroom quality ($\beta = -.13, SE = .17, p = .416$). There was not a stronger association between social skills and later special education status when classroom quality was lower, as had been expected. Follow-up analyses re-running the model with the four individual quality factors were all non-significant.
CHAPTER V
DISCUSSION

In carrying out the current study, there were three main goals. First, the study attempted to identify the early predicting factors of special education referral and placement at the end of kindergarten. Specifically, it examined abilities of young children that serve as predictors of need for later special education services within the population of young children who were not identified for special education services at the beginning of pre-kindergarten. Second, the study examined pre-kindergarten global classroom quality to explore its association with later special education status. Finally, it investigated the impact of pre-kindergarten classroom quality on the association between abilities of young children and later special education referral. Furthermore, the study attempted to go beyond general classroom quality to see if specific types of quality, including emotional climate and instructional support, produced differential special education status based on child ability levels.

The current study specifically aimed to explore these questions within state-funded pre-kindergarten settings as such programs have become increasingly prominent in the United States over recent years (Bryant et al., 2002). To do this, data was utilized from the National Center for Early Development and Learning’s (NCEDL) Multi-State Study of Pre-Kindergarten and the Study of State-Wide Early Education Programs (SWEEP), which combined collected data from nearly 3,000 children in state-funded pre-kindergarten
programs across 11 states. As such, this represents one of the most comprehensive studies of this relatively new subset of early childhood education programs.

Findings

Findings from this study offer partial support for study hypotheses. As predicted, abilities of young children were found to predict later special education placement. Specifically, the lower the child’s level of social skills and language ability at the entry to pre-kindergarten the more likely the child was to have an IEP or a planned referral at the end of kindergarten. Global quality in the state-funded pre-kindergarten setting was not found to be related to later special education status. Further, higher levels of program quality did not serve as a protective factor for children with lower levels of early ability in terms of reducing their need for later special education. Findings pertaining to each of the three research questions are discussed below.

Hypothesis 1. Abilities of Young Children Predict Kindergarten Special Education Status

The first research question examined whether or not child ability at entry to pre-kindergarten predicts special education status at the end of kindergarten. This study built on the current body of literature by specifically looking into the early characteristics of children who are not identified for special education at the time of entry into pre-kindergarten (i.e., do not have severe disabilities). This focus advanced the understanding of the characteristics of young children who are likely experiencing relatively milder disabilities.

Empirical Basis. The majority of the current body of literature investigating special education status has examined child demographics that are associated with special education referral. Whereas the literature in this area is somewhat conflicting, most studies find that
minority racial/ethnic status is associated with special education placement, with children from minority racial/ethnic groups being represented in special education at a higher rate than would be expected based on percentages in the overall population (Donovan & Cross, 2002; USDE OSERS, 2005). Children in special education are also more likely to be poor than those in the general population (USDE OSERS). Researchers have debated inconclusively whether or not the overlap between social economic status and race are confounded in this research (Oswald, Coutinho, Best, & Singh, 1999; Skiba, Poloni-Studinger, Simmons, Feggins-Azziz, & Chung, 2005). While some researchers find that differences in socio-economic status explain racial disparity in special education (Oswald, Coutinho, Best, & Singh, 1999), others report that even when poverty is controlled for, racial/ethnic groups are disproportionately represented in special education (Skiba, Poloni-Studinger, Simmons, Feggins-Azziz, & Chung 2005). Further, gender has consistently been associated with special education placement, with males significantly more likely to receive services than females (Oswald, Best, Coutinho, & Nagle, 2003).

In addition to these demographic variables, some abilities of young children have also been found to be associated with later academic difficulty and special education needs. In particular, low levels of language, specifically expressive and receptive vocabulary, have been linked to need for later services in the literature (Keogh, Coots, & Bernheimer, 1995; Pianta & McCoy, 1997; Roth, McCaul, & Barnes, 1993). Similarly, poor social skills in young children have been associated with eventual special education placement. Specifically, early deficits in the social-emotional competence areas of assertiveness, leadership, and independence have been linked to later academic success as well as special education status (Pianta & McCoy; Wagner, Kutash, Duchnowski, Epstein, & Sumi, 2005).
While both social competence and language ability in the early years have been fairly consistently identified in the literature as predictors of later academic and special education needs, much of the research in this area is limited to the population of young children already being served by special education in their early years.

**Findings and Interpretation.** The findings from the current study both add support to this existing literature on the topic as well as expand upon past findings. As predicted, this study added further evidence that certain child skills, as early as entry to pre-kindergarten, can serve as predictors for later special education needs. Specifically, the findings suggest that both social skills and language ability in young children are associated with special education status at the end of kindergarten. Lower levels of early ability in each of these skill areas are linked to higher likelihood of special education referrals at the end of kindergarten. This relationship was found to exist above and beyond the influence of demographic characteristics. The current study builds upon previous research by finding this association of early ability and special education status among children entering pre-kindergarten who have not previously been identified as special needs children.

Interestingly, whereas both social skills and language ability were found to predict later special education status, social skills were found to be a far more powerful predictor than language skills. That is, social skills of young children \( OR = 2.79 \) had much more predictive power of special education status at the end of kindergarten than language skills of young children \( OR = 1.05 \). One possible explanation for these differential effects relates to the visibility of the children being referred in kindergarten. Teacher referrals for special education are made, in general, when a teacher perceives that the child is struggling in the classroom. Some research suggests that behavioral issues such as inattentiveness,
noncompliance, and disorganization also contribute to the prediction of special education referral (Cooper & Speece, 1988). Given the link between social skills in young children and later behavior problems, it is possible that children with lower levels of social skills at entry to pre-kindergarten are more likely to receive referrals at the end of kindergarten due to more visible externalizing behavior problems. Conversely, young children with lower language ability may be less likely to be identified early for special education (i.e., by the end of kindergarten) because their difficulties in the classroom may initially be overlooked if they are not presenting with behavioral difficulties. As such behavior differences may have contributed to the differential effects of each of these abilities in young children.

Given the shift in federal regulation towards an emphasis on earlier intervention for young children, as well as empirical evidence supporting the value of early identification and remediation of special needs children (Bowman et al., 2000), the findings in the current study provide important information for prevention and amelioration of potential problems. These findings suggest that non-identified children experiencing early deficits in either social skills or language are likely to require special education services by the time they reach school age. If children are identified at the onset of pre-kindergarten who are likely to need later assistance, a preventative approach suggests that this subset of children may benefit more from receiving earlier intervention services, as opposed to waiting to intervene until they begin having greater difficulties in later grades. Prevention work will hopefully improve child outcomes, including diminishing the need for special education. While the current study found evidence of a general association between low levels of child ability and later special education needs, it did not go as far as to identify a specific cut-off score that could categorize an at-risk group based on ability level. Future research could go beyond the
current study by working to identify a specific level of deficit that corresponds to a greater likelihood of later need for special education services. Such a cut-off could serve as a means for identifying a group of children that are at-risk for later special education and, as such, are good candidates for early intervention.

**Hypothesis 2. Association Between Class Quality and Kindergarten Special Education**

The second research question explored whether global classroom quality in the pre-kindergarten classroom was associated with special education status at the end of kindergarten. It was hypothesized that high global classroom quality would be associated with a decreased need for special education at the end of kindergarten.

**Empirical Basis.** In general, the current body of early intervention literature supports the notion that early childhood education is associated with improved developmental outcomes for young children (Barnett, 1995; Bowman et al., 2000). Specifically, research links high quality early childhood care and education efforts with a variety of improved child academic and social-emotional outcomes (Peisner-Feinberg et al., 1999; Schweinhart et al., 1993; Campbell & Ramey, 1995). Several large scale studies of state-funded pre-kindergarten have also documented specific associations in the pre-kindergarten setting (Barnett, Lamy, & Jung, 2005; Gormley, 2005; Howes, et al., 2006, Burchinal, et al. 2006). Pre-kindergarten classrooms that are considered to be of high quality are those that offer children learning opportunities through language stimulation and exploration of their environment. Furthermore, these classrooms are characterized by sensitive and responsive interactions between children and their caregivers. In addition to findings of improved child academic and social skill levels in such classrooms, participation in the intensive and high quality early childhood programs has been found to significantly decrease need for later
special education services when compared to control groups (Barnett, 1995; Campbell & Ramey, 1995; Schweinhart et al., 1993; Conyers, Reynolds, & Suh-Ruu, 2003). These findings suggest that, in addition to improving academic and social skills, exposure to intensive high quality pre-kindergarten may reduce the need for later special education. This past research, however, has largely been experimental in nature, comparing special education status of those attending high quality early childhood programs versus those receiving no early intervention services. As such, previous studies have not examined variations of classroom quality as they relate to special education status, as was done in the present study.

Use of observational measures of global classroom quality, such as the ECERS-R and the CLASS, help to quantify classroom quality. Scores on both of these quality measures range from 1-7. On the ECERS-R a score of 1 indicates “inadequate” quality, 3 indicates “minimal” quality, 5 indicates “good” quality, and 7 indicates “excellent” quality. On the CLASS, scores of 1 or 2 indicate the classroom is low on that dimension, and 3, 4, or 5 indicate that the classroom is in the mid-range, and a 6 or 7 indicates the classroom is high on that dimension. In considering the various indicators on the ECERS-R and the CLASS, one can expect that children exposed to classrooms receiving higher ratings, may make greater developmental gains in turn reducing later need for special education services. For example, on the “interactions among children” indicator on the ECERS-R Teaching and Interactions factor, classrooms earn a rating of 3 when teachers encourage peer interaction, stop negative peer interactions, and some positive peer interaction occurs. By comparison, a high quality classroom earning a rating of 6 is characterized by typically positive peer interactions and opportunities for children to work collaboratively on tasks. Such interactions found in these higher quality classrooms would allow children opportunity for growth across both social and
language domains. Similarly, classrooms earning a 3 on the “encouraging children to communicate” indicator on the ECERS-R Teaching and Interactions factor, need only display some activities that are generally appropriate for the children that encourage them to communicate and provide some materials to encourage communication. By contrast, classrooms that are high in quality and earn a 6 on this indicator go beyond offering such activities by balancing listening and talking appropriately for the age and ability level of children during activities and linking children’s spoken communication with written language. Again, this more comprehensive application of communication activities is likely linked to better language and learning outcomes for children. On the “dramatic play” indicator which loads on the ECERS-R Provisions for Learning factor, classrooms of minimal quality earn a 3 for having some dramatic play materials accessible for at least one hour daily. Classrooms earn a 6 on this index by incorporating rotating themes into play items, including props representing diversity, enriching dramatic play with pictures, stories, and trips, and providing opportunity for active outdoor dramatic play. These added components in the classroom offer greater opportunities for imaginative play, encouraging creativity and social growth.

Similarly, on the CLASS, on the “teacher sensitivity” scale on the Emotional Climate factor, classrooms in the mid-range (i.e., earning scores of 3, 4, or 5) have teachers that are generally aware of child needs, but sometimes fail to address child difficulties. These teachers may not always successfully communicate genuine concern to child problems. High quality on the “teacher sensitivity” correlates to teachers who have a clear awareness and sensitivity to individual child needs and are consistently responsive to those needs. Teachers serve as a secure base allowing children to go off and explore their environment freely. On
the “positive climate” construct on the Emotional Climate factor, a mid-range classroom involves teachers with a generally positive regard for children, but they may at times be distant or dismissive. High scoring classrooms evidence a strong emotional connection between teachers and children with a comfortable, friendly, and emotionally supportive atmosphere. Such a highly positive climate would be expected to lead to a supportive learning environment for young children. Given the opportunities granted to children in higher quality classrooms, greater gains across developmental domains are expected, ultimately resulting in reduced need for special education placement.

**Findings and Interpretation.** The results of the current study did not support the hypothesis that classroom quality in state funded pre-kindergarten is associated with special education referrals at the end of kindergarten. These findings suggest that the degree of classroom quality in the state-funded pre-kindergarten setting was not salient enough to determine special education status. One factor that may have contributed to the lack of support of the hypothesis relates to the variability of the quality data. The standard deviation for the ECERS \((SD = .80)\), CLASS \((SD = .64)\), and the quality composite \((SD = .65)\) in the current data set are somewhat lower than the variability reported for the CLASS and ECERS quality measures in other studies which is typically approximately one scale point (Peisner-Feinberg, et al., 1999; La Paro, Pianta, & Stuhlman, 2004). As such the lower variability in quality across classrooms may be a contributing factor to the lack of significant findings. Similarly, in general, the level of classroom quality reported in the pre-kindergarten classrooms is fairly low. The means of the overall quality composite \((M = 4.16)\), the ECERS \((M = 3.81)\), and the CLASS \((M = 4.48)\) meet only minimal levels of quality standards (Harms, Clifford, & Cryer, 1998; La Paro & Pianta, 2003). This low mean level of quality in
combination with the limited variability of the data suggests only a small subset of the classrooms were high quality. Notably, despite the limited range of quality, other studies using this dataset have found an association between program quality and developmental outcomes, including both academic and social skills (Burchinal et al., 2006; Howes, et al., 2007). Similarly, other studies have found positive outcomes associated with quality at comparable levels. For example, the Cost, Quality, and Outcomes Study, which examined full-day child-care centers found the average quality in the centers, as measured by the older version of the ECERS, was 4.26 (SD = 1.0) (Peisner-Feinberg, et al., 1999). An association between quality and cognitive skills was found, with improved math and language abilities associated with higher global quality. In addition, higher global quality was associated with improved social skills, such as peer interaction and behavior problems. Previous studies specifically looking at the association between attendance of high quality programs and later special education status did not collect quantitative measures of classroom quality, so it is impossible to compare how the quality in the current study classrooms compares to theirs. It is possible that only high levels of classroom quality are able to affect special education status, and there were not enough classrooms in the current study that met such standards. Furthermore, it may be to affect later special education status, more individualized instruction is required, above and beyond the global quality of the classroom.

A related explanation for the lack of support for the hypothesis relates to the correlational nature of the current study, in contrast to the experimental nature of many of the previous studies documenting the association between these constructs. Most of the previous literature examining the relationship between quality early childhood education and special education referral compared outcomes of children in intensive high quality early education
programs to children receiving little to no early intervention services. The current study compared quality across a range of pre-kindergarten classrooms as it related to special education status. As such, it is possible that while high quality early childhood education programs significantly reduce special education in comparison to no services, the variation of quality in the pre-kindergarten programs was not sufficient enough to produce differential special education status across quality levels.

Another possible explanation for these non-significant findings is that the construct of classroom-level quality, in and of itself, is not a strong enough predictor of special education status above and beyond other factors. Other child level constructs, for example, the academic and social abilities identified by the first research question, appear to be more important in determining special education status in the state-funded pre-kindergarten setting. It is possible that the type of quality measured by the ECERS-R and CLASS does not capture what matters most in determining later special education status. While extensive, these measures focus on the organization of the school day, the availability of materials in the classroom environment, the emotional climate, and the nature of interactions between children and adults. Other factors, however, such as the extent and quality of one-on-one work with children, are less emphasized. It is possible that such individualized intervention is more important in determining special education status than the classroom level constructs captured by the quality instruments and that measures focusing on quality and quantity of one-to-one interactions would be better predictors of later special education referral.

**Hypothesis 3. Interaction Effects Between Child Skills and Classroom Quality**

The final research question went beyond looking at the relationship between quality and special education status by considering whether or not there are interaction effects
between skills of young children and classroom quality in predicting special education status. An interaction was expected between skills of young children and quality with the association between young children’s social-emotional and/or language competence and special education referral at the end of kindergarten being weaker when pre-kindergarten classroom quality is higher.

**Empirical Basis.** Research studies have demonstrated that children who are identified as having disabilities or being at-risk for developing disabilities display significant cognitive and behavioral gains when enrolled in high quality early childhood education programs (Dunst et al., 1989). Such children have been found to benefit more from early childhood education programs than from intervention at later ages (Bowman et al., 2000). Furthermore, children with mild disabilities, in particular, have been shown to experience significant developmental gains following involvement in early education programs (Dunst et al., 1989). As such, the literature suggests that groups that are at high risk for later school difficulty, including those with mild delays or disabilities, may benefit most from high quality care (Burchinal et al., 2002; Dunst et al., 1989; Lerner et al., 2003). This finding, in combination with the association between reduction in later special education placement and high quality early childhood education, suggests that children at-risk for requiring special education services later in life are likely to benefit considerably from high quality early childhood education and care.

**Findings and Interpretations.** The current study, however, did not provide support for the hypotheses that classroom quality in state funded pre-kindergarten would reduce special education referrals for children at-risk for special education. It was predicted that program quality would serve as a protective factor, reducing the association between low
levels of child ability and later special education referral. Instead, child ability was predictive of later special education placement, regardless of classroom quality. As noted previously, the lower levels and lack of variability in classroom quality found in the current study may have contributed to the lack of support found for this hypothesis. It is possible that the range of quality observed across classrooms did not demonstrate enough variability to produce differential special education status. Furthermore, given the size and nature of this study, various limiting factors, outlined below, may have contributed to the lack of significant findings related to classroom quality.

**Considerations**

Some characteristics of the study methodology and design should be acknowledged when considering the findings from this study. Specifically, the data used in this study were not originally collected for the purpose of investigating the research questions of the present study. As such, several aspects of the methodology were not ideally suited to exploring the study questions. A few issues surround the identification of the special education status. For example, the special education status of the children was determined solely on the basis of teacher self-report, which may at times be flawed due to reporter error or confusion regarding special education status. In addition, some of the questions used to determine special education status were somewhat ambiguous. For example, teachers were asked whether or not the child had been referred for an evaluation, but they were not asked when or if that evaluation had actually taken place. Thus, it was impossible to determine if the evaluation was still pending or if it had taken place and the child was deemed ineligible for special education services. Similarly, for children who did have an IEP, teachers were not asked to report the specific category the children were eligible under. Instead they reported which
“type(s) of disability” the child had (i.e. speech, physical/sensory, cognitive/language, social/emotional, other). These categories were used in place of actual eligibility categories because the study’s principal investigators thought that teachers would be better able to answer questions regarding the nature of the child’s disability, as opposed to accurately reporting special education category. Furthermore, the categories were not mutually exclusive and teachers were prompted to select all of the types of disability that applied to each child. Whereas the format of these questions was designed in order to provide the most complete data in terms of child disability, the lack of official special education category made any sort of comparison of special education status based on official eligibility category impossible. Additionally, comparisons to national statistics based on special education categories could not be made.

An additional factor of the current study which should be considered relates to the time frame over which the participants were followed. In the SWEEP study, children were followed only through the kindergarten school year. The last special education data in the SWEEP study were collected from kindergarten teachers during the spring of the kindergarten year. Whereas these data provide important insight into which children are referred over the time span from the beginning of pre-kindergarten through the end of the kindergarten year, it fails to examine outcomes of children through the first years of school, specifically during the first and second grades. As these early years of school tend to be the period of time when many early academic skills are introduced to children, these are also the years when many special education needs are identified by teachers. For example, current national statistics indicate that approximately 247,000 four year olds are being served through special education. In comparison, by age six, the average age of children leaving
kindergarten in this study, approximately 338,000 are being served. Whereas this indicates a large increase in identified students by the end of kindergarten, current national statistics also indicate that by age ten approximately 530,000 students are served by special education. This suggests that by approximately the fourth grade, roughly 192,000 additional students have been identified for services (USDE OSERS, 2005). This represents a 36 percent increase in identified students over the first four years of school. As such, the exclusion of these later years from the outcome data likely resulted in an underestimate of children at-risk for later special needs. In attempts to account for this shortcoming, teachers were asked in the spring of kindergarten to predict which children they planned to recommend for a special education evaluation by either the end of the kindergarten year or the beginning of first grade. Whereas this addition may have helped account for many of the children at risk for later special education services, it is still likely that many more children would have been identified had the data from the students’ elementary school years data been available.

A related aspect of the dataset deserving consideration concerns the homogeneity of the special education group. Teachers’ responses to identifying the “type of disability” children had suggested that a majority of the children with IEPs (84 percent) had disabilities related to speech difficulties. Whereas the responses to this question were not mutually exclusive, and were thus hard to analyze, this data does suggest that the special education group represents a particular subset of special education referrals. One possible explanation for the homogeneity of the group relates to the decision to exclude children with IEPs at entry to pre-kindergarten from the study. This likely eliminated children with severe disabilities from the study as such children are typically identified early in life. As such, this exclusion most likely led to a more homogenous group of study children. Furthermore, the
lack of variability may also be partially related to the time frame of the study as many children identified for special education in pre-kindergarten or kindergarten have speech delays as a component of their disabilities (USDE OSERS, 2005). Recent national statistics indicate that for the population of 3 to 5 year olds served through special education, approximately 49 percent are served under the category of Speech and Language Disability (SLI). An additional 35 percent of those served in this age group are categorized under Developmental Delay (DD), and it is likely that at least a subset of these children would also be considered to have speech difficulties as an area of disability. By contrast, national statistics suggest that only 19 percent of children in special education in later years (ages 6 to 21) are served under the category of Speech and Language Disability (SLI). These statistics suggests that if children could have been followed further into their school years, the breakdown of disability likely would have become more heterogeneous. This variability may have also allowed for some comparison across special education eligibility groups.

Furthermore, the ambiguity of the question asking for “type of disability” may have increased the likelihood for children being categorized as having a speech disability. Had there been access to specific information regarding the special education category the children were served under, the information obtained would likely be more easily compared to national special education statistics. For example, whereas teachers may identify children as having speech difficulties, information from their IEPs may reveal that they are in fact served under the category of Developmental Delay due to delays not only in the area of communication, but also in one or more of the other four areas of functioning (i.e. cognitive, social-emotional, physical, and adaptive functioning). As such, the wording of the question may also explain the significant proportion of the special education group noted to have
speech difficulties as a component of their disability. However, without eligibility category information, it is difficult to make accurate comparisons to the national statistics. Had the study originally been designed to explore these issues, questions would likely be more specific to provide a greater depth of information related to special education status. Acknowledgement of the current study’s methodological characteristics can help guide future research in this area.

**Limitations of the Study**

Furthermore, some limitations of this study deserve acknowledgement. In terms of methodology, the composite scores used as independent variables in the analyses were created by collapsing various measures or scales to create a composite variable. For example, language ability was examined through a composite which combined scores on measures of receptive vocabulary (PPVT-III) and expressive vocabulary (OWLS). The decision to create this composite was driven by the large correlation between these two language measures and the desire to create a more reliable measure of language while reducing the number of predictor variables. Despite the benefits of creating this composite, it is possible that in collapsing these measures into an overall score important information from these slightly different constructs of language might have been lost. Similar concerns are noted for the social skills composite which combines the social skills and behavior problems scales.

Concerns of this type regarding the quality composite, which combined the ECERS-R and CLASS, are eliminated by follow-up analyses which determined that substituting the individual factors of the quality measures for the composite produced similar non-significant findings. Whereas the current study determined that the benefits of forming composite
scores outweighed the harm, these potential limitations are important to keep in mind when considering results.

A similar limitation in the current study relates to the dependent variables. In considering special education status at the end of kindergarten, the questions in the study initially lent themselves to four categories of special education status: (1) children who had an IEP, (2) children who did not have an IEP but had received a referral for evaluation, (3) children who did not have an IEP or a past referral, but whose teachers planned to recommend for future evaluations, and (4) children who did not fall into any of the three categories. However, given the sample size and the low-incidence of special education referral and placement, there were too few cases to analyze them as four separate groups. Instead, in order to increase the sample sizes in the categories, the dependent variable was collapsed into a dichotomous outcome comparing 1) the group of children who either have IEPs or will be referred to 2) the group of children that did not have an IEP or a planned referral. Whereas a comparison across the four level variable may have been interesting, due to sample size limitations, the two-level outcome was determined to be the best method for examining special education status. It is important to take this limitation of the data into account when considering results of the study.

**Implications for Practice and Future Research**

As mentioned previously, this study provided further evidence to support past research of skills of young children that predict later difficulty. The study findings help broaden our understanding of the predictive power of abilities of young children by extending these findings to the population of children that are not receiving special education services at the beginning of pre-kindergarten. The findings associating language ability and
social skills of young children with special education provide important information about this subset of the children entering pre-kindergarten. The identification of both types of ability as predictors of later special education lends support to targeting early intervention efforts for these populations. While this study was not successful in identifying the types of classroom intervention that are well-suited to children with low levels of ability in these areas, the study provides a good starting point for future research.

As noted earlier, the current study was not originally designed with intentions of investigating the specific study questions. As such, improvements can be made to future studies by more closely tailoring methodology in order to gain better information about special education status. Future research would be enhanced by collecting more reliable and specific special education status data. Reliability of outcome data could be improved by review of actual school records, as opposed to relying on teacher self-report. While a more time-consuming approach, this method may enhance the accuracy of outcome data. In addition, such an approach would allow for more specific data to be gathered by the category of special education for which children are identified. Such information would allow for analyses comparing different categories of eventual special education placement as well as comparisons to special education statistics at the federal level. Additionally, following children into later years of schooling would provide opportunity to capture more children that eventually will be identified for special education services.

Future studies can also build on the information gained from this study regarding predictors of special education by looking at specific aspects of the state-funding pre-kindergarten population that can improve placement and referral for this at-risk population. Whereas the current study did not identify an association between global classroom quality
and special education status for the at-risk children, future investigations of classroom quality within a study specifically designed for that purpose would be worthwhile given the possibility that both the limited variability in quality and the lack of high quality classrooms contributed to the lack of findings in the current study. In addition, future research can shift its focus to variables on a teacher level, as opposed to a classroom level. It is possible that the nature of the teacher-child relationship may offer a better association with special education status for children. For example, whereas emotional support at the classroom level was expected to benefit children with low levels of social skills, it is possible that teacher level variables such as teacher-child warmth or attachment better meet the needs of these children. As the current study contains data regarding the teacher-child relationship, there is potential for such future analyses even within the present dataset. Similarly, a more individualized measure of child engagement in instructional activities may better predict improved child outcomes than the classroom level instructional support, as was hypothesized in the current study.

Finally, the current study found support for a general association between abilities of young children and later special education status, it did not establish a cut-off score that identifies an at-risk group based on ability level. A logical next step for future research could be efforts to identify such a cut-off score for child abilities that could help detect a group of children that is at-risk for special education and, as such, could benefit greatly from early intervention. From there, it will be important to expand upon this research by investigating which aspects of the growing state-funded pre-kindergarten programs may improve outcomes for such children and if they require more intensive and targeted intervention services that go beyond high quality intervention at the classroom level. Future studies can examine whether
more individualized one-on-one intervention may be necessary to improve special education status for these children.

Conclusions

The present study lends further support to the earlier findings that early childhood characteristics can predict later need for special education services. Study findings provide evidence that this association is found specifically in the children who are not receiving special education at entry to state-funded pre-kindergarten. This knowledge is relevant to current practice in the field of early childhood education as it can be used in aiding young children in hopes of preventing future need for special education services. While this study failed to identify classroom level variables associated with improved special education status for these children, it provided a good starting point for future studies. It is important that this line of research does not stop at identifying children at-risk for failure, but goes beyond this to find effective early intervention to decrease later need for special education. Future studies can build upon this work by addressing the limitations of the methodology of the current study and by further exploring aspects of state-funded pre-kindergarten classrooms that relate to improved outcomes. In addition to examining classroom level variables of intervention, studies designed purely with the intent of investigating these questions can go beyond this by exploring variables related to the child’s experience in the classroom at both the teacher and child level. In doing so, means of reducing the need for special education in this at-risk population can be identified.
APPENDIX

Spring Kindergarten Teacher Questionnaire: Special Services Questions

Special Services

16. Has this child ever been referred for evaluation for an Individualized Education Plan (IEP)?  
☐ yes  ☐ no

17. Does this child have an Individualized Education Plan (IEP) to receive special services for a disability?  
☐ yes  ☐ no  
  go to 18  go to 20

IF YES on question 17 (child has an IEP):

18. When did this child first receive this IEP ___ ___ / ___ ___ ___ ___  
Month Year

19. What type of disability is described on this child’s IEP? Check all that apply.

☐ a. speech  ☐ d. social/emotional
☐ b. physical/sensory  ☐ e. other: Specify: ______________
☐ c. cognitive/language

IF NO on question 17 (child does not have an IEP):

20. By the end of the year do you think you will recommend this child be evaluated for an Individualized Education Plan (IEP)?  
☐ yes  ☐ no

21. Do you think you will recommend this child be evaluated for an IEP when s/he begins 1st grade?  
☐ yes  ☐ no
REFERENCES


Bryant, D., Clifford, R. M., Saluja, G., Pianta, R., Early, D., Barbarin, O., et al. (2002). *Diversity and directions in state pre-kindergarten programs*. Chapel Hill: The University of North Carolina, FPG Child Development Institute, NCEDL.


