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Academic Achievement and Postsecondary Educational Attainment of Domestically and Internationally Adopted Youth

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ABSTRACT

Adopted youth often do not achieve in school as well as their non-adopted peers. We used data from the High School Longitudinal Study to examine high school and postsecondary achievement outcomes in adopted youth. We compared outcomes for domestically adopted youth, internationally adopted youth, and non-adopted youth. Results indicate that domestically adopted youth have lower grade point averages. Internationally adopted youth were less likely to enroll in four-year postsecondary institutions than were non-adopted youth.

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Research on the academic achievement of adopted children suggests that whereas adopted youth do not differ from their peers and siblings on measures of intelligence, they do not achieve equally as well in school (van IJzendoorn et al., 2005). Indeed, adopted youth often experience academic and psychological struggles at greater rates than their non-adopted peers (Duszynski et al., 2015). These challenges place them at risk for not succeeding in school.

This achievement gap has been attributed to a variety of potential causes, including delays in cognitive development (e.g., Grotevant & McDermott, 2014), as well as to the emergence of psychological problems (e.g., Logan et al., 1998) and behavioral problems (e.g., Juffer et al., 2004; Miller et al., 2000). Although research on the academic achievement of adopted youth has been plentiful, few studies have actually examined long-term achievement outcomes for these students. In the present study, we add to this literature by examining academic outcomes assessed both at the end of high school and in postsecondary settings, for students who had been adopted either domestically or internationally.

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Influences on academic achievement of adopted youth

The relationships between adoption status and achievement seem straightforward on the surface level: Overall, adopted youth do not fare as well academically as do non-adopted youth (Miller et al., 2000). Nevertheless, achievement gaps between adopted and non-adopted youth are not universal; indeed, there is variation in achievement within adopted youth, as we review below (Dalen & Rygvold, 2006). A number of factors need to be considered in order to understand the potential causes of achievement deficits in adopted youth.

Age of adoption

One of the most consistent findings in the literature is that academic achievement tends to be lower for children who were adopted after the age of one (Merz et al., 2013; van IJzendoorn et al., 2005). Moreover, youth that had experienced adverse environments prior to adoption (including having resided in low-quality orphanages or other unfavorable environments) have been found to achieve at lower levels than adopted children who did not experience such environments (McGuinness & Pallansch, 2000; Tan, 2009). Merz et al. (2013) found that adopted children (ages 8–17) who had spent more than 14 months in an adverse environment prior to adoption were more likely to experience deficits in inhibitory control and working memory. Beckett et al. (2007) compared the academic achievement of children who had been adopted from Romanian orphanages to children who had been adopted from the U.K. and had not spent time in orphanages. Results indicated that the children from the Romanian orphanages experienced deficits in reading at age 11; those deficits were greater for children who had spent six months or more in an orphanage prior to being adopted (Beckett et al., 2007). In addition to age of adoption, these deficits also have been attributed to the poor quality and neglect that many children experienced in Romanian orphanages (Nelson et al., 2014).

Cognitive development in pre- and post-adoption

Delayed cognitive development also can adversely affect achievement. Such delays have been found to be related to exposure to adverse contexts early in life. For example, research suggests that adoptees who experienced extreme deprivation (e.g., residing in poorly run orphanages) often exhibit cognitive deficits that can endure throughout childhood and into adolescence (e.g., Beckett et al., 2007; McGuinness & Pallansch, 2000). In a study comparing children adopted from five countries (Cambodia, Ethiopia,

India, Kenya, and Tanzania), Escueta et al. (2014) found that early exposure to traumatic events precipitated the emergence of emotional difficulties in adoptees; those emotional difficulties, in turn, were related to delays in cognitive development. Other research (e.g., Grotevant & McDermott, 2014) suggests that stress experienced by adopted children early in life can have deleterious effects on the development of the neuroendocrine system, which in turn may contribute to impaired brain development.

Although long-term research is limited, there is evidence that at least for some adopted youth, cognitive delays lessen over time. For example, results of a 20-year longitudinal study of adopted children indicate that adopted children's cognitive abilities become more like those of their adoptive parents as children develop through later childhood and adolescence (Plomin et al., 1997). In addition, van IJzendoorn et al. (2005) published a meta-analysis examining both intelligence and achievement in adopted youth. Whereas adopted children had significantly higher intelligence than did either their biological siblings who had not been adopted or peers who remained in various institutions (e.g., orphanages), the intelligence of the adopted children did *not* differ from their peers, classmates, or siblings in the adopted environments. Nevertheless, the adopted children did not do as well academically as did their peers, classmates, or siblings, suggesting that something about the experience of being adopted places at least some adoptees at risk for academic difficulties. Research also suggests that adoptees who had experienced adversity early in their lives display better executive functioning during adolescence when the adoptees experience positive caregiving during adolescence (Colich et al., 2020).

Meta-analytic findings also indicate that adopted youth experience delays in language abilities, although the effect size is small ($d = .09$; van IJzendoorn & Juffer, 2005). Language deficits may contribute to lower achievement for adopted youth, since language skills undergird learning in most subject domains. These differences in language may be exacerbated for children who are adopted after the age of one, and thus have spent more time in institutional care. For example, Rakhlin et al. (2015) reported that the length of institutionalization is even a stronger predictor than the age at adoption of language development in internationally adopted children.

Country of origin

Children who are born in one country and are adopted by families in a different country are referred to as internationally adopted youth (IAY). The United Nations identified the United States as the main receiving country for international adoptions originating in several Asian countries, including China, the Republic of Korea, and Vietnam (United Nations,

2009). Moreover, national data suggest that about half of all internationally adopted children had been born in Asian countries (United States Census Bureau, 2014). International adoptions have declined over the past two decades in the United States. For example, in 1999, there were 15,719 international adoptions in the United States, whereas in 2019, there were 2,971 international adoptions (United States Department of State, 2020). Research that specifically examines achievement in international adoptees has been limited at best (Mohanty & Newhill, 2006). Nevertheless, some studies have examined academic achievement in this population. In general, research suggests that IAY seem to experience some cognitive delays immediately upon adoption (e.g., Dalen & Theie, 2012), although they often catch up to their non-adopted peers within several years (Beckett et al., 2010). Peñarrubia et al. (2020) noted that internationally adopted children often display deficits in executive functions (e.g., selective attention, planning and working memory) when compared to non-adopted children. In the United States, the proportion of children who are adopted internationally under the age of 1 is often low (e.g., only 9.9% were adopted under the age of 1 in 2012, and 9.2% in 2014) (Jones & Placek, 2017); thus some of the academic difficulties experienced by IAY may be related to the cognitive delays experienced by children adopted beyond the first year of life. Moreover, IAY who are adopted at school age (as opposed to as infants) seem to be particularly vulnerable to experiencing cognitive delays and academic difficulties in school (Helder et al., 2016). In a study examining IAY between the ages of 8-11 (i.e., between 5 to 11 years *after* having been adopted), Loman et al. (2009) found that IAY were more likely to experience academic difficulties and to need intervention services than were either non-adopted youth (NAY) or IAY who had been adopted early in life from foster care settings.

Some of the achievement problems experienced by IAY may be due to the aforementioned early language deficits. Many IAY come from countries in which the native language that the children are exposed to early in life differs from the languages used in their post-adoption homes. Dalen and Theie (2014) compared IAY to non-adopted youth (NAY) during childhood. They found that IAY exhibited deficits in motor development and communication skills, lower activity levels, and greater reports of challenging behaviors at 24 months age; nevertheless, the only difference that remained at 36 months was a continuing deficit in communication skills. They suggest that the enduring communication deficits may be causally related to subsequent problems with language and cognitive development. A meta-analysis conducted by Scott et al. (2011) indicated there are unique language development patterns for IAY. They found that at preschool ages, there were no significant differences between adoptees and the

non-adoptees in language skills; however, during the school-aged years, IAY experienced poorer language outcomes than did NAY.

Results of some studies suggest that language delays early in life may contribute to some of the learning problems experienced by IAY when they get to school, although these problems may not emerge until adolescence. For example, Dalen and Theie (2019) found no achievement differences between IAY and non-adopted youth during either the first or third grades, although they did note a trend toward greater variation in achievement for the adoptees in the third grade. . Moreover, some research suggests that academic differences between IAY and NAY become evident during adolescence; these may be related to developmental delays in IAY that may not have deleterious effects on achievement until adoptees enter into adolescence. Dalen (2001) compared a matched sample of 193 IAY with 193 NAY (ages 11-16). Results indicated that the internationally adopted children performed at lower levels than did their non-adopted peers on both academic and socioemotional outcomes; much of this was explained by differences in language skills.

Some research suggests that IAY may be at greater risk for attentional and behavioral problems. For example, some studies indicate that IAY may exhibit more symptoms of attention-deficit hyperactivity disorder (ADHD) than domestically adopted youth (DAY) (e.g., Andresen, 1992; Wiik et al., 2011). Dalen et al. (2020) found that whereas hyperactivity decreases between grades one and three for NAY, it does not for IAY. Crea et al. (2014) found that older age at the time of adoption is related to greater ADHD symptomology in adopted youth by the age of 14. In a study that focused on international transracial adoptees who had been adopted during infancy, academic achievement was in the normal range at age seven, although parents reported behavioral problems at home, particularly for boys (Stams et al., 2000).

A few studies have also documented differences between IAY and domestically adopted or non-adopted youth with regard to other variables that are related to academic achievement. Dalen et al. (2020) examined changes in academic motivation in IAY. They found that school motivation decreased between the 1st and 3rd grades for IAY, but not for NAY. Anderman et al. (2018) examined expectancy and value beliefs for STEM in adopted youth. Findings indicated that both IAY and DAY believed that math was less important than did NAY, whereas IAY reported lower intrinsic valuing of math and science, and lower expectancies for success in math, than did NAY. In a related study, Koenka et al. (2020) found that internationally adopted adolescents who had a strong identification with their ethnic heritages were more likely to experience feelings of belonging in their high schools (Koenka et al.,

2020). Results from a meta-analysis (Juffer & van IJzendoorn, 2005) indicate that IAY tend to be referred for mental health services more than are NAY, but they have fewer behavioral problems and are referred for mental health services less often than are DAY. Lindblad et al. (2003) conducted a national cohort study of over 5,000 IAY in Sweden. IAY had more psychiatric problems than did the general population, immigrants, or their siblings.

Special needs

One consistent finding in the literature is that adopted youth are recommended for and receive special education services at higher rates than do their non-adopted peers of the same age, in the same schools. In their meta-analysis, van IJzendoorn et al. (2005) found only a few studies that had examined the relationships between adoption status and special education referrals; nevertheless, results of those studies indicated that adopted children were referred for special education services more often than were non-adopted children. Brodzinsky and Steiger (1991) examined state-level data from New Jersey and found that adopted children and adolescents were over-represented in special education. Using data from the Early Childhood Longitudinal Study (ECLS), Raleigh and Kao (2013) found that White adopted children are more likely than nonwhite adoptees to receive special education services.

Educational attainment of adopted youth

Although numerous studies have examined achievement and related factors (e.g., cognitive development) for adoptees during childhood and adolescence, few studies have examined the longer-term educational attainment of adopted youth. Indeed, we know very little about how some of the academic challenges experienced by adopted youth during childhood play out over time.

There is some research suggesting that adopted youth are at risk for completing less postsecondary education than are non-adopted youth, although results are not consistent. Lindblad et al. (2003) examined educational attainment in IAY. Although IAY reached the same educational levels as their peers, they attained less education than would be expected based on their adoptive families' socioeconomic status. In contrast, some studies report no differences in educational attainment for adoptees (e.g., Feigelman, 1997). For example, Dalen et al. (2008) examined postsecondary educational attainment for a large sample of male adoptees in Sweden. Both IAY and DAY had lower overall educational

attainment compared to NAY, with the exception of Korean-born adoptees, whose educational attainment was higher overall than the general population. Nevertheless, IAY were more likely than the general population to actually complete their postsecondary education. Sánchez-Sandoval et al. (2019) examined the relationships between both mental and physical quality of life and educational attainment in a sample of adults who had been domestically adopted as children. They did not find any significant relationships between educational attainment and either quality of life outcomes.

There is also some evidence that risk factors associated with adoption may be predictive of lesser educational attainment. For example, in a study examining age of adoption and college completion, Decker and Omori (2009) found that children who had been adopted at age six or later were less likely to complete college than were those who were adopted at younger ages. In a longitudinal study of several hundred adopted children, McClelland et al. (2013) found that the study participants who had been adopted received lower scores on tests of reading and mathematics at age 21, and were less likely to have completed college by the age of 25, compared to the non-adopted participants, even after controlling for vocabulary knowledge at age four, gender, and maternal education level. More specifically, the odds of completing college by the age of 25 were 52.2% lower for adoptees than for non-adoptees.

The present study

In this study, we extend prior work on the educational achievement and attainment of adopted youth by examining several long-term outcomes, both at the end of secondary school as well as several years after graduation. Given the relationships between the early experiences of some adoptees (e.g., cognitive and linguistic delays) to achievement during childhood, it is likely that adoptees continue to experience academic difficulties at the end of high school and during postsecondary education. Specifically, we examine the relationships between adoption status (IAY, DAY, and non-adopted) and high school academic outcomes, including (a) 12th-grade grade point average (GPA), (b) total high school credit hours earned, and (c) postsecondary education status.

Materials and methods

We used data from the National Center for Education Statistics (NCES)' High School Longitudinal Study 2009 (HSL:09; Duprey et al., 2018). The original sample was recruited based on a two-stage stratified random

sample design with schools randomly selected in the first stage and then students randomly selected from the sampled schools in the second stage (Ingels et al., 2011). In the fall of 2009, 21,444 9th-grade students from 944 schools, their parents (or guardians), math and science teachers, along with their school administrators and counselors completed the base-year surveys. NCES conducted the first follow-up in spring 2012, followed by the 2013 update which included the collection of students' high school transcripts (collected after students were scheduled to graduate), and more recently, the second follow-up in spring 2016. The current study includes students' and parents' responses to the base-year and first follow-up questionnaires to obtain students' demographic data, as well as data drawn from high school transcripts and students' responses to the second follow-up questionnaires. We received human subjects approval for secondary analysis of data for this study.

Sample

We followed procedures used by Anderman et al. (2018) to identify both domestically and internationally adopted study participants, as well as a sample of non-adopted students. Students were considered as non-adopted and being raised by biological parent(s) (NAY) if at least one of their parent or guardian respondents identified that he or she was a biological parent. Students with one biological and one adoptive parent were categorized as not-adopted. Ultimately participants were categorized as adopted if (a) a single parent reported being an adoptive parent; (b) one parent reported being an adoptive parent and had a spouse who was not a biological relative of the student; or (c) both spouses were adoptive parents. Students whose guardians were either foster parents, grandparents or other relatives, other types of guardians, or partners of aforementioned adults were not included in this study. Adopted students were further grouped into DAY or IAY based on their and their parents' birth countries.

Students were included in the sample only if all the information above was verifiable and consistent across the two data collection time points (i.e., base year in 2009 and first follow-up in 2013).¹ Another important inclusion criterion we made was that students raised by biological parent(s) (NAY) were only included if they shared school with at least one DAY or IAY participant as of the base-year or first follow-up data collection period. The final sample included in our analyses consisted of 7,420 students (7,040 NAY, 250 DAY, 130 IAY) from 310 schools. Race, sex, special education status, and socioeconomic status (SES) for each adoption category are presented in [Table 1](#).

Table 1. Characteristics of sample by adoption status.

Demographic characteristics	Unweighted			Weighted		
	NAY (<i>N</i> = 7,040) % or <i>M</i> (<i>SD</i>)	DAY (<i>N</i> = 250) % or <i>M</i> (<i>SD</i>)	IAY (<i>N</i> = 130) % or <i>M</i> (<i>SD</i>)	NAY (<i>N</i> = 1,269,080) % or <i>M</i> (<i>SD</i>)	DAY (<i>N</i> = 43,230) % or <i>M</i> (<i>SD</i>)	IAY (<i>N</i> = 8,510) % or <i>M</i> (<i>SD</i>)
<i>Student race</i>						
White	60.0%	51.0%	10.0%	58.2%	50.2%	7.5%
Hispanic	14.2%	13.9%	8.2%	14.6%	14.6%	8.3%
Black	9.0%	17.1%	4.5%	9.5%	17.4%	4.5%
Asian	7.3%	1.2%	75.4%	7.7%	1.2%	75.2%
Native American / Pacific Islander	.9%	3.2%	3.0%	.9%	3.2%	3.0%
Multiracial	9.0%	13.1%	1.5%	9.1%	13.4%	1.5%
<i>Student sex</i>						
Female	49.4%	41.4%	67.2%	48.3%	41.5%	59.7%
Male	50.6%	58.6%	32.8%	51.7%	58.5%	40.3%
<i>Special education status</i>						
Individualized Education Plan (IEP)	18.6%	44.8%	18.2%	23.1%	57.2%	39.4%
No IEP	81.4%	55.2%	81.8%	76.9%	42.8%	60.6%
<i>Socioeconomic status (SES)</i>						
Open communication with mother	3.50 (2.19)	3.45 (2.13)	4.09 (1.98)	3.66 (2.03)	3.19 (2.12)	3.95 (1.90)
Open communication with father	2.57 (2.26)	2.47 (2.27)	3.08 (2.29)	2.64 (2.18)	2.35 (2.27)	3.22 (2.36)

Note. NAY = nonadopted youth; DAY = domestically adopted youth; IAY = internationally adopted youth. The percentage calculation was based on the number of students in the same adoption categories (same columns in the table). Percentages for IEP are based on 9th-grade enrollment lists by school personnel as well as the parent/guardian's report that the 9th grader was currently receiving special education services. The *M* and *SD* values of SES are based on composite measures of parental/guardian income, occupation, and highest level of education (Duprey et al., 2018) at Waves 1 (i.e., base-year data collection; when students were in 9th-grade) and 2 (i.e., first follow-up data collection; when students were in 11th grade). The reports of sample sizes are rounded to the nearest ten per IES guidelines for restricted-use data (United States Department of Education, Institute of Education Sciences, National Center for Education Statistics, 2019).

Measures

Demographics and covariates

Student race, sex, special education status, and SES served as covariates in all analyses. Special education status was determined based on school reports of eligibility for special education during the ninth grade and parents' base year response regarding whether or not the student had an individualized education plan (IEP) during the 9th-grade year. NCES constructed and provided a composite, continuous SES variable based on parental/guardians' education, occupation, and income in each of the base-year and first follow-up data files (Ingels et al., 2011). The current study included the SES variable constructed in the first follow-up survey (when students were in 11th-grade), which was a standardized score that ranged between -1.75 to 2.28 .

Additionally, we included a measure of parent-student communication. We included this because parents are the primary individuals from whom

adolescents consistently seek and receive support; research suggests that perceived support from parents can mitigate potential challenges (e.g., heavy course loads, course tracking, anxiety about the future) that adolescents often endure (e.g., Akos & Galassi, 2004; Benner et al., 2017). Positive associations have been reported between adolescent open communication with parents and various academic outcomes, including perceived competence, value, achievement-orientation, self-control, and GPA (e.g., Callahan et al., 1990; Cripps & Zyromski, 2009; Harackiewicz et al., 2012; Lam & Ducreux, 2013; Masselam et al., 1990). Two variables were derived from six survey items administered while students were in the ninth grade that asked with whom they had talked about the following topics: 1) math course taking, 2) science course taking, 3) other course-taking, 4) going to college, 5) job/career after graduation, and 6) personal problems, since the beginning of the past school year (e.g., “Which of the following people have you talked with about which math course to take this year?”). The response options were 1) mother/female guardian, 2) father/male guardian, 3) friends, 4) a favorite teacher, 5) a school counselor, and 6) no one. Students were asked to “check-all-that-apply.” We created the two variables, based on the number of topics that the students reported discussing with both their mothers or their fathers (min = 0, max = 6).

Lastly, high school yearly GPA was obtained from high school transcripts. We included average GPA for academic courses from 9th through 11th-grades as a covariate representing prior achievement. GPA ranged from 0 (low) through 4.0 (high).

High school academic outcomes

We used two outcome variables derived from students’ official transcripts, and one outcome variable derived from students’ self-reports. Total credit hours earned and 12th-grade grade point average (GPA; ranging from 0.0 to 4.0) for academic courses were obtained from official school transcripts collected for each participant. Although SAT and ACT composite scores were also available in the HSLs transcript data, they were not used in the current study due to small number of valid scores from the transcripts of DAY (31%) and IAY (50%).

Students’ postsecondary education status was identified based on students’ self-reports in the second follow-up survey, which took place approximately three years after the participants’ scheduled date of on-time graduation from high school (Duprey et al., 2018). Students indicated whether they had “ever enrolled in an undergraduate degree or certificate program after high school.” If they indicated that they had, then they also

were able to report the specific postsecondary institution that they attended. NCES reported the postsecondary institution's classification as a composite variable using six categories based on the 2016 Integrated Postsecondary Education Data System (IPEDS; National Center for Education Statistics (NCES), 2016): "highly selective, 4-year institution," "moderately selective, 4-year institution," "inclusive, 4-year institution," "selectivity not classified, 4-year institution," "selectivity not classified, 2-year institution," and "selectivity not classified, less than 2-year institution." Using these categorizations, we created two dichotomous variables: one comparing participants who had enrolled in a four-year institution to those who had enrolled in a two-year institution, and the other comparing those who had never enrolled in a postsecondary institution with those who had enrolled in a two-year institution.

Analyses

We conducted linear and multinomial logistic regression analyses with adjustment for school clustering to investigate whether students who were (a) non-adopted and raised by biological parents (NAY), (b) domestically adopted (DAY), or (c) internationally adopted (IAY) differed in high school and postsecondary academic outcomes (i.e., total credit hours in academic courses, 12th-grade academic GPA and postsecondary education enrollment). In all analyses, corrections to the standard errors for clustering effects were made using the school identification number, using the CLUSTER command in Stata 16.0. We also controlled for all of the aforementioned demographic variables. We used the sampling weights provided by NCES (Duprey et al., 2018) for the base year, first and second follow-ups, and the 2013 update and high school transcript data. The use of sampling weights is often recommended in secondary data analysis for adjusting for sampling methods (e.g., oversampling bias and nonresponse) and producing representative estimates (Duprey et al., 2018; Ingels et al., 2011). Since our major interest was comparing all three groups—NAY vs. DAY, NAY vs. IAY, and DAY vs. IAY—each regression model was analyzed twice, once with NAY as the reference group and again other with DAY as the reference group.

Results

In [Table 1](#), we report unweighted descriptive statistics for demographics and for the measures of student communication with mothers and fathers; we report these separately for NAY, DAY, and IAY participants. [Table 2](#) includes unweighted descriptive statistics for high school academic

Table 2. Descriptive statistics for high school academic performance measures and postsecondary education status by adoption status.

Variable	Unweighted			Weighted		
	NAY (N=7,040)	DAY (N=250)	IAY (N=130)	NAY (N=1,269,080)	DAY (N=43,230)	IAY (N=8,510)
	% or M (SD)	% or M (SD)	% or M (SD)	% or M (SD)	% or M (SD)	% or M (SD)
High school total credit hours in academic courses	18.49 (5.44)	16.30 (6.00)	21.04 (4.14)	18.64 (4.98)	16.57 (5.48)	21.18 (3.11)
9th - 11th-grade composite GPA for academic courses	2.65 (.89)	2.26 (.85)	3.08 (.61)	2.59 (.87)	2.43 (.72)	3.00 (.65)
12th-grade GPA for academic courses	2.85 (.82)	2.46 (.89)	3.04 (.66)	2.80 (.79)	2.44 (.88)	3.02 (.65)
<i>Postsecondary education status</i>						
Never enrolled in postsecondary institution	22.23%	35.37%	3.77%	25.4%	33.0%	12.5%
2-year institution	20.36%	26.22%	18.87%	24.8%	32.7%	24.1%
4-year institution	57.41%	38.41%	77.36%	49.8%	34.3%	63.4%

Note. The percentages for these measures exclude "non-response" or "legitimate skip/not applicable" cases (Duprey et al., 2018).

Data Source: National Center for Education Statistics, High School Longitudinal Study, 2009-2016.

Table 3. Correlations between continuous variables.

Variable	1	2	3	4	5	6
1. High school total credit hours in academic courses	–					
2. 9th through 11th-grade GPA for academic courses	.63	–				
3. 12th-grade GPA for academic courses	.44	.77	–			
4. SES	.30	.38	.30	–		
5. Open communication with mother	.20	.26	.21	.22	–	
6. Open communication with father	.21	.29	.21	.31	.62	–

Note. All correlation coefficients were statistically significant at $p < .001$.

Data Source: National Center for Education Statistics, High School Longitudinal Study, 2009-2016.

performance and postsecondary enrollment by adoption status. Correlations between all continuous variables are presented in Table 3. There were positive correlations between all pairs of variables ($p < .001$). Although significant correlations among these variables are not surprising, we assessed variance inflation factors (VIFs) and tolerances of all predictor variables in each analysis to check for multicollinearity. The results indicated no evidence of multicollinearity; all VIFs < 1.80 , and all tolerances $> .56$.

Tables 4 and 5 present results for linear regression analyses, and Table 6 presents results for multinomial logistic regression analyses, adjusted for clustering effects. Since there were three categorizations for adoption status (i.e., IAY, DAY, and NAY), one of the categorizations was omitted

Table 4. Results of high school total credit hours in academic courses.

Variable	<i>b</i>	<i>SE</i>	95% CI	
			Lower	Upper
<i>Adoption Status (Ref=DAY)</i>				
NAY	1.99	1.15	-.28	4.25
IAY	2.84*	1.35	.19	5.49
<i>Race (Ref=White)</i>				
Hispanic	1.37*	.58	.23	2.51
Black	.59	.53	-.46	1.64
Asian	.70	.39	-.07	1.47
Native American/Pacific Islander	1.43	.82	-.19	3.04
Multiracial	.22	.40	-.56	1.00
Sex: Male	-.41	.27	.95	.13
Special education status: IEP	-1.03**	.39	-1.80	-.27
SES	.64***	.18	.28	1.00
Open communication with mother	.12	.09	-.05	.30
Open communication with father	.07	.07	-.07	.20
9th through 11th-grade GPA for academic courses	2.81***	.24	2.33	3.29

Note. *** $p < .001$; ** $p < .01$; * $p < .05$. Reference group is DAY.

Source: National Center for Education Statistics, *High School Longitudinal Study, 2009-2016*.

Table 5. Results of 12th-grade GPA for academic courses.

Variable	<i>b</i>	<i>SE</i>	95% CI	
			Lower	Upper
<i>Adoption Status (Ref=NAY)</i>				
DAY	-.32*	.15	-.60	-.03
IAY	-.01	.12	-.25	.24
<i>Race (Ref=White)</i>				
Hispanic	.07	.06	-.05	.19
Black	-.08	.06	-.21	.05
Asian	-.002	.06	-.11	.12
Native American/Pacific Islander	.33	.21	-.08	.74
Multiracial	-.03	.06	-.15	.09
Sex: Male	-.08*	.04	-.15	-.01
Special education status: IEP	-.04	.05	-.14	.05
SES	.04	.05	-.01	.08
Open communication with mother	.01	.01	-.01	.03
Open communication with father	-.01	.01	-.02	.01
9th through 11th-grade GPA for academic courses	.77***	.04	.69	.84

Note. *** $p < .001$; * $p < .05$.

Source: National Center for Education Statistics, *High School Longitudinal Study, 2009-2016*.

from each analysis and served as the comparison group. The comparison group is indicated within each of the regression tables.

Adoption status and high school total credit hours in academic courses

The model predicting credit hours earned in academic courses (see Table 4) explained approximately 37% of the variance, $F(13, 237) = 52.81$, $p < .001$, $R^2 = .37$. IAY earned a significantly greater number of credit hours than did DAY, $b = 2.84$, $t(237) = 2.11$, $p < .05$. The other comparison pairs (i.e., NAY vs. IAY, NAY vs. DAY) did not differ in their total credit

Table 6. Multinomial logistic regression predicting postsecondary education status.

Variable	Never enrolled in postsecondary institution				Enrolled in 4-year institution			
	OR	SE	95% CI		OR	SE	95% CI	
			Lower	Upper			Lower	Upper
<i>Adoption Status (Ref = NAY)</i>								
DAY	.66	.30	.27	1.62	.57	.25	.24	1.34
IAY	.93	.79	.18	4.86	.30*	.17	.10	.92
<i>Race (Ref = White)</i>								
Hispanic	.27***	.09	.14	.51	.61	.16	.36	1.03
Black	.51	.22	.22	1.20	1.09	.37	.56	2.12
Asian	1.40	.85	.43	4.58	1.26	.46	.61	2.58
Native American/ Pacific Islander	3.46	3.00	.64	18.90	1.45	1.94	.10	20.12
Multiracial	1.27	.47	.62	2.62	.86	.28	.46	1.62
Sex: Male	.99	.23	.63	1.54	1.14	.23	.76	1.70
Special education status: IEP	1.61*	.37	1.03	2.53	.56**	.12	.36	.85
SES	.64**	.12	.45	.92	1.88***	.28	1.40	2.52
Open communication with mother	.90	.05	.81	1.01	1.02	.06	.91	1.14
Open communication with father	.95	.06	.84	1.06	1.02	.05	.93	1.12
9th through 11th-grade GPA for academic courses	.41***	.05	.31	.52	4.24***	.68	3.10	5.80

Note. Base/referent outcome was enrollment in 2-year institution. *** $p < .001$; ** $p < .01$; * $p < .05$.
Source: National Center for Education Statistics, *High School Longitudinal Study, 2009-2016*.

hours earned in academic courses. Additionally, total credit hours earned in academic courses was greater for Hispanic students (compared to White students), and lower for students who had an IEP. SES and prior GPA were both related positively to total credit hours earned in academic courses.

Adoption status and 12th-grade GPA for academic courses

Table 5 includes results for the model predicting 12th-grade GPA. The predictors explained approximately 61% of the variance in 12th-grade GPA, $F(13, 225) = 96.59$, $p < .001$, $R^2 = .61$. DAY had significantly lower 12th-grade GPAs than did their NAY peers, $b = -.32$, $t(225) = -2.17$, $p < .05$. The other comparison pairs (i.e., NAY vs. IAY, DAY vs. IAY) did not differ in their 12th-grade academic GPAs. Students' academic GPA in 12th-grade was positively predicted by academic GPA in earlier high school years (i.e., 9th-, 10th-, and 11th-grades), $b = .77$, $t(225) = 20.60$, $p < .001$. Male students tended to have lower 12th-grade academic GPAs than female students, $b = -.08$, $t(225) = -2.17$, $p < .05$.

Adoption status and postsecondary education status

We used multinomial logistic regression to examine predictors of postsecondary education. The base or referent outcome was attending a 2-year institution (coded as zero for both sets of analyses). Odds ratios for each variable in the model are reported in Table 6. Odds ratios greater than 1 suggest a student was more likely to be in the group coded as 1 on the outcome variable (i.e., never enrolled in postsecondary institution or enrolled in a 4-year institution). Results indicate that IAY were significantly less likely to attend a 4-year postsecondary institution than NAY, $OR = .30, p < .05$. Hispanic students were less likely than White students to have never been enrolled in a postsecondary institution, $OR = .27, p < .001$. Students who had an IEP were more likely to have never enrolled in a postsecondary institution ($OR = 1.61, p < .05$), and were less likely to have enrolled in 4-year institutions ($OR = 0.56, p < .01$). Higher SES and 9th- through 11th-grade GPAs negatively predicted having never enrolled in a postsecondary institution, whereas they both positively predicted enrollment in 4-year institutions.

Discussion

Results of several studies suggest that adopted youth are at risk for poor academic achievement, compared to non-adopted youth (van IJzendoorn & Juffer, 2005). However, few previous studies have examined predictors of academic outcomes measured both at the end of high school and in postsecondary settings for adopted youth. In the present study, we examined achievement outcomes measured at the end of high school (i.e., credit hours earned and GPA) and two years after high school (i.e., enrollment in postsecondary education) for both domestically and internationally adopted young adults.

High school achievement

Our results indicated that domestically adopted youth (DAY) had lower 12th-grade grade point averages than did the non-adopted (NAY) participants. Interestingly, this was the only outcome for which the domestically adopted youth differed. In contrast, the internationally adopted youth (IAY) earned significantly more credit hours than DAY. These achievement gaps remained even after controlling for special education status, demographics, and prior GPA, and accounting for the nested nature of the data (i.e., students being nested within schools). Although research often has revealed achievement gaps between adopted and non-adopted youth (e.g.,

Wierzbicki, 1993), few studies have distinguished between DAY, IAY, and NAY simultaneously. van IJzendoorn et al.'s meta-analysis did examine the relations between achievement and adoption status and found no differences in either achievement or IQ for DAY and IAY (van IJzendoorn et al., 2005). Levy-Shiff et al. (1997) compared the academic achievement of domestically and internationally adopted youth in Israel and found no significant differences in grades or IQ.

These achievement gaps are probably not attributable to differences in general self-perceptions between different types of adoptees. Juffer and van IJzendoorn (Juffer and Van IJzendoorn, 2007) conducted a meta-analysis examining self-esteem differences among DAY, IAY, and transracial adoptees, and found no differences among these populations. Moreover, youth who had been adopted reported higher self-esteem than did comparable youth who remained living in institutionalized settings. Juffer and van IJzendoorn (2007) suggest that both the investments of adoptive families in adoptees' success, as well as the resilience that many adoptees demonstrate in overcoming early adverse conditions, may explain the differences in self-esteem between youth who have been adopted and those who have not been adopted. Nevertheless, although parents of IAY in particular invest many resources into promoting their children's academic success, research suggests that when those supports are lacking, IAY are at high-risk for experiencing academic problems (Werum et al., 2018). Thus, positive self-beliefs and parental support may contribute to the academic achievement of adoptive youth, but this may play out differently for IAY and DAY.

Postsecondary education

Internationally adopted participants were less likely to enroll in four-year postsecondary institutions than were non-adopted participants. No differences were found for domestically adopted participants. Although there is little research examining educational attainment among international adoptees, some important work in this area has been conducted in Sweden. Lindblad et al. (2003) examined the educational attainment of Swedish international adoptees compared with the general population, finding that the educational attainment of the international adoptees was lower than for the general population, after having adjusted for SES. In contrast, Dalen et al. (2008) examined postsecondary enrollment among male adoptees in Sweden. They found that Korean adoptees obtained higher levels of postsecondary education than did others. Moreover, after controlling for intelligence test scores, international adoptees had a greater likelihood of completing their postsecondary studies than did the general population. Some of these differences in findings may be attributable to the fact that

Dalen et al. only examined male adoptees, and attained postsecondary follow-up data when their participants were between the ages of 25-34, which is substantially older than the HSLs participants.

In our study, although the IAY participants' grade point averages did not differ from the GPAs of either the DAY or NAY participants, it is important to note that IAY often experience additional unique challenges that may contribute to their lower likelihood of enrolling in four-year postsecondary institution. For example, IAY often experience deficits in language development (Scott et al., 2011), hold maladaptive motivational beliefs (e.g., Anderman et al., 2018; Dalen et al., 2020), have a greater risk of displaying ADHD symptomology (Crea et al., 2014; Wiik et al., 2011), and have a greater likelihood of reporting mental health problems than NAY (Juffer & IJzendoorn, 2005). In addition, some of the IAY participants may have been adopted at older ages than were the DAY students (Jones & Placek, 2017). Given that age of adoption, as well as having received poor quality care early in life have been found to be related to diminished academic achievement in adopted youth (McGuinness & Pallansch, 2000; Merz et al., 2013; Tan, 2009), later adoptions for IAY may have contributed to subsequent decisions regarding postsecondary education. Moreover, some parents may advise their internationally adopted adolescents against attending a four-year institution, as a means of protecting them from experiencing academic and social struggles during college. Although research on the achievement of IAY in adolescent populations is limited, Dalen (2001) found that IAY do not fare as well on academic outcomes as do NAY during adolescence, and that much of this was explained by differences in language skills. One possibility is that the language delays experienced by some IAY (but not necessarily by DAY) may have affected standardized test performance (e.g., on the SAT), but not affected overall GPA. Although we were unable to examine the relationship between adoption status and college admissions exam scores, future studies examining college admissions exam scores as outcomes may provide insights into whether IAY and DAY perform differently on these exams.

Because international adoptions often are transracial (Hellerstedt et al., 2008, IAY also may wrestle with racial identity issues that are unique to IAY (e.g., Tan & Jordan-Arthur, 2012; Trenka et al., 2006)). Transracial international adoptees' experiences with discrimination have been found to be related to a variety of both internalizing and externalizing problems, even after accounting for childhood internalizing/externalizing problems and adversity experienced prior to being adopted (Lee et al., 2015; Qin et al., 2017). IAY adolescents in transracial families may be treated as if they are members of the majority culture by friends and family, but may be treated differentially by others (e.g., peers or teachers) (Ferrari et al., 2017).

Such differential treatment may contribute to academic stress and lower motivation (e.g., Koenka et al., 2020). Given the generally positive relationships between healthy identity development and achievement during adolescence (Miller-Cotto & Byrnes, 2016), as well as the role of identity in shaping adolescents' self-perceptions of ability (Eccles, 2009), struggles with ethnic identity development may contribute to lower enrollments in four-year colleges for IAY.

Limitations

The presents study has a number of limitations that should be considered in interpreting the results. First, we were unable to determine the ages at which either the DAY or IAY samples had been adopted, or whether they experienced adversity prior to adoption. Research indicates that children who are adopted after the age of one generally do not achieve at the same levels as either NAY or children adopted prior to that age (Merz et al., 2013). Moreover, adopted children who experienced adverse environments (e.g., poor quality care in an orphanage) prior to adoption also are more likely to achieve at lower levels (e.g., McGuinness & Pallansch, 2000; Tan, 2009).

Second, there are several other variables that we would have liked to have included in our analyses. For example, although we would have liked to include measures of drop-out status or on-time graduation as outcome variables, we were unable to include those due to the small number of adopted study participants who had either dropped out of school or had completed high school late. Moreover, although we would have liked to examine college admissions test scores as an outcome, there was insufficient data among adoptees to perform those analyses. Nevertheless, future studies that include larger samples of adopted youth may yield useful information about predictors of such outcomes. In addition, we were unable to incorporate measures assessing the struggles that adolescents who have been adopted may experience with issues of identity. Adopted youth face all of the identity-related dilemmas that other adolescents experience, but they also may experience psychological distress as they wonder about their birth families and their ethnic and personal identities, (Koenka et al., 2020) and as they struggle with discrimination (Lee et al., 2015) and microaggressions (Garber & Grotevant, 2015). We also could not incorporate a general measure of intelligence or cognitive ability since those data were not collected as part of the HSLS study. Some of the differences in our findings for postsecondary educational attainment and those reported by Dalen et al. (2008) may be attributable to these design differences. Future studies

that incorporate measures of identity development, cognitive ability, academic struggles may yield additional insights into the achievement of adopted youth.

Finally, the number of adopted students in the overall sample was small ($N = 250$ DAY, $N = 130$ IAY). Although we incorporated design weights to the data, the sample of adoptees is not representative of the actual distributions of adoptees in the United States, since the HSLs study was not designed to draw a representative sample of adoptees. Moreover, the greatest attrition between 2009 and 2016 was for the domestically adopted participants (67.73% were retained in 2016); this may explain the non-significant differences in four-year college enrollments when comparing DAY to the other groups. Future studies with larger representations of adopted youth are clearly needed. Nevertheless, although our samples of adopted youth were small, we employed a rigorous process to identify those youth and to verify their adoptive status, and we employed appropriate NCES design weights and adjusted for clustering (i.e., school effects) in all of the models.

Conclusions

Our results indicate that both domestically and internationally adopted adolescents are at risk for experiencing academic struggles. Indeed, for all adolescents, the accumulation of multiple risk factors place youth at greater risk for experiencing a range of problematic outcomes (Sameroff, 2006). The aforementioned risk factors, which are experienced by many adoptees during childhood and adolescence, ultimately may negatively impact achievement. In particular, our results suggest that whereas domestically adopted youth do not achieve as well as others in high school, internationally adopted youth are less likely than others to have enrolled in four-year postsecondary institutions within several years of having graduated from high school.

This is among the first studies to examine academic outcomes measured at both the end of high school and several years after graduation for adopted youth. Our results support findings from other research (e.g., van IJzendoorn et al., 2005) suggesting that adoptees do not achieve as well as non-adopted peers. The present study adds to the extant literature by examining these results separately for domestically and internationally adopted youth, and by examining both high school and post-secondary outcomes. These findings serve as a reminder to educators that adopted youth often have academic difficulties, and that the experiences of domestically and internationally adopted youth that contribute to these difficulties may differ.

Note

1. For NAY, 92.67% of the sample were retained in 2013 and 77.48% in 2016; for DAY, 86.85% were retained in 2013 and 67.73% in 2016; for IAY, 92.54% were retained in 2013 and 79.85% were retained in 2016.

Declaration of interest statement

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors. The authors do not have any potential competing interests to report.

Data availability

The data used for this study are available from the National Center for Education Statistics (<https://nces.ed.gov/surveys/hsls09/>). Note that the restricted-use (licensed) data were used for this study; only the public data are available via this website.

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