Exploring growth trajectories of problem behavior in young children

Bethany Lynn Mccaffrey

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Exploring Growth Trajectories of Problem Behavior in Young Children

by

Bethany L. McCaffrey

A Dissertation
Submitted to the University at Albany, State University of New York
In Partial Fulfillment of the Requirements for the Degree of Doctor of Philosophy

School of Education
Department of Educational and Counseling Psychology

2012
Abstract

Given the negative outcomes associated with problem behavior and the heightened risk for children with disabilities to display problematic behavior, the current study implemented hierarchical linear modeling to explore the growth trajectories of problem behavior in a nationally representative sample of preschool children with disabilities. Results indicated child and contextual risk factors were associated with varying levels of problem behavior at 5.5-years-old. Further, cross-level interactions between age and disability classification and age and gender were found to be significant, indicating variations in the trajectories of problem behavior from 3- to 8-years-old can partially be explained by child disability and gender.
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Exploring Growth Trajectories of Problem Behavior in Young Children

While most children develop social competence and acquire emotional and behavioral self-regulation as part of their normal development, some children experience poor social-emotional adjustment, which can lead to severe behavior problems (Campbell, 1995; Powell, Dunlap, & Fox, 2006). These behaviors interfere with the acquisition or performance of socially acceptable behavior and may manifest themselves as either internalizing problems or externalizing problems. Internalizing behaviors include conditions such as anxiety, inhibition, sadness, loneliness, depression, social withdrawal, and poor self-esteem. Externalizing behaviors include topographies such as disruptive, noncompliant, defiant, aggressive, and delinquent behaviors, as well as high activity levels and poor attention spans (Achenbach, 1991, 1992; Achenbach & Edelbrock, 1987; Arnold et al., 2006; Kovacs & Devlin, 1998; Rubin & Asendorpf, 1993).

The emergence of problem behavior is associated with a host of negative outcomes, including both academic and social failure. Poor long-term trajectories have been well documented from several longitudinal studies, including the National Longitudinal Transition Studies (NLTS and NLTS-2; Wagner, 1995; Wagner & Cameto, 2004), the National Adolescent and Child Treatment Study (NACTS; Greenbaum et al., 1996), and the Special Education Elementary Longitudinal Study (SEELS: Blackorby et al., 2004). Compared both to students without disabilities and students in other disability categories, students identified as eligible for special education services specifically due to emotional and behavioral disorders (EBD) have lower grade point averages and higher
levels of truancy, course failure, and school dropout. These students also enroll at lower rates in postsecondary education. Long-term negative social outcomes for this group include social skill deficits, low levels of social interaction, poor interpersonal relationships, low rates of employment, substance abuse, family violence, mental health issues, crime, and interactions with the juvenile justice system (Hinshaw, 1992a, 1992b; Kauffman & Landrum, 2008; Moffitt, Caspi, Dickson, Silva, & Stanton, 1996; Patterson, DeGarmo, & Knutson, 2000).

Theoretical Framework

The development of problem behavior can be understood from a developmental psychopathology framework (Cicchetti & Rogosch, 1996). The emergence of adaptive and/or maladaptive behavior is seen as resulting from multiple interactions among child, parental, and contextual factors over time. Researchers have identified specific risk factors at each of the identified levels that place children at increased risk for developing problem behavior. Specific risk factors at the individual child level include gender, prematurity, attachment, temperament, primary language, language skills, social skills, and cognitive ability. Problem behavior, particularly externalizing and disruptive behaviors, have historically been associated with males, with researchers documenting this finding as young as the preschool years (Campbell, 1997; Coolahan, Fantuzzo, Mendez, & McDermott, 2000; Fantuzzo et al., 2007; Macmillan, McMorris, & Kruttschnitt, 2004; Magee & Roy, 2008). Recently, however, the rate of problem behavior in females has increased; Stahl, Finnegan, and Kang (2003) found between 1990 and 2000 there was a 72% increase in the number of females detained in juvenile detention centers, compared to a mere 5% increase in males. Also, infants born
prematurely (Rose, Feldman, Rose, Wallace, & McCarton, 1992), children with attachment issues (Shaw, Owens, Vondra, Keenan, & Winslow, 1996), and children with difficult temperament (Calkins, Blandon, Williford, & Keane, 2007; Keenan, Shaw, DelliQuadri, Giovannelli, & Walsh, 1998) have been found to be at heightened risk for developing problem behavior.

Interestingly, bilingual children tend to have lower rates of problem behavior compared to their English-monolingual and non-English-monolingual peers (Han, 2010; Han, & Huang, 2010). Children’s cognitive abilities (Lavigne et al., 1996), including their language (Beitchman et al., 2001) and social skills (Harden et al., 2000), have important implications for the emergence of problem behavior. Children who lack adequate skills and children with disabilities often have lower levels of adaptive behavior and emotional regulation placing them at an increased risk for developing problems (Dekker, Koot, van der Ende, & Verhulst, 2002; Dykens, 2000; de Ruiter et al., 2007; Tremblay, 2000).

Factors at the parental level that increase a child’s risk for problem behavior often focus on maternal characteristics and include stress, conflict, depression, education, social support, and discipline style. Increased levels of parental stress, conflict, and depression have been associated with increased child problem behavior (Burchinal, Roberts, Zeisel, Hennon, & Hooper, 2006; Harden et al., 2000; Gross, Sambrook, & Fogg, 1999; Owens & Shaw, 2003). Researchers have also found education plays a role, with children whose mothers have lower levels of education exhibiting more problem behavior compared to children whose mothers have greater educational attainment (Burchinal et al., 2006; Macmillian et al., 2004). In addition, increased problem behaviors
in children are associated with mothers who report low levels of social support (Shaw et al., 1996) and harsh discipline styles (Burchinal et al., 2006; Gross et al., 1999; Owens & Shaw, 2003).

Contextual factors placing children at risk for problem behavior include elements such as socioeconomic status (SES), community violence, family instability, household type, number of children in the home, and presence of a household member with a disability. Children from low-income or low-SES families are at heightened risk for developing problem behaviors (Han & Huang, 2010; Keiley, Bates, Dodge, & Pettit, 2000; Qi & Kaiser, 2003). Researchers purport that the correlates of poverty may hinder access to effective treatment and actually exacerbate existing problems (Arnold et al., 2006). Consistent with a developmental psychopathology framework, Qi and Kaiser (2003) suggest that behavior problems in children from low-income families appear to be the result of interactions between child characteristics, family characteristics, and sociodemographic risk factors related to poverty. Family instability (Ackerman, Kogos, Youngstrom, Schoff, & Izard, 1999) and neighborhood violence (Harden et al., 2000), both correlates of poverty, are also related to problem behavior, with greater instability and community violence associated with increased problem behavior. In addition, researchers have found children residing in single-parent households typically display greater amounts of problem behavior (Han & Huang, 2010; Seltzer, 1994). Increased problem behavior has also been associated with number of children living in the household, with children from larger families exhibiting more behavior issues (Macmillian et al., 2004; Rutter, Giller, & Hagell, 1998). Further, children who have a
household member with a disability are also more likely to display problematic behavior (LeClere & Kowalewski, 1994).

These child, parental, and contextual factors have been identified by numerous researchers as placing children at increased risk for developing problem behaviors. However, the notions of multifinality and equifinality must be taken into account. Specifically, multifinality refers to the possibility that multiple and distinct developmental trajectories can emerge despite individuals being exposed to the same etiological factor, whereas equifinality is the idea that despite exposure to different factors, similar outcomes may emerge (Cicchetti & Rogosch, 1996; Cox, Mills-Koonce, Propper, & Gariepy, 2010). In addition, it is important to note other child, parental, and contextual elements may serve as protective factors that mitigate risk for onset and development of significant problem behaviors (Luthar, Cicchetti, & Becker, 2000; Rutter, 1987). For example, a child with strong language and social skills may be able to overcome the risk of having a mother with high levels of stress and depression.

Although individual factors associated with increased risk have been identified, ultimately it is the multiple interactions between child, parental, and contextual characteristics that contribute to either the emergence of adaptive or maladaptive behavior. These complex interactions occur in a reciprocal manner, in which factors from one area can both influence and be influenced by factors from another area. Therefore, in order to explore the developmental trajectories of problem behavior in young children, the various contributors must be examined in relation to one another rather than in isolation (Cox et al., 2010). By fully understanding the dynamic relationships among the
factors, researchers may be able to predict the trajectories of problem behavior in young
children and thus intervene prior to onset.

**Prevalence Rate**

The prevalence rate of problem behavior in young children is estimated to range
from 10% to 15% in the general population of typically developing preschoolers
(Campbell, 1995) and up to 30% in the population of children attending Head Start
programs (Qi & Kaiser, 2003; Webster-Stratton & Hammond, 1998). These estimates
have risen drastically from the 3% to 6% prevalence estimates in the 1980s (Achenbach
& Edelbrock, 1987). Further, young children with disabilities often have levels of
problem behavior that are three to seven times higher than their non-disabled peers, with
these differences being observed in children as young as 3-years-old (Baker, Blacher,
Crnic, & Edelbrock, 2002; Baker, Blacher, & Olsson, 2005; de Ruiter et al., 2007).

The Individuals with Disabilities Education Act (IDEA; P.L. 108-446, 2004)
identifies 13 disability classifications for children and youth ages 3- through 21-years-
old. School-aged children and youth may qualify for special education services under the
following classifications: autism, deaf-blindness, developmental delay, emotional
disturbance, hearing impairment (including deafness), mental retardation, multiple
disabilities, orthopedic impairment, specific learning disability, other health impairment,
speech or language impairment, traumatic brain injury, and visual impairment (including
blindness). Young children (ages 3- through 9-years-old) are eligible to receive special
education services under a more generic and broad “developmental delay” category and
need not be identified as having a specific disability. IDEA grants states the right to
name, define, and identify an age range for this category. For example, New York State
classifies a child between the ages of 3- and 5-years-old with a disability as a “preschool student with a disability.”

Four possible explanations for the differences in prevalence of problem behavior exhibited by children with and without disabilities have been identified (de Ruiter et al., 2007). Specifically, children with disabilities more frequently have (a) limited communication skills, (b) additional stressors due to the disability, (c) higher occurrence of neurological and genetic problems, and (d) limited independence due to the disability. Together these factors place children with disabilities at increased risk for developing problem behavior. Further, researchers are finding different disability classifications are associated with varying levels of problematic behavior (Gadeyne, Ghesquiere, & Onghena, 2004; Luteijn et al., 2000).

To add to the complexity, many young children with disabilities meet diagnostic criteria for multiple diagnoses. Specifically, the comorbidity between behavior and language and literacy problems has been identified as early as the preschool years (Benner, Nelson, & Epstein, 2002; Lonigan et al., 1999). This co-occurrence tends to be stable over time, with 71% of children with behavior problems having clinically significant language deficits (Benner et al., 2002) and 31% to 81% having moderate to high levels of literacy deficits (Trout, Nordness, Pierce, & Epstein, 2003). In addition to increased resistance to intervention, the co-occurrence of behavior problems and reading difficulties portend a host of negative outcomes, such as low achievement, teacher and peer rejection, discipline problems, tardiness, school dropout, unemployment, substance abuse, incarceration, mental illness, and early death (Blackorby et al., 2004; Kauffman & Landrum, 2008).
**Trajectories**

Growth trajectories can be described as the developmental course or path of a given attribute, defined by the stability or change in that attribute over time. Researchers studying the growth trajectories of problem behavior in community samples of children have found general declines in the amount of problem behavior exhibited by children as they age (Calkins et al., 2007; Keiley et al., 2000; Nagin & Tremblay, 1999; Shaw, Gilliom, Ingoldsby, & Nagin, 2003). For most children, externalizing or aggressive behavior peaks at age 2 and then decreases in intensity as children acquire more cognitive, language, and self-regulatory skills and are able to use other means of problem solving (Tremblay, 2000).

For those children who do not experience the typical decrease in problem behavior, researchers have identified multiple distinctive trajectories for, or pathways to, increasing problem behaviors (Broidy et al., 2003; Hill, Degnan, Calkins, & Keane, 2006; Nagin & Tremblay, 1999; Shaw et al., 2003). Although it is acknowledged there is likely an infinite number of trajectories of problem behavior, researchers exploring the developmental course of behavior in males are consistently fitting models that identify three to four distinct groups that have vast differences in terms of their trajectories: a low or no problem trajectory, a moderate-level desister trajectory, a high-level desister trajectory, and a persistent or chronic problem trajectory (Broidy et al., 2003; Calkins et al., 2007; Nagin & Tremblay, 1999; Shaw et al., 2003). Children in the desister groups show initial growth in their levels of problem behavior that then dissipate over time. Specifically of interest is the group of children who appear to remain stable in the amount and intensity of their problem behavior and continue to display chronic patterns of
problem behavior into adolescence. While this group is comprised of approximately 5-10% of the population, these children have higher levels of problematic behavior throughout school and continued delinquency into adolescence and early adulthood (Broidy et al., 2003; Nagin & Tremblay, 1999; Shaw et al., 2003).

Although children with disabilities often exhibit higher amounts of problem behavior compared to their peers, a limited number of studies have investigated changes in the amount of these problems over time. From those limited studies, conclusions have been mixed; Green, O’Reilly, Itchon, and Sigafood (2005) and Richardson, Koller, and Katz (1985) found high levels of persistence and stability, while de Ruitter et al. (2007) found similarities in the trajectories of problem behavior from age 6 to age 18 in youth with and without intellectual disabilities, with overall declines in problem behavior for both groups. Yet, as most researchers have focused on the problem behavior of school-aged children and adolescents, little is known about the early developmental course of problem behavior in young children with disabilities.

Specifically, due to increased resistance to intervention over time (O’Shaughnessy, Lane, Gresham, & Beebe-Frankenberger, 2003), identification of children at-risk for developing problem behaviors needs to occur at a young age. Meeting the needs of these children has become a national priority (U.S. Department of Education, 1999). The importance of appropriate social-emotional development for school readiness and the poor long-term outcomes associated with problem behaviors have led to national initiatives for the early identification and intervention for the population of young children (Shonkoff & Phillips, 2000; U.S. Department of Health and Human Services, 2001). In addition, the enactment of No Child Left Behind, which has created minimum
academic standards that *all* children are expected to meet by third grade, asserts the importance of proactive approaches to early identification and intervention in order to ensure children reach established proficiency levels (Fantuzzo et al., 2007).

Further, with the nation’s fiscal crisis and the increasing costs of special education, research is needed to better understand the trajectories of problem behavior in the population of young children with disabilities. Without a clear understanding, effective intervention cannot be implemented, resulting in poor outcomes, including increased interactions with the justice system, and ultimately huge costs to taxpayers. This study seeks to explore the complex relationships among early child, parental, and contextual factors that contribute to the emergence and persistence of problem behavior so appropriate intervention services can be developed and provided to children at an early age.

**The Current Investigation**

The very nature of a developmental psychopathology perspective highlights the importance of investigating behavior using a longitudinal design that allows researchers to determine how various child, parental, and contextual factors interact to contribute to the emergence and stability of problem behavior over time. Specifically, due to the greater prevalence of problem behavior in young children with disabilities, the current study sought to examine growth trajectories of these behaviors in a national sample of preschoolers with disabilities in order to determine key factors that place these children at increased risk and to evaluate if multiple pathways to disordered behavior exist in this population. Three research questions were addressed in order to gain this insight.

1. What is the overall trajectory of problem behavior in young children with
2. What early child, parental, and contextual factors are associated with variations in trajectories of problem behavior in young children with disabilities?

3. How do various interactions among child, parental, and contextual factors contribute to variations in trajectories of problem behavior in young children with disabilities?

**Method**

The Pre-Elementary Education Longitudinal Study (PEELS) dataset was used in this study. PEELS was federally funded by the National Center for Special Education Research in the U.S. Department of Education’s Institute for Education Sciences. The purpose of PEELS was to follow a nationally representative sample of preschool children receiving special education services longitudinally over a 5-year period in order to explore preschool experiences and outcomes, transitions to kindergarten, and early elementary school experiences and outcomes.

**Participants**

The current sample consisted of children who participated in PEELS. The PEELS database contains information on a total of 3,104 young children with disabilities. Their families were recruited through 258 school districts nationwide during the 2003-2004 and 2004-2005 academic years. Children were ages 3-, 4-, or 5-years-old at the time of recruitment and determined to be eligible for the study if they (a) had an individualized education program (IEP) or individualized family service plan (IFSP); (b) had an English- or Spanish-speaking parent or guardian or an adult who could use signed communication to respond to questions either using the telephone, a telephone relay
service, or interpreter for the hearing impaired; (c) were the family’s first child sampled for PEELS; and (d) resided in a participating school district at the time of enrollment in PEELS.

A two-stage sampling design was used to ensure a nationally representative sample. At stage one, 2,752 local education agencies (LEAs) were selected from the population of all LEAs providing special education services to preschool children with disabilities (N = 7,829). At stage two, a random sample of children was selected from the population of all eligible children, with 80% of families agreeing to participate. Families received $15 for their participation in PEELS. The final sample consisted of three cohorts of children: Cohort A consisted of children who were 3-years-old when they began participation in PEELS (n = 986), Cohort B consisted of children who were 4-years-old (n = 1,125), and Cohort C consisted of children who were 5-years-old (n = 993). Detailed information regarding sampling, recruitment, weighting, and participant enrollment is available in Markowitz et al. (2006), which can be found on the PEELS website: http://www.peels.org. Of the 3,104 total participants, data on 3,010 children were used in the current analyses; 94 cases were dropped to meet statistical analysis requirements. Due to the ability of the statistical program to handle flexible designs, attrition was not an issue in the current study.

Procedure

PEELS began in 2003 and included five waves of data collection, with the last wave collected in 2009. Data were obtained through direct assessment of children, phone interviews with parents, and mail surveys with children’s teachers, principals, district and
state administrators, and other service providers. The current study utilized archival child, parent, and teacher data from Waves 1 through 4.

**Measures**

Data used in the current study were gathered from the PEELS Family Questionnaire, the Peabody Picture Vocabulary Test (PPVT), and the PEELS Teacher Questionnaire. Descriptive statistics for all study variables, along with the corresponding PEELS instrument, are presented in Table 1. Included variables were identified as a child, parental, or contextual risk factor, or an assessment of problem behavior. Each variable presented in the table is described in detail in the appropriate section: child-level risk factors, parental-level risk factors, contextual-level risk factors, and child problem behavior. Due to the extensive nature of the Family and Teacher Questionnaires and variations in the questionnaires based on assessment wave and age of participating child, the reader is directed to the PEELS website for full descriptions of the instruments.

**Table 1**

*Descriptive Statistics for Predictor and Outcome Measures*

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<td>Problem Behavior- Age 5</td>
<td>2498</td>
<td>99.52</td>
</tr>
<tr>
<td>Problem Behavior- Age 6</td>
<td>2648</td>
<td>101.02</td>
</tr>
<tr>
<td>Problem Behavior- Age 7</td>
<td>1824</td>
<td>102.92</td>
</tr>
<tr>
<td>Problem Behavior- Age 8</td>
<td>848</td>
<td>103.44</td>
</tr>
</tbody>
</table>

**Note.** Categorical variables presented as the proportion of respondents in each category. PPVT, Peabody Picture Vocabulary Test. FQ, PEELS Family Questionnaire. TQ, PEELS Teacher Questionnaire.
**Child-level risk factors.** The current study focused specifically on four child-level risk factors: gender, primary language, language skills, and primary disability. Gender, primary language, and language skills are variables known to be associated with problem behaviors. In addition, primary disability was included in the analysis as certain disability classifications are also associated with increased problem behavior.

*Gender.* Parents of participating children reported their child’s gender as part of the Family Questionnaire. For the purpose of this study, gender was dummy coded with male children coded as 0 and female children coded as 1. Approximately 70% of participating children were males and 30% of children were females.

*Primary language.* As part of the Family Questionnaire, parents were asked their child’s primary language. For the purpose of this study, language was dummy coded with non-English languages coded as 0 and English coded as 1. Approximately 91% of caregivers reported English as their child’s primary language. Of the 9% of children who spoke a non-English language, approximately 80% spoke Spanish as their primary language.

*Language skills.* As part of PEELS, children’s vocabulary levels were assessed yearly using The Peabody Picture Vocabulary Test (PPVT-III, Dunn & Dunn, 1997). The PPVT-III is a direct assessment designed to measure receptive vocabulary. The PPVT-III has been normed on a national sample of children and has established reliability and validity evidence. Raw scores on the PPVT-III are converted to standard scores with a mean of 100 and a standard deviation of 15. As the statistical technique used in the study (i.e., hierarchical linear modeling) precludes missing values at Level 2 and PPVT-III scores remain relatively stable over time, children’s average PPVT-III scores across the
four waves were used in the current analyses, thereby allowing children with at least one PPVT-III score to be included in the final sample. The average PPVT-III score across waves for the current sample of children was 94.94, suggesting slightly lower levels of language skills compared to the general population.

**Child disability.** Participating children’s primary and secondary disabilities were asked on both the Family and Teacher Questionnaires. Disability data were taken from the PEELS demographic file, which contained primary disability information based on the 13 disability classifications under IDEA. However, due to the low prevalence of certain disabilities in the sample, for the purpose of the current analyses, categories that contained less than 1% of the sample were aggregated with other disability groups based on similar topographies. This resulted in nine disability classifications: autism, audio/visual impairment (includes deaf-blindness, hearing impairment, and visual impairment), developmental delay, emotional disturbance/behavior disorder, learning disability, mental retardation, orthopedic impairment, speech or language impairment, and other disability (includes multiple disabilities, other health impairment, traumatic brain injury, and other). Dummy variables were set up for each of the nine categories, with a code of 0 indicating the child was not identified with the particular disability and a code of 1 indicating the presence of the disability. The reference or contrast group (i.e., the group that had 0 across each of the dummy variables) consisted of children who were identified with no disability/IEP. It should be noted, although a requirement for participation in PEELS was the child had to be eligible for special education services at time of enrollment, the archival PEELS demographic file identifies a group of children with no disability/IEP. The rationale for their inclusion in the data file is unknown. The
majority of children in the sample were classified either with a speech or language impairment (50%) or developmental delay (30%).

**Parental-level risk factors.** Education was the only parental-level variable included in the current analyses. Education level is known to be associated with problem behavior in children, with children who have parents with low levels of education often exhibiting higher levels of problem behavior.

**Parental education.** The highest level of education achieved by the respondent and his/her spouse was assessed with the Family Questionnaire at Waves 1 through 4 and coded as: (1) less than high school/no GED, (2) high school diploma or GED, (3) some college/post secondary vocational courses, (4) 2- or 3-year college degree or vocational diploma, (5) 4-year college degree, (6) some graduate work/no graduate degree, and (7) graduate degree. For the current study, parental education was derived by taking the highest education level from either parent across waves. The average highest level of parental education for the current sample was 3.84, corresponding to approximately a 2- or 3-year college degree or vocational diploma. As the parental education scale was linear in nature, it was treated as a scale variable in the analyses.

**Contextual-level risk factors.** The following contextual-level variables were included in the current analyses: income, household member with a disability, and household type. Children from families with lower incomes, those who have a household member with a disability, and live in a household headed by a single parent are at increased risk for developing problem behaviors.

**Income.** The income variable used in the current analyses was derived from three household income questions on the Family Questionnaire at Wave 1. For the current
study, family income was coded as: (1) $5,000 or less, (2) $5,001-$10,000, (3) $10,001-$15,000, (4) $15,001-$20,000, (5) $20,001-$25,000, (6) $25,001-$30,000, (7) $30,001-$35,000, (8) $35,001-$40,000, (9) $40,001-$45,000, (10) $45,001-$50,000, and (11) more than $50,000. The average income level was in the $30,001-$35,000 range; however, the mode was more than $50,000, suggesting that families in this sample tended to be at least upper-middle class. Due to the linear nature of the income variable, it was treated as a scale variable for purpose of the analyses.

**Household type.** Household type was derived from an item on the Family Questionnaire at Wave 1 that asked respondents to indicate whether a spouse or partner currently resided in the home. For the current study, household type was coded as 0 for single-parent households (respondents who reported no spouse/partner living in the home) and 1 for two-parent households (respondents who indicated a live-in spouse/partner). Approximately 21% lived in a single-parent household and 79% of participating children lived in a two-parent household.

**Household member with disability.** A question asking about the presence of a household member with a disability was included on the Family Questionnaire. For the current study, this variable, taken from Wave 1, was coded as 0 for no member with a disability and as 1 for the presence of a household member with a disability. Approximately 72% of participating children did not live with anyone who had a disability, while 28% of children lived in a home where there was another member identified with a disability.

**Interactions among risk factors.** In addition to the child, parental, and contextual main effects, the interactions among these variables were explored.
Specifically the following interactions were included in the analyses: gender*parental education; gender*income; primary language*parental education; and primary language*income. Parental education and income were centered around their means prior to creating each interaction term, thereby increasing interpretability and avoiding problems with multicollinearity (Aiken & West, 1991). In addition to the interactions among child, parental, and contextual variables, cross-level interactions between each child, parental, and contextual risk factor and age were explored.

**Child problem behavior.** The Pre-Kindergarten Behavior Scale- Second Edition (PKBS-2; Merrell, 2002) and Social Skills Rating System (SSRS; Gresham & Elliott, 1990) were used to assess children’s problem behaviors. As part of the Teacher Questionnaire, teachers completed the PKBS-2 in Waves 1 and 2 and completed the SSRS in Waves 3 and 4. Both scales were normed on national samples and have established reliability and validity evidence. Further both scales consist of two subscales: social skills and problem behavior. Only scores from the problem behavior subscale were included in the current analyses. Both assessments convert scores to composite standard scores based on a distribution with a mean of 100 and a standard deviation of 15. Higher scores on the problem behavior scales are indicative of greater amounts of maladaptive behavior.

The problem behavior scale of the PKBS-2 consists of 42 items that measure both internalizing and externalizing problems. Teachers are asked to rate on a four-point scale (never, rarely, sometimes, and often) the extent to which the child has engaged in an array of behaviors during the past three months. Standard scores range from 74 to 150 or more. Functional levels have been identified with scores falling in the bottom 20th percentile.
reflecting no problems/high functioning, scores between the 20th and 80th percentiles reflecting average problems, scores between the 80th and 95th percentiles reflecting moderate problems, and scores above the 95th percentile reflecting significant problems. Reliability evidence suggests that the PKBS-2 is an appropriate measure to use with children ages 3 to 6. Internal consistency has been established, with Cronbach alpha coefficients ranging from .93 to .95 on the problem behavior scale. Stability evidence has also been reported, with three-week test-retest reliability for the subscales of the problem behavior scale ranging from .70 to .78 (Merrell, 2002).

The SSRS problem behavior scale consists of 18 items and is designed to assess internalizing problems, externalizing problems, and hyperactivity. Teachers are asked to rate on a three-point scale (never, sometimes, and very often) the extent to which the child has exhibited a set of skills or behaviors during the past two months. Standard scores range from 85 to 145. Three behavior levels have been identified (i.e., fewer, average, and more), with approximately 68% of scores falling between 85 and 115, 27% between 115 and 130, and 5% between 130 and 145. Internal consistency has been established, with Cronbach alpha coefficients of .84 for the problem behavior scale. Stability evidence for the teacher form has also been documented, with four-week test-retest correlations ranging from .84 to .93 across the subscales (Gresham & Elliott, 1990).

The switch from the PKBS-2 to the SSRS in Wave 3 of PEELS was to maintain developmental appropriateness of the assessments, as the PKBS-2 was designed for children 3- through 6-years-old and the SSRS was designed for children 3- through 18-years of age. A strong correlation (.83) between the problem behavior scales of the PKBS-2 and the SSRS has been found (Merrell, 2002).
Data Analytic Strategy

Using hierarchical linear modeling (HLM: Bryk & Raudenbush, 1987, 1992; Raudenbush & Byrk, 2002), growth curve analyses were conducted to investigate developmental trajectories of problem behavior from the preschool to early elementary years. All linear growth trajectories were fit using maximum likelihood estimation. A linear model shows general shifts in behavior and provides a good approximation of more complex relationships that cannot be modeled due to the limited number of observations (Raudenbush & Bryk, 2002). An advantage of using HLM over other methodologies in studying growth is HLM views multiple time points or observations of an individual as nested within the person. Therefore, HLM accounts for the shared variance associated with the nested structure of the data. In addition, HLM provides flexibility in dealing with unbalanced designs and can account for differences in the number and spacing of time points across cases, thus allowing for incomplete or missing data at Level 1 under the assumption that the data are missing at random (MAR). As such, HLM can include all participants with one or more data points in the analyses (Raudenbush & Bryk, 2002).

As HLM requires at least one Level 1 data point, participants who did not have any problem behavior scores were excluded from the analyses. In addition, since HLM requires complete data at Level 2, data were gathered from various PEELS files in order to obtain complete data. After extracting data from multiple PEELS sources, 79 participants had missing data across four study variables: primary language, income, household member with a disability, and household type. Data imputation, using the mode for dichotomous variables and the mean for ordinal variables, was performed. The 79 participants represented fewer than 3% of the total sample. Mean replacement was
also conducted for those participants with missing PPVT scores, which was less than 6% of the sample. These imputation procedures allowed 97% of the original sample to be maintained, resulting in a final sample size of 3,010 participants.

As this study was interested in growth or change of behavior over time, the Level 1 or time-level model was:

\[ Y_{ti} = \pi_{0i} + \pi_{1i} a_{ti} + e_{ti} \]  

for \( i = 1, \ldots, n \) subjects, where \( Y_{ti} \) was the observed status at time \( t \) for person \( i \), \( a_{ti} \) was the age at time \( t \) for person \( i \), \( \pi_{0i} \) was the intercept (true ability of person \( i \) at \( a_{ti} = 0 \)), \( \pi_{1i} \) was the growth rate for person \( i \) over the data-collection period, and \( e_{ti} \) was the measure of random error, indicating the amount of unexplained variability in the outcome measure. Further consistent with HLM’s assumption, the errors \( e_{ti} \) from each Level 1 model were independent and normally distributed with common variance \( \sigma^2 \). While each person’s development was represented by an individual growth trajectory at Level 1, in the Level 2 model the individual trajectories became the outcome variable and were modeled based on person-level characteristics. The Level 2 or person-level model was:

\[ \pi_{0i} = \beta_{00} + \beta_{01} X_i + \beta_{02} X_i + \ldots + r_{0i} \]  

and

\[ \pi_{1i} = \beta_{10} + \beta_{11} X_i + \beta_{12} X_i + \ldots + r_{0i} \]  

where Equation 2 represents the model for the intercept or the initial level of problem behavior in the sample and Equation 3 represents the model for the slope or the change in problem behavior over time.

The intercept of these models is generally interpreted as the expected average value of the dependent variable when all predictor variables are zero. However, a zero
value for the predictors often times does not have substantive meaning. Centering the variables adjusts the value of the intercept by taking into account the characteristics of the sample and therefore gives it a meaningful value. All predictor variables in the current analyses were grand mean centered. This means that the intercept for a dummy coded variable becomes the mean adjusted for the proportion of cases that have been coded 1. Grand mean centering scale variables makes the interpretation of the intercept the average value for the entire sample. For example, age was centered at 5.5-years so the intercept indicated the amount of problem behavior at the middle of the examined growth period (i.e., 3- to 8-years-old) and the coefficients indicate the change that occurred in 1-year increments. Interpretation of the intercept when all variables have been grand-mean centered is then the expected value of the dependent variable for the “average” child in the sample (i.e., the child who has average values on all predictor variables). Centering predictor variables also reduces the associated standard error and provides more stable estimates, as estimates are based on the middle of the growth period and not a time frame beyond which the data exist.

The use of weights in data analyses account for a study’s sampling design, nonresponses, and allows for generalization to the larger population; in this study, all young children with disabilities. However, as the current study triangulated data from multiple sources to preserve the original sample, the current sample (n = 3,010) was larger than any of the PEELS weight files. The appropriate weight file (i.e., parent-child-teacher longitudinal) included weight values for only 1,268 participants or roughly 40% of the original sample. As similar results were found for analyses with and without population weights, all presented results are based on the unweighted sample in order to
maintain the highest proportion of the original sample. Further, all analyses presented are based on the imputed Level 2 data and report the robust standard errors.

Results

An unconditional growth model was initially fit to explore the developmental trajectory of problem behavior in young children with disabilities across early childhood. Explanatory models were then fit to explore how well variations in the trajectory were explained by child, parental, and contextual risk factors.

Early Developmental Trajectories of Problem Behavior

An unconditional growth model was fit to explore the trajectories of problem behavior in young children with disabilities from age 3- to 8-years-old (Table 2). Because all variables were grand mean centered, the value of the intercept, 100.39, can be interpreted as the average problem behavior score for the “average” sample child (i.e., the child who has average values across all predictors). Type of behavior scale (PKBS-2 or SRSS) was included as a control variable to account for the effect of assessment scale. In general, given the nature of the scale, children’s behavior scores tended to be higher on the SSRS. After controlling for type of scale, the fixed effects for the age slope indicated from 3- to 8-years-old, the average sample child’s amount of problem behavior would be expected to decrease by 0.41 points each year.

Table 2

Unconditional Growth Models for Problem Behavior

<table>
<thead>
<tr>
<th>Coefficient</th>
<th>SE</th>
<th>T</th>
<th>Variance</th>
<th>df</th>
<th>χ²</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Component</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

24
The variance around the intercept and slope (random effects) indicate whether the parameter estimates vary across children, thereby representing individual differences in the linear change that occurs from 3- to 8-years of age (slope) and overall levels of behavior at 5.5-years of age (intercept). As can be seen in Table 2, the random effects were significant, indicating significant differences among children do exist which may be explained by including predictor variables in the model. Further, after controlling for time, the “within variance” or amount of variation that remained at Level 1 was 111.02, suggesting that approximately 48% of the variation in problem behavior scores is due to differences between children and 52% is within children (i.e., at the time-level).

### Predictors of Problem Behavior Trajectories

To explain the significant variation that was found to exist among individual problem behavior trajectories, child, parental, and contextual risk factors, and the interactions among these variables, were included in a series of models to explore how these predictors explained levels of problem behavior when children were 5.5-years of age and also the rate of change in problem behaviors in children from 3- to 8-years-old. Behavior scale was included as a control variable and therefore fixed at Level 1 and not modeled at Level 2. Controlling for this variable constrained the variable to have the same effect across all children (Raudenbush & Bryk, 2002). Results from the final model are displayed in Table 3.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Estimate</th>
<th>SE</th>
<th>z</th>
<th>p</th>
<th>df</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept (5.5 years)</td>
<td>100.39</td>
<td>0.21</td>
<td>467.50*</td>
<td>0.01</td>
<td>2871</td>
</tr>
<tr>
<td>Slope (Age)</td>
<td>-0.41</td>
<td>0.17</td>
<td>-2.49**</td>
<td>0.01</td>
<td>2871</td>
</tr>
<tr>
<td>Slope (Test)</td>
<td>6.64</td>
<td>0.39</td>
<td>16.87*</td>
<td>0.01</td>
<td>2871</td>
</tr>
</tbody>
</table>

*p < .01, **p < .05.
Table 3

*Problem Behavior Trajectories*

<table>
<thead>
<tr>
<th></th>
<th>Coefficient</th>
<th>SE</th>
<th>t</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>100.39</td>
<td>0.19</td>
<td>517.53*</td>
</tr>
<tr>
<td>Child Variables</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>-1.78</td>
<td>0.43</td>
<td>-4.13*</td>
</tr>
<tr>
<td>Language Skills</td>
<td>-0.19</td>
<td>0.08</td>
<td>-10.66*</td>
</tr>
<tr>
<td>Primary Language Not English</td>
<td>-3.27</td>
<td>0.71</td>
<td>-4.58*</td>
</tr>
<tr>
<td>Autism</td>
<td>10.49</td>
<td>0.75</td>
<td>13.92*</td>
</tr>
<tr>
<td>Developmental Delay</td>
<td>5.42</td>
<td>0.49</td>
<td>11.00*</td>
</tr>
<tr>
<td>Emotional Disturbance</td>
<td>16.07</td>
<td>1.61</td>
<td>9.98*</td>
</tr>
<tr>
<td>Learning Disability</td>
<td>3.28</td>
<td>1.36</td>
<td>2.41**</td>
</tr>
<tr>
<td>Mental Retardation</td>
<td>4.66</td>
<td>1.07</td>
<td>4.36*</td>
</tr>
<tr>
<td>Other Disability</td>
<td>3.04</td>
<td>0.90</td>
<td>3.38*</td>
</tr>
<tr>
<td>Contextual Variables</td>
<td></td>
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</tr>
<tr>
<td>Income</td>
<td>-0.32</td>
<td>0.07</td>
<td>-4.81*</td>
</tr>
<tr>
<td>Two-Parent Household</td>
<td>-1.16</td>
<td>0.55</td>
<td>-2.11**</td>
</tr>
<tr>
<td>Slope</td>
<td>-0.42</td>
<td>0.16</td>
<td>-2.59*</td>
</tr>
<tr>
<td>Child Variables</td>
<td></td>
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<tr>
<td>Female</td>
<td>0.68</td>
<td>0.22</td>
<td>3.10*</td>
</tr>
<tr>
<td>Autism</td>
<td>-2.00</td>
<td>0.39</td>
<td>-5.11*</td>
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<td>Emotional Disturbance</td>
<td>-3.12</td>
<td>0.88</td>
<td>-3.55*</td>
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<tr>
<td>Mental Retardation</td>
<td>-1.41</td>
<td>0.54</td>
<td>-2.58*</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Variance</th>
<th>df</th>
<th>$\chi^2$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>75.10</td>
<td>2860</td>
<td>7536.37*</td>
</tr>
<tr>
<td>Slope</td>
<td>4.76</td>
<td>2867</td>
<td>3407.47*</td>
</tr>
</tbody>
</table>

*p < .01. **p < .05.
The fixed effects indicate that greater problem behavior at 5.5-years-old (intercept) was predicted by the following child-level variables: being male, having a lower PPVT score, speaking English as the primary language, and being classified with one of the subsequent disability labels (listed by coefficient size): emotional disturbance, autism, developmental delay, mental retardation, learning disability, and “other” disability. Children identified with an audio/visual, orthopedic, or speech and language impairment did not have behavior levels that significantly differed from the reference group (i.e., children with no disability/IEP) at 5.5-years of age.

The interpretation of these findings is that while holding all other variables constant, males typically had problem behavior scores 1.78 points higher than females, while children for whom English was not their primary language, typically had problem behavior scores 3.27 points below children who spoke English as their primary language. Further, a decrease of 0.19 in a child’s problem behavior score would be expected for each additional unit increase in his/her PPVT score, suggesting children with greater language skills have lower amounts of problem behavior. Disability label also predicted increased amounts of problem behavior at 5.5-years of age for six of the disability classifications. While holding all other variables constant, children identified with emotional disturbance typically had problem behavior scores 16.07 points higher than children with no disability/IEP. Children with autism (10.49), developmental delays (5.42), mental retardation (4.66), learning disabilities (3.28), and “other” disabilities (3.04) also had elevated scores at 5.5-years-old, when all other variables were held constant.
Significant contextual predictors of higher amounts of problem behavior at 5.5-years-old included family income and household type. While holding all other variables constant, a child’s problem behavior score would be expected to decrease by 0.32 points for every one unit increase in income level and would be expected to decrease by 1.16 points if the child was living in a two-parent household, suggesting lower family income and living in a single-parent household are risk factors for elevated problem behavior. Parental education level and the presence of an additional member of the household with a disability did not significantly contribute to the explained variance. Further, the explored interactions between child and parental (i.e., Gender*Parental Education and Primary Language*Parental Education), and child and contextual variables (i.e., Gender*Income and Primary Language*Income) were not found to be significant.

In modeling the slope, significant cross-level interactions were found between age and four child-level variables (gender, autism, emotional disturbance, and mental retardation). For change in problem behavior from 3- to 8-years-old, it was found males declined in amount of problem behavior, whereas females actually increased in amount of problem behavior (Figure 1). In addition, children identified with autism, emotional disturbance, or mental retardation declined at faster rates compared to their peers with no disability/IEP, despite having elevated levels of problem behavior (Figure 2).
Figure 1. Problem behavior trajectories for males and females.

Figure 2. Problem behavior trajectories by disability classification.

Note: DD, developmental disability. ED, emotional disturbance. LD, learning disability. MR, mental retardation. “Other” includes multiple disabilities, other health impairments, traumatic brain injury, and other.
Compared to the unconditional growth model, the final explanatory model fit the data significantly better ($\chi^2 = 703.63, \text{df} = 2, p < .001$). The overall proportion of variance accounted for in the explanatory model was calculated relative to the variance in the unconditional growth model (i.e., variance unconditional model – variance explanatory model / variance unconditional growth model; Singer & Willet, 2003). The relative proportion of explained variance for the intercept was 25% and 13% for the slope. The random effects from the explanatory model indicate that there were still significant amounts of variation in the intercept and slope that were not explained by the included child, parental, and contextual predictors and therefore left unexplained.

**Discussion**

The purpose of this study was to explore various child, parental, and contextual variables and the interactions among them in order to model the trajectories of problem behavior in a national sample of young children with disabilities. Overall, the included predictor variables accounted for approximately one-quarter of the differences in amount of problem behavior displayed by children with disabilities at 5.5-years of age, and accounted for 13% of the variation in the trajectories of problem behavior across early childhood. Results for each of the three research questions are discussed, followed by the implications and limitations of the current study.

**RQ1: What is the overall trajectory of problem behavior in young children with disabilities?**

The current study found general declines in the amount of problem behavior exhibited by young children with disabilities as they aged. This finding is consistent with researchers who have found similar decreases in problem behavior in typically
developing children across the preschool to early elementary years (Bub, 2009; Calkins et al., 2007; Owens & Shaw, 2003; Patterson, Shaw, Snyder, & Yoerger, 2005). Findings from this study are also aligned with de Ruitter et al. (2007) who found declines in problem behavior from 6- to 18-years-old in youth with intellectual disabilities. These findings support the notion that as children age they acquire more skill sets that allow them to cope with and handle disputes in more pro-social ways and without problem behavior (Tremblay, 2000).

**RQ2: What early child, parental, and contextual factors are associated with variations in trajectories of problem behavior in young children with disabilities?**

All four child-level variables were found to be significant. Gender predicted both the level of problem behavior at the intercept (i.e., 5.5-years-old) and changes in behavior from 3- to 8-years-old. Consistent with prior research using maternal ratings (Macmillan et al., 2004) and teacher ratings (Keiley et al., 2000; Vanfossen, Hendricks Brown, Kellam, Sokoloff, & Doering, 2010), the current study found males were reported by teachers to have significantly higher amounts of problem behavior at age 5.5 compared to females. Interestingly whereas both Keiley et al. (2000) and Vanfossen et al. (2010) found males increased at a faster rate than females in the amount of problem behavior exhibited over time, the current study found problem behavior in males decreased between 3- and 8-years-old, and actually increased in females. This finding is consistent with Calkins et al. (2007), who found decreases from 2- to 5-years-old in males’ externalizing behavior. However, no studies that have identified gender differences in problem behavior trajectories of young children have reported females increase in the amount of problem behavior displayed over time while males decrease, as was the current
finding. Although no studies have identified this trend until now, it is not entirely surprising, given the recent increase in females detained in juvenile detention centers (Stahl et al., 2003). Further, gender, specifically female, was the only variable in the current analyses that predicted increases in the amount of problem behavior exhibited over time.

In addition to gender, children’s language skills were associated with amount of problem behavior at age 5.5. Specifically, children with higher PPVT scores, indicative of more advanced language skills, tended to have lower amounts of problem behavior. This finding supports the notion that children with language difficulties are unable to acquire appropriate language skills, which in turn hinder their ability to use appropriate means of problem solving, resulting in greater amounts of problem behavior (Tremblay, 2000). The current finding is also aligned with de Ruiter et al. (2007), who identified limited communication skills as an explanation for the higher rates of problem behavior in children with disabilities.

Primary language also predicted amounts of problem behavior at 5.5-years-old, with non-English speaking children exhibiting significantly fewer problems than their English speaking peers. This finding somewhat contradicts previous research that has found non-English monolingual children had the highest levels of internalizing (Han, 2010; Han & Huang, 2010) and externalizing behaviors (Han & Huang, 2010) by third grade. Interestingly, Han (2010), who focused on Latino children, found English-dominant bilingual and English monolingual children had the highest rates of externalizing problems by this age. Findings from the current study are more consistent with that of Han (2010). This may in part be due to language similarities; 80% of
participating children in the current study who did not speak English as their primary language spoke Spanish. Findings from the two studies suggest that speaking Spanish as one’s primary language may be a protective factor for both children with and without disabilities.

The current study also replicated findings that different disability classifications are associated with varying levels of problem behavior (Gadeyne et al., 2004; Luteijn et al., 2000). Specifically, children identified with an emotional disturbance had the greatest amounts of problem behavior compared to all other children, both with and without identified disabilities. Compared to children who had no disability/IEP, this difference equates to over one full standard deviation, indicating both statistical and substantive differences in the amount of problem behavior exhibited. Other disability classifications were also associated with significantly greater amounts of problem behavior at 5.5-years-old compared to the no disability/IEP group. Specifically, in order of decreasing magnitude, these disability categories included: autism, developmental delay, mental retardation, learning disability, and other disability (includes multiple disabilities, other health impairment, traumatic brain injury, and other). It should also be mentioned, although the reference group consisted of children with no disability/IEP, this may not be entirely accurate, as one of the requirements for participation in PEELS was children had to be eligible for special education services at the time of recruitment. Given that all sample children met eligibility criteria, it is likely that some level of disability existed in the reference category. Further, taking into account the higher prevalence rate of problem behavior in children with disabilities, it is also likely the findings from the current analyses are underestimated. Specifically, the differences between the prevalence rates of
problem behavior in the disability categories compared to non-disabled category are probably larger than what was found in the current report.

Differences in trajectories, specifically rates of change in problem behavior over time, were predicted by three disability classifications: emotional disturbance, autism, and mental retardation. Although these classifications were associated with the three greatest amounts of problem behavior at 3-years old, as can be seen in Figure 2, children identified with these disabilities actually declined faster in the amount of problem behavior displayed over time. Further, by the end of the study growth period (i.e., 8-years-old), children with mental retardation exhibited levels of problem behavior similar to children identified with no disability/IEP. Children with emotional disturbance, despite having significant declines in their problem behaviors, still had elevated levels compared to their peers in all other categories.

Although parental education was not found to be significant in the final model, it is likely due to its correlation with income level. In addition, this study used the highest level of education attained from either parent across any of the four assessment waves. The majority of past studies have focused primarily on maternal education at the commencement of the study (e.g., Burchinal et al., 2006; Macmillan et al., 2004). Income, however, did predict the amount of problem behavior in children at 5.5-years-old in the current study, with children from families with higher incomes displaying fewer problem behaviors. This finding is consistent with previous studies, which have found negative relationships between SES and problem behavior in typically developing children (Han & Huang, 2010; Keiley et al., 2000; Vanfossen et al., 2010). While some studies have found higher rates of problem behavior over time for children living in
poverty (Macmillan et al., 2004; Vanfossen et al., 2010), income was not found to be associated with changes in problem behavior in children with disabilities from 3- to 8-years-old. Although significant, given the small coefficient size and limited scale range (1- $5,000 or less to 11- more than $50,000), income level is likely to be underestimated; each $5,000 increase in income (up to $50,000) is only associated with approximately one-third of a point decrease in total problem behavior. While all other variables are held constant, this equates to roughly a three-point difference between children whose family incomes were $5,000 or less and children whose family incomes were more than $50,000. However, the underestimation is likely due to a ceiling effect on the income scale; approximately one-third of the sample reported incomes of $50,000 or more. If the scale had a larger range and differentiated among the higher income respondents, the coefficient estimates would likely be more substantive and meaningful.

As with income, household type was associated with levels of problem behavior at 5.5-years-old, but not with changes in amount of behavior over time. This finding replicates that of Han and Huang (2010), who found children residing in two-parent households were likely to exhibit fewer problem behaviors than their peers living in single-parent homes. What makes the current finding interesting is although single-parent households had a significantly lower mean income compared to two-parent households, the effect of household type was significant over and above income level, indicating additional variance in amount of problem behavior is explained by the inclusion of household type in the final model. Finally, this study did not find any effect of having an additional member of the household with a disability on the amount of problem behavior.
displayed in children with disabilities at 5.5-years-old or on changes in behavior across early childhood.

**RQ3: How do various interactions among child, parental, and contextual factors contribute to variations in trajectories of problem behavior in young children with disabilities?**

Besides the cross-level interactions between age and gender and age and the three disability categories discussed above, none of the interaction terms among child, parental, and contextual factors were found to significantly predict levels of or changes in trajectories of problem behavior over time. Specifically, while the main effect for gender was associated with problem behavior at 5.5-years-old and also changes in behavior from 3- to 5-years-old, the interactions between gender and parental education and between gender and income were not significant. Also, although the main effect for primary language predicted amount of behavior at 5.5-years of age, the interaction terms between primary language and parental education and primary language and income were not significant. These findings indicate in the population of young children with disabilities, the effect of parental education and income on problem behaviors does not differ for males and females or for children who do and do not speak English as their primary language.

**Implications for Practice, Future Research, and Limitations**

This study contributes to the field of early childhood special education by extending research on problem behavior to the preschool level and also to include young children with disabilities. To the researcher’s knowledge, this is the first longitudinal study to extend to young children with disabilities, and one of the few studies that explore
problem behavior trajectories in young children in the United States. Researchers in the United States have been slow to focus on problem behavior at the time of emergence compared to researchers in European countries such as the Netherlands and Sweden (e.g., Baker, Blacher, & Olsson, 2005; Mesman et al., 2009).

Specifically this study sheds light on the trajectories of problem behavior in a nationally representative sample of children with disabilities. The utilization of a national sample increases the generalizability of findings, allowing knowledge gained from this study to be used to tailor intervention services for this population of children. As variables associated with increased problem behavior have been identified, developing and providing effective early intervention, perhaps even prior to the onset of problem behavior, is possible. Particularly, because female children with disabilities are likely to increase in the amount of problem behavior exhibited over time, intervening at an early age in order to stop the escalation is crucial.

Additional research is needed at the preschool and even earlier levels so the emergence of problem behavior can be identified and tracked longitudinally across childhood. Specifically, based on the notions of multifinality and equifinality, in order to fully understand and be able to predict the trajectories of problem behavior, early child, parental, and contextual risk factors, along with the interactions among these variables and changes in them over time need to be assessed. Future research needs to include both children with and without disabilities to see where differences in risk factors and trajectories exist. Understanding the complexity of the relationships will allow more effective and tailored interventions to be designed and implemented to children prior to the emergence of the problem behavior.
The current study had several limitations worth noting. As identified above, future research needs to encompass the full scope of predictor variables. This study did not include all known child, parental, and contextual risk factors in the analyses, but rather select variables from each area. Further, only a limited number of interactions were explored among the factors. Another limitation was the outcome variable used in the current study focused on total combined problem behaviors, and thus did not differentiate between externalizing and internalizing problems. Evidence from the limited number of studies exploring growth trajectories of problem behavior in young children suggest differences may exist in the trajectories of the two different types of behavior. Despite the existence of internalizing behavior in young children, these problems are often overlooked and not assessed at such a young age. Based on a recent review of existing literature, half of all studies exploring problem behavior trajectories in young children focused exclusively on externalizing behaviors (McCaffrey, 2012). However, the current study took into account both externalizing and internalizing problems and modeled the trajectories of total combined problem behavior, thereby providing a more accurate estimation of the growth of problem behaviors in young children with disabilities.

Another limitation of the study was two different behavior scales were used to assess problem behavior. Although the current study statistically controlled for test type and the fact that the PKBS-2 and SSRS are among the most widely used instruments to assess problem behavior in children, the PKBS-2 has a more psychopathology orientation compared to the SSRS, which is oriented more toward problem behavior (Matson & Wilkins, 2009; Merrell & Harlecher, 2008). In addition, while both scales assess internalizing and externalizing behaviors, the SSRS also includes questions related to
hyperactivity in its problem behavior scale. This additional element of behavior may account for the discovery of higher scores on the SSRS. Further, the effect of age is likely underestimated in the analyses due to child age and behavior scale being somewhat correlated. Specifically, all 3- and 4-year-old problem behavior assessments were based on the PKBS-2, whereas all 7- and 8-year-old assessments were based on the SSRS (5- and 6-year-old assessments were based on either the PKBS-2 or SSRS depending on the assessment wave). Both assessments were also based exclusively on teacher-ratings. Keiley et al. (2000) found differences in amount of problem behavior based on whether the ratings were done by the child’s teacher or mother. However, using teacher ratings is likely to be more accurate for three reasons: (a) inflated maternal ratings of problem behavior scores have been associated with maternal depressive symptoms (Fergussen, Lynksey, & Horwood, 1993); (b) teacher reporting bias does not appear to be a significant problem (Han, 2010); and (c) teacher ratings correlate with self-reports of problem behavior and have been found to predict problem behavior better than parental ratings (Lochman, 1995).

While several limitations exist in the current study, findings from the study were generally consistent with past research that has noted a decline in problem behaviors over time. Further, this study identified specific child and contextual factors that placed children with disabilities at increased risk for problem behaviors. A key finding from the current study was the identification of gender differences in trajectories of problem behavior over time. While prior research with typically developing children often shows increases in the amount of problem behavior exhibited by males, this study found decreases in problem behavior over time for male children with disabilities but found
female children with disabilities are likely to increase in the amount of problem behaviors displayed across early childhood.
References


