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America's Youngest Kindergarteners' Elevated Levels of Internalizing Problems at School Entry and Beyond: Evidence from the Early Childhood Longitudinal Study

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Abstract The study investigated developmental trajectories of internalizing problems from kindergarten to fifth grade in young kindergarteners versus older peers in kindergarten, as well as factors that may be attributed to such differential trajectories. Data on a sample of 9,796 kindergarteners from the Early Childhood Longitudinal Study were analyzed using individual growth curve models. Results revealed that the younger kindergarteners displayed more symptoms of internalizing problems than their older peers at school entry and that such elevated levels of problems persisted into fifth grade. Protective factors included higher socioeconomic status and favorable parental perceptions of child's abilities to pay attention and solve problems. These findings are informative for school-based early intervention efforts.

Keywords Kindergarteners · Internalizing problems · Externalizing problems · Developmental trajectories · ECLS-K

Introduction

According to a recent study published in Academic Pediatrics (Guyer et al., 2009), emotional and behavioral problems at a very early stage in life, along with obesity, tobacco exposure, and unintentional injury, constitute major burdens on the health of preschool-aged children, and they can be antecedents to a host of health problems across their life span. Thus, early interventions aimed at improving the mental health of these young children could translate into a total lifetime savings of approximately $65 billion for the nation (Guyer et al., 2009). In addition to its association with high health-care expenditures, children's emotional development is crucial to their overall well-being as it lays a foundation for their cognitive, behavioral, and interpersonal development (Allen & Sheeber, 2009; Berk, 2003).

Previous studies have established that children's behavior and emotional problems generally fall into two

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categories: externalizing problems such as hyperactivity or conduct problems and internalizing problems such as depression and anxiety (e.g., Achenbach, 1966; Achenbach & Edelbrock, 1978). In contrast to externalizing problems, which are marked by concrete, observable behaviors (Keenan, Shaw, Delliquadri, Giovannelli, & Walsh, 1998), internalizing problems are associated with an inner mental state or subjective mood that is experienced privately and therefore may not be readily observable to others, even though it may be very real to the child itself (Keenan et al., 1998; Mesman & Koot, 2000).

Early identification and treatment for internalizing problems in childhood are important because these problems are often antecedent to anxiety and depression in adulthood (Hammen & Garber, 2001). Besides this insidious long-term effect, children who display symptoms of internalizing disorders are frequently found to have poor self-concepts and often suffer from low social inclusions (Nyberg, Henricsson, & Rydell, 2008), have teenage pregnancies (Mollborn & Morningstar, 2009), drop out of school (Havighurst, Bowman, Liddle, Matthews, & Pierce, 1962), abuse substances (Couwenbergh et al., 2009), engage in antisocial acts (Veenstra, 2006), be unemployed (US Department of Education, 2002), suffer from alcoholism (Rhodes & Jasinski, 1990), and have suicidal ideation (Shin et al., 2009). Given that such internalizing problems can become entrenched without early detection and intervention (Forness, Kavale, MacMillan, Asarnow, & Duncan, 1996), it is critical to understand the developmental patterns and associated risk factors for internalizing problems in childhood (Kovacs & Devlin, 1998).

In their seminal work, Achenbach and Edelbrock (1978) observed that both internalizing and externalizing problems seem to vary as a function of the child age, sex, race, and socioeconomic status. In their view, a thorough investigation of such factors in child psychopathology should be a top priority for future research. Indeed, being male, Black or Hispanic, and of low socioeconomic status have been shown to be associated with externalizing problems; however, their relationship with internalizing problems has scarcely been studied (e.g., Campbell, 1995; Raver, 2002). It is rather striking that some recent research on child internalizing psychopathology did not even take these demographic variables into consideration (e.g., Van Lier & Koot, 2010).

Available literature using a cross-sectional nationally representative sample of British 5- to 15-year-olds concluded that children from the same grade who are younger than their classmates are at a greater risk of mental health problems (Goodman, Gledhill & Ford, 2003). However, there is a dearth of research that specifically examines the associated risk of being younger in kindergarten for the development of internalizing problems. One such study was conducted by Zeng (2007), which examined the developmental trajectories of internalizing problem behavior among a nationally representative sample of children in the United States from kindergarten to third grade, using individual growth curve models. And likewise, it was found that child age at school entry is inversely related to the levels of their internalizing problems for the ensuing three years. One of the objectives of the present study is to expand Zeng's work by investigating how the younger kindergarteners differ from their older peers in kindergarten in their developmental trajectories of internalizing problems from kindergarten through fifth grade.

To date, few studies have investigated the developmental trajectories of internalizing problems of children from early childhood to middle childhood using a large-scale nationally representative sample. This may be due to the fact that such studies would be prohibitively expensive, as House (2002) regretfully pointed out, developing "large-scale, longitudinal studies and naturalistic observation methodologies" to investigate the developmental characteristics of child psychopathology can be very "time-consuming, labor-intensive, and expensive" (p. 28). To promote research on psychiatric disorders with an early-onset in childhood, the National Institute of Mental Health (2009) has made it a funding priority to encourage and support research that specifically examines the entire "developmental course of, periods of vulnerability or sensitivity for, or risk processes" of emotional and behavioral disorders.

Adding to the problem regarding the paucity of large-scale national samples examining internalizing problems and their trajectories is the fact that the available studies may raise methodological concerns. For example, some studies have employed small convenience samples of psychiatric patients from mixed age groups, which rendered generalization of the findings almost impossible (Garber, Keiley, & Martin, 2002). In the studies where longitudinal data were used, statistical methods most appropriate for longitudinal data analysis were frequently not employed (e.g., Morgan, Farkas, & Wu, 2009).

Theoretical Framework

Given its interdisciplinary nature, this study integrates theories from both developmental psychology and child psychopathology. The theory of developmental psychology that undergirds the present investigation is the maturationist theory proposed by Arnold Lucius Gesell (Dalton, 2005). In addition, the study incorporates two schools of thoughts from child psychopathology, one of which is represented by Achenbach and Edelbrock (1978) and the other by Cicchetti and Schneider-Rosen (1986).

The maturationist theory is quite influential in the field of child development and learning, especially when it comes to school readiness (Morrison, 2009). Maturationists view child development as a maturational process, whereby children develop both physically and mentally over time as determined by their own biological clock and genetic makeup (Dalton, 2005).

On the other hand, Cicchetti and Schneider-Rosen (1986) suggested that personal competences or abilities, both cognitive and noncognitive, can play a critical role in the development of child psychopathology. They further posited that perceived failure to reach the developmentally appropriate competencies could lead directly to distress and internalizing problems. Interestingly, much research in this area has concentrated instead on externalizing problems and certain competencies that could result in the manifestation of these problems. Therefore, little is known about the competencies that are associated with internalizing problems.

The aim of this study is to extend the available literature by examining how personal competencies and demographic factors affect the trajectories of internalizing problems throughout elementary school. It is hypothesized that children who enter kindergarten at a young age will be at a greater risk of developing internalizing problems during kindergarten as well as at an increased risk of continued problems throughout elementary school up to fifth grade than their older peers. Individual abilities, such as ability to pay attention and use problem-solving skills, are expected to be protective factors. In addition, the extent to which demographic characteristics (i.e., child sex, race/ethnicity and socioeconomic status) may influence the manifestation of internalizing symptoms during elementary school will be explored.

Method

Description of the Data Source

The Early Childhood Longitudinal Study, Kindergarten Class of 1998–1999 (ECLS-K), conducted by the National Center for Education Statistics, is the first large-scale study that followed a nationally representative sample of children from kindergarten entry to middle school. Using a multistage probability sample design, a total of 21,260 kindergarteners were selected at the start of the study in fall 1998. The ECLS-K focuses on children's early school experiences, and data were collected from the children, their parents/guardians, teachers, and school administrators. Additional information involving recruiting participants and study procedures can be viewed in the Early Childhood Longitudinal Study manuals (NCES, 2001, 2009).

Participants

For the present investigation, data were drawn from five waves: fall kindergarten (Wave 1), spring kindergarten (Wave 2), spring first grade (Wave 4), spring third grade (Wave 5), and spring fifth grade (Wave 6). Wave 3 (fall first grade) was excluded because data were collected from only a subsample of 30 percent of the ECLS-K children. Additionally, ECLS-K stopped collecting teacher reports on children's internalizing and externalizing problem behaviors at eighth grade (Wave 7), which are the main variables under investigation in this study; therefore, Wave 7 was also excluded from this study. However, ECLS-K stopped collecting parent reports on these problem behaviors much sooner at third grade (NCES, 2006), rendering these parent reports unfit for the present longitudinal analysis from kindergarten to fifth grade. On the other hand, only parents reported their perceptions on their children's ability to pay attention and solve problems, which are used for this study.

Due to the unique sampling design of ECLS-K, the longitudinal sampling weight released by NCES (2009) is used to generate unbiased parameter estimates for the population from which ECLS-K sample was drawn. The sampling weight not only adjusts for unit and item nonresponse but also accounts for oversampling of certain subpopulations, resulting in a total sample of 9,796 children, along with their parents and teachers.

Measures

Teacher Ratings of Children's Internalizing and Externalizing Problem Behaviors

ECLS-K utilized the Social Rating Scale (SRS), adapted with permission from the Social Skills Rating System (Gresham & Elliot, 1990), to measure internalizing and externalizing behaviors that school children exhibited. Teachers rated individual students on each social skill and behavior using a scale from 1 to 4, indicating "Student never exhibits this behavior," "Student exhibits this behavior occasionally or sometimes," "Student exhibits this behavior regularly but not all the time," and "Student exhibits this behavior most of the time." The Internalizing Problem Behavior Scale (IPBS), a subscale of SRS, consists of four items measuring children's anxiety, loneliness, low self-esteem and sadness. The Externalizing Problem Behavior Scale (EPBS), also a subscale of SRS, consists of five items that report the frequency a child argues, fights, disturbs ongoing activities, gets angry, or acts impulsively. NCES (2001) compressed the IPBS and EPBS scores of each participant by averaging their scores across all the items on each scale, and only these resulting mean scores

were released for the public-use data; as a result, scores on both IPBS and EPBS scales range from one to four. Altogether, teacher SRS was collected at five different time points: Fall Kindergarten, Spring Kindergarten, Spring First Grade, Spring Third Grade, and Spring Fifth Grade, and the split half reliability for IPBS over these data waves is 0.80, 0.78, 0.77, 0.76, and 0.77, respectively, and 0.90, 0.90, 0.86, 0.89, and 0.89 for EPBS (NCES, 2001, 2002, 2004, 2006, 2009).

Sociodemographic Variables

Four demographic variables were examined: age, gender, race, and socioeconomic status. Since age is a key variable in this investigation, it warrants some elaboration.

Age at school entry was measured in months, and since the exact date when fall semester starts is not available in the public-use data file, children's age at school entry was calculated by finding the difference between child's birthdate and September 1, 1998; this variable was further dichotomized into two categories: the younger versus the older kindergarteners. This dichotomization follows the example of a previous study conducted by Stipek and Byler (2001) that examined the association between child outcomes and age at kindergarten entry based on a sample of 237 children from three different sites in the United States: a rural and urban area from the northeast region, and an urban area from the west. In their study, Stipek and Byler categorized children into three groups according to their age: young, intermediate, and old. In particular, the youngest group was defined as those who "turned five after May 31 and before they entered kindergarten or in the fall after entering kindergarten" (p. 181). This criterion is followed in this investigation: Specifically, children who turned five on or before May 31, 1998, were coded as older, and the rest younger. There are two reasons why the children were categorized into two groups only (younger vs. older): First, our focus is on the younger kindergarteners and how well they do compared with their peers; second, it renders this study higher ecological validity because this dichotomization closely parallels the US kindergarten entry policies where arbitrary cutoff dates are commonly used in all states to determine the eligibility of a child (Education Commission of the States, 2008).

The variable representing gender is dichotomous, indicating whether a child was male or female. The socioeconomic status (SES) variable integrated information from three sources: parental or guardian's education, occupation, and household income (NCES, 2001). The resulting composite SES score ranges from −4.75 to 2.75, with higher scores indicating higher SES. The race variable was recoded as White, Black, Hispanic, and Asian.

Parental Ratings of Child Competences/Abilities

In each wave of data collection except for wave 2, parents were asked two single-item questions as part of the parent questionnaire to evaluate child's abilities to pay attention and solve problems relative to those of other children of the same age. For each question, parents responded on a Likert scale of one to four, indicating the child is better than other children, comparable to other children, slightly less able than other children, or much less able than other children. These two sets of variables were recoded into two time-varying covariates, with higher scores indicating higher abilities.

Analytical Techniques

Comparison of Baseline Characteristics

To find out how younger kindergarteners as a group differ from their older peers, comparison of the baseline background characteristics between these two groups was made, using the *t* test for continuous variables and chi-square test for categorical variables. In addition, effect sizes were calculated using Cohen's d for continuous variables and odds ratio for dichotomous variables. All the analyses in this study were conducted using the SAS system (version 9.2).

Linear Versus Quadratic Individual Growth Curve Models

Due to the longitudinal nature of the ECLS-K data, the individual growth curve models (IGCM) with random growth factors (i.e., intercept, slope, and quadratic term) were used for the data analysis. IGCMs are specifically designed to analyze longitudinal data in which repeated measures may be correlated; observations may be unevenly spaced in time, or the data may be unbalanced, which means that there are different numbers of observations for individual participants due to missing data (Rogosa, 1995). It is worth pointing out that the ability of the IGCMs to borrow statistical strength makes it possible to account for individuals with sparse data by using information from similar individuals with more data (Rubin, 1987).

To test whether the developmental trajectories are linear or quadratic, both linear and quadratic unconditional growth curves models were fitted. A time-varying variable that is calibrated in semesters was used as the metameter for the linear growth models, and this variable is squared to create a quadratic term (i.e., semester × semester) for the quadratic model. Below is the mathematical representation of the unconditional quadratic individual growth model. It has two levels: time points (level 1) nested within children

(level 2) (Raudenbush & Bryk, 2002; Singer & Willett, 2003).

$$\begin{aligned} &\text{Level 1 model:} \quad y_{ti} = \pi_{0i} + \pi_{1i}t_i + \pi_{1i}t_i^2 + \boldsymbol{\alpha}'\mathbf{x}_i + \varepsilon_{ti} \\ &\text{Level 2 model:} \quad \pi_{0i} = \beta_0 + r_{0i} \\ &\qquad\qquad\quad \pi_{1i} = \beta_1 + r_{1i} \end{aligned}$$

where y_{ti} is the internalizing problem behavior score at time t for child i; π_{0i} is the estimated internalizing problem behavior score of child i; π_{1i} is the estimated growth rate per semester in internalizing problem behavior of child i; β_0 is the expected internalizing problem behavior score for all children at the first measurement occasion; β_1 is the expected growth per semester in internalizing problem behavior score for all children in the entire sample; $\boldsymbol{\alpha}' = (\alpha_1, \ldots, \alpha_p)$ is the vector of the fixed effects for the independent variables $\mathbf{x}_i' = (x_{i1}, \ldots, x_{ip})$ which include the externalizing problem variable. Finally, the ε and r terms are residuals associated with observations and children, respectively.

Full Individual Growth Curve Model

To build the conditional models to explain the variations in children's internalizing problem behavior scores, a dichotomous dummy variable was created as a covariate to differentiate the youngest children at kindergarten entry from those who are older. The interaction of this dummy variable with the slope (i.e., semester) reflects the degree to which the growth rates of younger and older kindergarteners differ.

Also included in the final model are the parent reports of child's abilities to pay attention and solve problems over time, which were converted into two time-varying covariates, respectively. The rest of the covariates in the model are the four sociodemographic variables, as discussed previously.

Results

There were significant differences between the younger kindergarteners and their older peers in the baseline background characteristics at kindergarten entry (see Table 1):

The younger kindergarteners as a group were on average almost seven months younger than their older peers, and there were fewer boys in this group (48.22 vs. 52.94 %). It is interesting to note that parents of the younger kindergarteners reported less favorable perceptions of their children's abilities to pay attention and solve problems ($p < 0.0001$).

For both groups, the majority of children are White (see Table 1, 56.21 % of White for younger group and 62.48 % for older group). Overall, the younger group is about six percent higher in minorities; however, there are more Asians in the younger group (3.93 %) than in the older group (2.48 %). In addition, younger kindergarteners as a group have slightly higher socioeconomic status ($p < 0.001$).

Exploring the Relationship Between Internalizing and Externalizing Problem Behavior

The internalizing problem behavior scores for both younger and older kindergarteners range from one to four. Moreover, for younger kindergarteners as a group, their average internalizing problem scores and the corresponding standard deviations (in parentheses) at the aforementioned five assessment time points are 1.55 (0.49), 1.58 (0.47), 1.62 (0.46), 1.69 (0.50), and 1.68 (0.53), respectively; likewise, for older kindergarteners, their average internalizing problem scores and the corresponding standard deviations are 1.52 (0.48), 1.58 (0.47), 1.59 (0.47), 1.66 (0.48), and 1.67 (0.51), respectively.

Correlation analyses were conducted to explore the relationship between internalizing and externalizing problem behavior for the entire sample of kindergarteners, and it was found that, across these five data waves, there were positive associations between the two, and such correlations range from 0.24 to 0.34.

Linear Versus Quadratic Unconditional Individual Growth Curve Models

To explore the characteristics of the developmental trajectories of children's internalizing problems, both linear and quadratic unconditional individual growth curve models were fitted (see Table 2).

The fit statistics such as Akaike information criterion (AIC/AICC) and Bayesian information criterion (BIC) for the quadratic model are smaller than those for the linear model, indicating that the quadratic model provides a better fit for the data. In addition, the deviance statistic of 47.2 obtained by subtracting the log-likelihood statistic (i.e., -2 restricted log-likelihood) of the quadratic model from that of the linear model is highly significant ($p < 0.0001$), suggesting the quadratic model fits better.

As shown in Table 2, the linear term of time (i.e., semester) is positive, but the quadratic term is negative, suggesting the growth trajectory of internalizing problems to be a concave curve, which is consistent with Fig. 1. Overall, the growth curves of the two groups (i.e., younger kindergarteners and their older peers) are parallel to each other; furthermore, there is an interesting pattern in the trajectories of the internalizing problems: specifically, children went through three distinct phases in relation to internalizing problems from kindergarten to fifth grade.

Table 1 Comparison of baseline characteristics between the younger and older kindergarteners

Variable	Kindergarteners								Effect size[c]	χ^2 or t	p
	Younger[a] (n = 3,071)[b]				Older[a] (n = 6,724)[b]						
Demographic characteristics											
Child gender (%)										18.76	<0.001
Male/female	48.22/51.78				52.94/47.06				0.83		
Child race/ethnicity (%)										44.83	<0.001
White	56.21				62.48				1.00		
Black	17.32				16.55				0.86		
Hispanic	22.53				18.49				0.74		
Asian	3.93				2.48				0.57		
	M	SD	Min	Max	*M*	SD	Min	Max			
Child age (in months) at kindergarten entry	61.22	1.52	57.00	63.00	68.16	3.11	64.00	80.00	−1.82	117.05	<0.001
Socioeconomic status	0.01	0.79	−4.75	2.69	−0.05	0.81	−4.75	2.75	0.08	−3.35	<0.001
Parent report of child ability											
Child ability to pay attention	3.06	0.63	1.00	4.00	3.10	0.66	1.00	4.00	−0.07	−2.21	0.03
Child ability to solve problems	3.19	0.62	1.00	4.00	3.26	0.61	1.00	4.00	−0.12	−4.84	<0.001
Teacher report of child											
Internalizing problems	1.55	0.49	1.00	4.00	1.52	0.48	1.00	4.00	0.05	1.96	0.05
Externalizing problems	1.62	0.60	1.00	4.00	1.62	0.58	1.00	4.00	0.00	0.06	0.95

Data from the ECLS-K K-8 full sample public-use data file, National Center for Educational Statistics, NCES 2009-005, USDE

[a] The cutoff date for younger versus older kindergarteners is May 31, 1998

[b] The samples are weighted

[c] Cohen's d was calculated for continuous variables and odds ratio for categorical variables

Table 2 Comparisons of fit statistics of linear versus quadratic unconditional individual growth curve models

	Linear model	Quadratic model
Parameter estimates		
Semester	0.010****	0.024****
Semester × semester	–	−0.001****
Fit statistics		
AIC	107,701.9	107,654.7
AICC	107,701.9	107,654.7
BIC	107,733.8	107,686.6
−2 Res log-likelihood	107,693.9	107,646.7

Data from the ECLS-K K-8 full sample public-use data file, NCES 2009-005, USDE

* $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$; **** $p < 0.0001$

As Fig. 1 shows, both younger kindergarteners and their older peers experienced the steepest growth of internalizing problems from the fall of kindergarten to the spring of kindergarten, and although the problems continued to develop from the spring of kindergarten to the spring of third grade, the growth rates have reduced for both groups. After third grade, both groups seem to have hit a plateau: the growth of internalizing problems for the older group has gradually leveled off, and for the younger group, the internalizing problems have begun to decrease from the spring of third grade to the spring of fifth grade.

Individual Growth Curve Models with a Single Covariate

To explore the role each covariate or covariate set (i.e., race variables) plays in the growth curve model, covariates were entered one at a time to find out their unique contribution to the model. Table 3 shows the parameter estimates from these models.

Table 3 shows that being younger, being a boy, and having higher levels of externalizing problems are risk factors for internalizing problems. The race variables were entered to the model as a set, and it was found that being Black is a risk factor for internalizing problems and being Hispanic has no effect, while being Asian is a protective factor. Other protective factors are consistent favorable parental report of abilities to pay attention and solve problems over time.

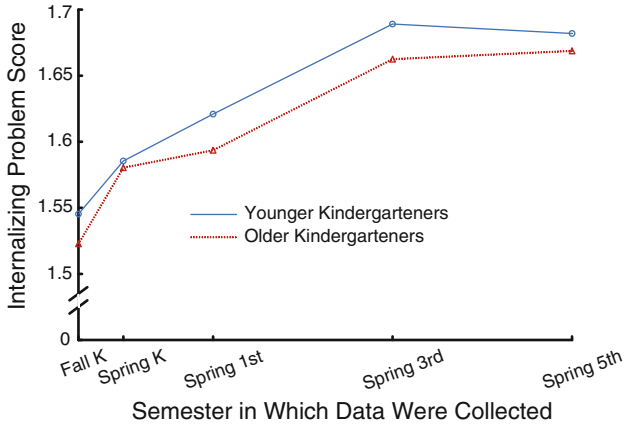

Fig. 1 Differential growth trajectories of internalizing problems of the younger versus the older kindergarteners

Full Individual Growth Curve Model

A full model was fitted to explore the effects of the demographic variables and parental report of child's personal competence on the development of internalizing problems while controlling for externalizing problems (see Table 4).

As Table 4 shows, younger kindergarteners displayed more symptoms of internalizing problems at school entry compared with their older peers. And more importantly, such elevated levels of problems persisted from kindergarten through fifth grade. On average, younger kindergarteners as a group were 0.03 points ($p < 0.05$) higher than their peers on their internalizing problem behavior scores.

There is no difference in the growth rate of internalizing problems between these two groups, however, as the interaction effect between the group membership of being younger versus older and the time (i.e., semester) was found not significant. For both groups, internalizing problem scores increased by 0.02 points per semester ($p < 0.0001$), and the growth trajectories for both groups are quadratic, or concave, to be specific.

As discussed previously, there is consistent correlation between internalizing and externalizing problems; thus, this model explored the effects of demographic and personal competence variables on the development of internalizing problems, net of the effect of externalizing problems. Indeed, externalizing problems significantly contribute to the development of internalizing problems by an increase of 0.24 points in internalizing problem scores ($p < 0.0001$). It is worth noting that the effect of being a male is completely reversed both in magnitude and in directionality compared to the corresponding single covariate model: Being a boy helps decrease internalizing problems by 0.03 points ($p < 0.0001$).

On the other hand, parents' favorable perceptions of child's abilities to pay attention and solve problems are each found to be a protective factor, which predicts a decrease in child's internalizing problems by 0.04 points ($p < 0.0001$) and 0.06 points ($p < 0.0001$), respectively. Additionally, higher socioeconomic status is also a protective factor ($p < 0.001$).

Discussion

Although Achenbach and Edelbrock pointed out in late 1970s that the study of children's internalizing and externalizing problems should be of a high priority, the bulk of research in child psychopathology concentrated on children's externalizing problems in the ensuing two decades, while internalizing problems remained understudied (e.g.,

Table 3 Simple regression: individual growth curve models with single covariate

Covariate	Estimate	SE	Effect size[b]	*t*	*p*
Younger versus older	0.031	0.008	0.064	3.91	<0.001
Child gender (male vs. female)	0.034	0.007	0.070	4.64	<0.001
Socioeconomic status	−0.067	0.005	−0.100	−14.31	<0.001
Race					
Black[a]	0.027	0.012	0.055	2.31	0.02
Hispanic[a]	0.016	0.010	0.033	1.66	0.10
Asian[a]	−0.078	0.017	−0.160	−4.49	<0.001
Ability to pay attention	−0.108	0.005	−0.138	−23.48	<0.001
Ability to solve problems	−0.099	0.002	−0.121	−20.50	<0.001
Externalizing problem behavior	0.256	0.004	0.302	59.32	<0.001

Data from the ECLS-K K-8 full sample public-use data file, NCES 2009-005, USDE

[a] Race variables were entered into the model as a covariate set (three dummy variables with Whites as the reference group)

[b] Standardized regression coefficients were computed as estimates of effect sizes

Table 4 Multiple regression: full quadratic individual growth curve model controlling for externalizing problem behavior

Covariate	Estimate	SE	Effect size[a]	*t*	*p*
Younger versus older	0.028	0.012	0.057	2.27	0.02
Child gender (male vs. female)	−0.030	0.008	−0.062	−3.94	<0.001
Socioeconomic status	−0.042	0.005	−0.063	−8.23	<0.001
Race					
Black	−0.073	0.012	−0.150	−5.84	<0.001
Hispanic	−0.026	0.010	−0.053	−2.49	0.01
Asian	−0.035	0.020	−0.072	−1.78	0.08
Ability to pay attention	−0.044	0.005	−0.056	−8.97	<0.001
Ability to solve problems	−0.063	0.005	−0.077	−12.58	<0.001
Externalizing problem behavior	0.240	0.005	0.283	46.23	<0.001
Semester	0.021	0.002	0.159	8.65	<0.001
Child being younger × semester	−0.001	0.002	−0.006	−0.40	0.69
Semester × semester	−0.001	0.000	−0.100	−5.34	<0.001

Data from the ECLS-K K-8 full sample public-use data file, NCES 2009-005, USDE

[a] Standardized regression coefficients were computed as estimates of effect sizes

Campbell, 1995; Raver, 2002). More than three decades later, it is still hard to draw definitive conclusions on differences in child psychopathology based on children's age, gender, race, and socioeconomic status.

This investigation is an attempt to fill this gap in the literature. It is the first to investigate the effects of being younger at school entry on the development of internalizing problem behaviors based on a longitudinal study of a nationally representative sample of kindergarteners. To provide a frame of reference with which to interpret the scores, we would like to mention that for both younger and older kindergarteners, the mean internalizing problem scores are within the 1–2 response range, which corresponds qualitatively to "Students never exhibits this behavior" to "Student exhibits this behavior occasionally or sometimes." Although scores in the 1–2 range are not typically concerning and at the lower end of the scale, it is important to note the differences in the scores between the two groups of children. Our results consistently showed that being younger at school entry is a risk factor for internalizing problems, and these problems persisted into fifth grade, even when externalizing problems were controlled for.

Higher socioeconomic status was found to be a protective factor for internalizing problems, which is not surprising as SES has been established as a key factor for a variety of issues, including educational attainment, physical and mental health, and other psycho-social outcomes (American Psychological Association, 2012). The prominence of SES in the literature also illuminates the significance of the factor of relative age (younger vs. older kindergarteners) examined in this study. As Table 3 shows, the effect size for being younger in kindergarten is 0.064, which is similar in absolute size compared to −0.100 for SES; further, when controlling for externalizing problems, the difference between the effect sizes for these two variables becomes even smaller, with 0.057 for being younger and −0.063 for SES (see Table 4). From a policy perspective, the variable of being younger is of greater importance as it is a policy-malleable variable (i.e., schools or the districts can control and change the variable), whereas SES does not easily lend itself for policy manipulation.

The single covariate models showed that both male gender and ethnic minority are risk factors for internalizing problems. It is worth pointing out that this finding on child sex is rather interesting as research to date often associates boys with conduct disorders (Kistner, 2009), with some studies reporting no gender differences in internalizing disorders among children and young adolescents (Kovacs & Devlin, 1998). We reasoned that these findings in the literature may have resulted from the relatively small samples employed. The fact that the magnitude of the actual difference between boys and girls on their measure of internalizing problems is very small renders it almost impossible for studies of small samples to detect such a difference.

We speculated that the reverse of signs for the coefficients of these two covariates of child sex and ethnic minority in the full model is an artifact of the fact that socioeconomic status and externalizing problem scores were controlled for in the model. This is because internalizing and externalizing problems are correlated, or comorbid, yet male gender and ethnic minority are known risk factors for externalizing problems (e.g., Campbell, 1995; Raver, 2002); thus, a good proportion of the variance

shared by internalizing and externalizing problems was removed when controlling for externalizing problems.

Parents' perceptions of child's abilities to pay attention and solve problems as compared to the child's peers turned out to be very important protective factors; conversely, this means that inattention and lower intellectual abilities would be strong risk factors, which is consistent with previous research (Hinshaw, 1992). These findings support the theory that failure to develop developmentally appropriate abilities and competence contribute to internalizing problems (Masten, Burt, & Coatsworth, 2006).

The study of the developmental trajectory of internalizing problems is important as it not only allows a comprehensive understanding of the problems over different stages but also provides opportunities to explore the risk correlates of such problems, especially at time points where the trajectory shifts (Kistner, 2009). One of the main contributions of this study is that it uncovered the shape of the developmental trajectories of internalizing problems from kindergarten to fifth grade to be quadratic, or to be specific, concave. Children appear to go through three distinct phases in the development of internalizing problems.

It is worth noting that a drastic increase in internalizing problems occurs among children from the fall to the spring of the kindergarten year. This is an interesting finding in light of the report by Merikangas et al. (2010) that the median age of onset for anxiety disorders was six years based on a nationally representative sample of 10,123 adolescents.

It is interesting to speculate about the underlying causes for this sudden increase in children's internalizing problems at the time of kindergarten transition, and one possibility may be the increased demands and tasks associated with transitioning to formal schooling. According to Education Commission of the States (2008), most states in the United States allow for early entrance to kindergarten. However, this finding has important implications for policy makers, administrators, teachers, and school-based mental health professionals, in that at the very least they should be made aware of the risks associated with starting kindergarten early versus waiting a year. Although there is overwhelming political and theoretical support for smoothing the kindergarten transition (National Education Goals Panel, 1998; Pianta, Rimm-Kauffman, & Cox, 1999), empirical evidence for the effectiveness of kindergarten transition practices has been scarce (Schulting, Malone, & Dodge, 2005). One example of a transitional program has been the one proposed by Pianta et al. (1999), conceptualized from a dynamic and ecological approach, where schools, families, and communities come together to help ease the children in this transition. However, more research should be conducted on how to best implement a transition program using this ecological approach (Bohan-Baker & Little, 2002).

The finding of elevated levels of internalizing problems among younger kindergarteners also provides additional support for the implementation of universal screening (Merrell, 2010) for early signs of emotional and behavioral problems in schools. Such screening would clearly benefit the youngest kindergarteners as a group who otherwise might go unidentified. School mental health screening will be particularly valuable for identifying children who specifically have internalizing problems, as these children may not be as easily identified or referred by teachers as they may not be problematic to classroom functioning or stress of the teacher, as is often common with children with externalizing problems. Given the findings of this study, it is recommended to have such screening at the time of transition to kindergarten.

Furthermore, school-based mental health professionals can be trained to implement behavioral screening as suggested by Severson, Walker, Hope-Doolittle, Kratochwill, and Gresham (2007). School counselors and school psychologists can be instrumental in promoting such screening, given their respective areas of expertise providing emotional and behavioral support as well as testing, interpreting results, and developing individualized treatment plans for the students. In addition, DeSocio and Hootman (2004) emphasized that school nurses can play a special role in children's mental health as they are often perceived as caring adults at school; therefore, they have the ability to form meaningful relationships with children.

Another implication of these results for policy makers relates to the issue of early referral for internalizing problems, given that externalizing problems, due to their greater visibility, have typically been the focus of referral and intervention in school settings (Campbell, 1995; Raver, 2002), despite the fact that both internalizing and externalizing problems in children often co-occur. In recent years, more attention has been paid to children's internalizing problems, and programs, albeit rare, have been developed where teachers were trained to implement interventions to address children's internalizing and externalizing problems in the classroom setting. One such intervention program that employed a cognitive-behavioral approach was reported by Weiss, Harris, Catron, and Han (2003) where structure and materials were provided to fourth-grade elementary school teachers to help children develop prosocial skills and reduce internalizing and externalizing problems. This program has also been modified and implemented for preschool children (Han, Catron, Weiss, & Marciel, 2005).

A similar intervention program that includes a component of teacher training to reduce internalizing and externalizing problems of children between the ages of four to

eight years was reported by Herman, Borden, Reinke, and Webster-Stratton (2011). They raised caution, however, that without proper training, teachers may not be able to accurately identify children's internalizing problems. Although such teacher training in mental health can be beneficial, it may not be feasible or part of the existing teacher training programs; thus, Glover and Albers (2007) suggested that screening instruments be developed such that additional training is not required for teachers as users. It is appropriate to point out that valuable information can be obtained based on teacher observations through rating scales, which in turn can be scored and interpreted by other professionals who are trained to make determinations regarding who may be at risk or display clinical elevations on certain areas of interest. Meanwhile, teachers should follow closely the guidelines issued by the National Association for the Education of Young Children for developmentally appropriate practices (Bredekamp & Copple, 1997) to foster the healthy development of children. It is important to note that what is appropriate for the older kindergarteners might not be appropriate for the younger ones.

Finally, although Achenbach and Rescorla (2001) reported that the correlation between internalizing and externalizing problems to be approximately 0.53 based on a sample of 4,994 children and adolescents, the current study found the correlation to be much lower, ranging from 0.24 to 0.34. This discrepancy may be explained by differences in sample composition between the Achebach and Rescorla's sample compared to this study's sample, where the former consisted of clinic-referred youth from six to eighteen years of age from three countries, including the United States, Australia, and England, the current sample consisted of a nationally representative sample of elementary-aged children. Thus, it would be expected that correlations between internalizing and externalizing scores be higher in the clinical sample than in a nationally representative sample of younger children, where these problems have a lower incidence.

Limitations and Future Research

The present results should be interpreted in light of several important limitations. First, although both teacher and parent reports were used in the study, each rater reported on only one construct of interest (i.e., teachers on students' emotional and behavioral problems and parents on children's cognitive abilities), thus not allowing for consistency comparisons across raters. This constitutes a limitation for two reasons, which are expanded in the following section.

First, in the assessment of child emotional and behavioral problems, prior research supports the use of multiple data sources and informants who can observe the child in varying environments and settings (e.g., Achenbach, McConaughty, & Howell, 1987; Stanger & Lewis, 1993; Youngstrom, Loeber, & Stouthamer-Loeber, 2000). For example, in elementary school-aged children, internalizing problems may appear to parents as tantrums, crying, freezing, clinging, or extreme shyness in social situations (Mount, Crockenberg, Bárrig Jó, & Wagar, 2010), and for teachers, the manifestations may appear to be the lack of age-appropriate socio-emotional skills and difficulties in acclimating to new situations and developing appropriate peer relations (Cicchetti, 1993; Masten & Coatsworth, 1995). The difficulty in the identification of these problem behaviors may be further compounded by the fact that they also take on developmental changes and manifestations over time, as posited by Keenan et al. (1998). Not surprisingly, Achenbach, McConaughty, and Howell (1987) provided empirical evidence through the meta-analysis of 119 studies that in general, even the best qualified adult informants such as parents and teachers poorly recognize the internalizing problems in children, with the average correlation between teacher and child ratings to be 0.20 and 0.25 between parent and child ratings.

In addition, parent report of his/her child's ability relative to peers may be affected by what is known as "illusory superiority" or the "third-person perception" bias (Henriksen & Flora, 1999; Hoorens, 1995); that is, parents may overestimate the child's abilities, assuming that his/her own child's ability is superior when compared to the ability of other children. An examination of the distribution of the variables confirms this hypothesis and shows that both distributions are moderately negatively skewed and highly leptokurtic, with skewness and kurtosis index of −0.90 and 12.26 for parent report on child's ability to pay attention and −1.01 and 13.37 for child's ability to solve problems. Teachers' report on children's cognitive abilities would have allowed for a less biased assessment.

Another limitation of the present study involved the measurement of the constructs of interest relying on scales with few items. Although this is often the case in representative national samples where feasibility is maximized by the inclusion of short instruments, it may be problematic as it may introduce random sources of measurement error. It may be important to note, however, that there is a trend in large (representative) panel studies in the direction of using relatively short or even single-item instruments. For example, Henkel et al. (2004) reported that a two-item instrument that they developed for depression screening works nearly as well as the original longer version of the instruments.

In addition, the somewhat arbitrary cutoff date (i.e., May 31, 1998) used to dichotomize the age variable into younger and older groups of kindergarteners may constitute

another potential limitation of this study as there may be no meaningful differences between children who turned five only one day apart. At the same time, this limitation also renders this study higher ecological validity because it closely parallels the US kindergarten entry policies where arbitrary cutoff dates are commonly used in all states to determine the eligibility of a child (Education Commission of the States, 2008).

Finally, one last potential limitation may be related to the seemingly small effect sizes associated with the study. Nationally, the younger kindergarteners on average had internalizing problem scores that were 0.03 points higher than the older kindergartners, with an effect size of 0.06. In discussing the concept of practical significance, Kirk (1996) pointed out that Cohen's (1988, 1992) rule of thumb for effect sizes (i.e., small–medium–large) must not be sanctified, nor should the determination of practical significance be ritualized. Likewise, Thompson (2002) strongly opposed that these general guidelines be followed blindly. In summarizing these views, Gamst, Meyers, and Guarino (2008) stated that ultimately, the evaluation of the importance or meaningfulness of an effect has to be the judgment of the researcher in light of the particular topic area of the research and relevant theory (p. 42). Hill, Bloom, Black, and Lipsey (2008) explicated further that there is no universal guideline or rule of thumb for assessing effect size measures; instead, one should consider the specific context in which a particular effect is observed. They recommend that benchmarks that are empirically derived in relevant contexts be used in judging and interpreting the size of an effect.

The present study may be a prime example for these views. Given that the study is based on a large-scale nationally representative sample as opposed to a small clinical sample of referred children, we did not expect to find highly elevated internalizing problems among the general population of young kindergarteners. In this case, it would be more illuminating to compare the relative size of the effects of all the important factors examined in this study, as recommended by the scholars in the field. From the perspective of early development and learning, the experience of internalizing and externalizing problems at such an early age and for such a prolonged period of time could seriously impair children's ability to acquire age-appropriate skills and foster positive relationship with peers and teachers, which in turn could lead to isolation and academic failure (e.g., Han et al., 2005; Raver, 2002). Therefore, even though the adverse effects that these younger kindergarteners experience may be very small in the absolute sense, it is nonetheless an important finding with much clinical significance, given that we know that there is much stability in diagnosis in psychiatric disorders with onset even in preschool years (Lavigne et al., 1998).

To capitalize on the findings of this study, future research can take the following three paths: (a) expand the study by incorporating children's academic achievement measures and investigate whether the younger kindergarteners also tend to perform less well academically compared with older kindergartners, (b) develop studies that incorporate internalizing problems as reported by teacher and parent to examine whether the same pattern for younger children remains when parent report is incorporated, and (c) extend the study longitudinally from prekindergarten through grade 16 to find out whether internalizing problems would persist even longer without intervention.

Conclusions

This study found that, in the context of school settings where there may be up to 12-month difference in age among children in the same kindergarten class, younger children may be at a greater risk of developing internalizing problems, even when controlling for the effects of co-occurring externalizing problems and other contextual factors such as child sex, SES, and ethnicity/race, thus providing empirical support for the maturationists' view (Vecchiotti, 2003). Clearly, internalizing problems are not transient, as people sometimes mistakenly believe (Mesman & Koot, 2000). In the absence of proper intervention, not only the younger kindergarteners developed higher levels of internalizing problems, but also such problems persisted into middle childhood, which makes sense in light of the theories of maturation and personal competency. The results supported that compared with older kindergarteners, younger kindergarteners' lack of developmental maturity physically and/or cognitively, as predicted by the maturationist theory, may put them at a decidedly disadvantaged position in many respects. Younger kindergarteners in general have not had the time to develop the cognitive abilities and social skills that are otherwise considered as "age-appropriate" for kindergarten. In the presence of their older peers, these mere facts associated with being younger may be perceived as their being incompetent or as personal failure, which could in turn lead to distress and the development of internalizing problems, according to the personal competency theory.

It is important to note that this finding is not to suggest the denial of school entry for the younger children; however, we strongly recommend that special support services be provided to children who start school at a very young age. In addition, based on our findings, we support the recommendation made by Goodman et al. (2003) that suggested that kindergarten teachers try to adjust their expectations according to the age of their students so as to avoid putting undue pressure on the younger children.

Although internalizing and externalizing problems in children often co-occur (Gjone and Stevenson, 1997; Verhulst and Van der Ende, 1993), externalizing problems, due to their greater visibility, have rendered themselves as the focus of referral and intervention until recently. Internalizing problems, on the other hand, are rather elusive and difficult to identify; thus, children with internalizing problems are less likely to be referred for treatment than children with externalizing problems (Wu et al., 1999). This is a grave matter, as these children were in their formative years in all respects; it is therefore imperative for the early childhood educators and programs to develop capacities to assist children with such problems.

Furthermore, the findings on demographic and personal competence variables not only provide important insights for future research but yield additional information as to which groups may be at a higher risk of developing internalizing problems and thus allowing mental health researchers and professionals to target these populations in designing preventive interventions in the schools, which in turn will help advance our national goals of primary prevention and early intervention for children's mental health.

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