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Effect of Early Grade Retention on School Completion: A Prospective Study

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This 14-year prospective study investigated the effect of retention in Grades 1–5 on high school completion (diploma, GED, or drop out). Participants were 734 (52.7% males) ethnically diverse, academically at-risk students recruited from Texas schools into the study when they were in first grade (mean age = 6.57). Propensity score weighting successfully equated the 256 retained students and the 478 students continuously promoted students on 65 covariates assessed in Grade 1. At the end of 14 years, 477 had earned a diploma, 21 had obtained a GED, 110 had dropped out, and 126 were missing school completion status. Using multinomial logistic regression with high school graduation as the reference outcome, retention led to a significant increase in the likelihood of dropping out of high school (odds ratio = 2.61), above students' propensity to be retained and additional covariates. The contrast between graduation and GED outcomes was not significant. A significant Retention × Ethnicity × Gender interaction was obtained: The negative effect of retention was strongest for African American and Hispanic girls. Even though grade retention in the elementary grades does not harm students in terms of their academic achievement or educational motivation at the transition to high school, retention increases the odds that a student will drop out of school before obtaining a high school diploma.

Educational Impact and Implications Statement

Even though grade retention in the elementary grades does not harm students in terms of their academic achievement or educational motivation at the transition to high school, retention increases the odds that a student will drop out of school before obtaining a high school diploma. Because this study used rigorous statistical methods to equate the retained and promoted students on a large number of variables related to future achievement and educational attainment at the beginning of Grade 1, it provides the strongest evidence to date that retention has a causal effect on dropping out of school. The negative effect of retention was strongest for African American and Hispanic girls. Given the huge cost of dropping out of school for the individual and society, policies that that keep students "on track" for graduation with their same-age peers need to be pursued.

Keywords: drop out, grade retention, high school completion, propensity score analyses, prospective methodology

Supplemental materials: http://dx.doi.org/10.1037/edu0000243.supp

Extensive data amassed over decades documents the economic, occupational, social, and health benefits of attaining a high school diploma (for reviews see Autor, 2014; Lansford, Dodge, Pettit, & Bates, 2016). High school graduates earn a national average of $8,000 more annually, relative to high school dropouts, and are far less likely to be periodically unemployed, on government assistance, or in prison. In addition, dropouts age 25 and older report being in worse health than adults of similar age who are not dropouts, regardless of income (Pleis, Ward, & Lucas, 2010). The ripple effect on the national economy is enormous (Alliance for Excellent Education, 2016). These costs have focused the attention of citizens, legislators, and policymakers on assessing and increasing graduation rates. In

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2015, 83% of students earned a regular high school diploma within four years of entering high school (National Center for Education Statistics, 2016). However, the graduation rates among Hispanic and Black students (78% and 75%, respectively) were lower than that of White students (88%). Furthermore, economically disadvantaged students graduated at a rate of 76%.

Students who are retained in grade are much more likely to leave school without a high school diploma (Alexander, Entwisle, & Dauber, 2003; Guèvremont, Roos, & Brownell, 2007; Jacob & Lefgren, 2009; Jimerson, 1999; Ou & Reynolds, 2008), leading some researchers and educators to conclude that the experience of repeating a grade has a causal effect on leaving school without a diploma. Despite the existence of substantial methodological limitations that potentially confound the interpretation of this relationship (detailed below), the repeatedly observed predictive association between grade retention and dropping out of school has led some researchers to label the practice of grade retention "educational malpractice" (Jimerson, 2004). The current prospective, 14-year longitudinal study investigates the effect of retention in Grades 1–5 on high school completion status. It extends the extant literature on effects of grade retention by minimizing methodological limitations of previous research, thereby providing a more accurate estimate of the effect of retention in Grades 1–5 on school completion 14 years after entering first grade. Furthermore, the study differentiates between two high school completion credentials: the general education development (GED) certificate and a high school diploma. As discussed below, although the GED has become a more accessible alternative to a high school diploma (Heckman, Humphries, & Mader, 2011), a dearth of research has examined the effect of grade retention on attainment of the GED instead of a diploma, despite substantial research documenting the more limited benefits of a GED relative to a high school diploma (Jepsen, Mueser, & Troske, 2016).

Prior Research on Effects of Retention on School Completion: Methodological Challenges

Preexisting Differences Between Retained and Promoted Groups

Methodological problems in estimating a casual effect of grade retention on subsequent achievement and educational attainment have been detailed in a number of recent publications (e.g., Vandecandelaere, Vansteelandt, De Fraine, & Van Damme, 2016; Wu, West, & Hughes, 2010) and will only be summarized here. The principal problem is that students are not randomly assigned to the "intervention" of grade retention. The factors that increase a student's risk of being retained in grade (e.g., low achievement, family poverty, low cognitive competence, poor learning-related skills) also increase their risk of subsequent low achievement and dropping out of school, thus confounding the causal interpretation of grade retention effects. Failure to satisfactorily remove the effect of these preexisting differences between students who are subsequently retained or promoted (i.e., selection effects) will lead to biased estimates of retention effects that are too large. Indeed, a meta-analysis of available studies found that the quality of the methods employed to reduce potential confounds moderated the magnitude of the effect of grade retention. High-quality studies yielded an average effect of retention on achievement that was not different from zero (Allen, Chen, Willson, & Hughes, 2009).

Prospective studies that control for potential confounders are critical to producing accurate estimates of the causal effect of retention. These studies are expensive to conduct because grade retention most commonly occurs in the early elementary grades. When variables are assessed after the retention decision is made, as in retrospective studies, it is typically not possible to separate antecedents from consequents (Rosenbaum, 1984). For example, are parents' educational aspirations for their child a prospective predictor of grade retention, or a consequence of the retention decision itself (Hughes, Kwok, & Im, 2013)?

Given the expense and effort required to conduct prospective studies of the effect of early grade retention on high school completion, it is not surprising that few published, prospective studies exist. Importantly, the majority of published, prospective studies of the effects of early grade retention on drop out from high school were conducted with cohorts of students who entered urban, minority-serving public schools prior to 1990 (Alexander et al., 2003; Ou & Reynolds, 2010; Temple, Reynolds, & Ou, 2004). These studies reported negative effects of retention on high school completion, after statistically controlling for a limited number of preretention variables. Although these studies are an improvement over studies that fail to control for likely confounds, the use of a limited number of covariates typically fails to capture all the important preexisting differences between the retained and promoted groups (Cook, Steiner, & Pohl, 2009; Steiner, Cook, Shadish, & Clark, 2010).

Retrospective studies have also been conducted on the effects of early grade retention on high school completion. Jacob and Lefgren (2009), in an effort to minimize potential selection effects, used administrative data to investigate the effects of retention on students enrolled in Grades 6 or 8 during the 1990s in the Chicago Public Schools. Students were required to achieve test scores that exceeded minimum performance goals in order to be promoted to the next grade. Taking advantage of the assignment to retention on the basis of the test grade, Jacob and Lefgren used a regression discontinuity analysis to estimate the effect of repeating the grade, controlling for the test scores. Results showed that retention in Grade 8, but not in Grade 6, increased students' risk of dropping out of school. Jacob and Lefgren speculated that the moderation of the effect of retention by retention grade may be attributable to differences in how retention was implemented in this study. Specifically, many retainees in Grade 8 completed their repeat year in "transitional" schools serving low achieving students rather than staying in their home school. Similar to other retrospective studies, Jacob and Lefgren were unable to address the possibility of differential attrition from the study by retained and promoted students (see below). The few prospective studies from the 1980s and 1990s conducted in nonurban schools either had very small samples (Jimerson, 1999) or employed inadequate statistical controls (Roderick, 1994); these studies also reported negative effects of retention.

In summary, the prospective studies of students who entered school in the 1980s and early 1990s are informative; however they reflect the educational policy context and the limited ethnic and income diversity in the study samples of the time. Consequently,

given the substantial changes in the educational policy context and ethnicity and family incomes of the current population of school students, results from these studies may not generalize to more contemporary students.

Differential Attrition

A second methodological challenge to estimating the effect of retention, especially retention in the elementary grades, on high school completion is attrition of students from the study if strong tracking and location procedures are not implemented. National longitudinal educational databases that carefully track students over the full range of the primary and secondary school years are not available. Furthermore, retrospective studies of secondary school students that analyze large national data sets (Andrew, 2014) not only have limited data on students prior to retention in the elementary grades, but also exclude students who left the district. The student population in the United States is highly mobile. Based on the U.S. Census, between the years 2005 and 2010, 44.7% of youth ages 5–9 years of age and 34.6% of youth ages 10–17 years of age moved households at least once (Ihrke & Faber, 2012). Furthermore, residential moves predict many negative academic, health, and behavioral outcomes, including grade retention and failure to earn a high school diploma (Herbers, Reynolds, & Chen, 2013; Simpson & Fowler, 1994; South, Haynie, & Bose, 2007). Hence, eliminating students from the analysis who leave the district may lead to bias in the estimation of the effect of retention.

High School Diploma Versus GED

Attaining a passing score on the General Education Development (GED) test is widely recognized as a form of high school completion. For example, in its report of educational attainment in the United States, the U.S. Census does not differentiate between completion of a high school diploma and a GED (Ryan & Bauman, 2016). The GED testing system, in place since the 1940s, claims to establish equivalence between dropouts and traditional high school graduates, opening the door to college and positions in the labor market. The accessibility of the GED has led to an increasing number of students who take the GED test instead of attaining a high school diploma. In recent years, the GED represents approximately 12% of all high school credentials issued (Heckman et al., 2011). Whereas holders of the GED have somewhat better postsecondary education outcomes than do similar at-risk students who dropped out of school (Tyler & Lofstrom, 2010), the magnitude of the economic benefits of a GED are minimal and diminish over time (Jepsen et al., 2016).

Prior studies on effects of retention on high school graduation have ignored the GED (Jacob & Lefgren, 2009), combined the GED with completion of a high school diploma (Alexander et al., 2003; Jimerson, 1999), or combined GED with school dropout (Temple, Reynolds, & Ou, 2004). Given that these three groups represent distinct completion outcomes (i.e., high school diploma, GED, drop outs), that differ on demographic correlates as well as post–high school educational and employment outcomes, it is important to keep these outcomes distinct in analyses of the effects of grade retention.

Context of Current Study

The current study was initiated in the Fall of 2001. In that year, the U.S. Congress passed the "No Child Left Behind" Act, which extended to a national level the movement begun in the mid1990s to end social promotion (i.e., the practice of advancing children to the next grade level who had not mastered the competencies at the previous grade level). This act required that assessments, aligned with state standards, measure the achievement of all children at each grade level (U.S. Department of Education, 2002). The implementation of these educational policies corresponded with a substantial increase in the percentage of students retained in grade from the 1995 to 2004 (Texas Education Agency, 2005).

Texas, the site of the current study, was a leader in this movement, under then governor George W. Bush. In 1999 Texas implemented policies requiring that schools assess the literacy of students from kindergarten through third grade and provide remedial instruction to students who failed to demonstrate grade-level literacy competencies. In 2003 Texas passed legislation requiring students in Grades 3, 5, and 8 to demonstrate mastery of grade-level competencies in order to advance to the next grade. Participants in the present study entered first grade early in the state's implementation of these accountability practices (Texas Education Agency, 2005). Specifically, students in Grade 3 in the 2002–03 academic year were required to pass the state reading test. In the 2004–05 academic year, students in Grade 5 were required to pass the state tests in both the reading and math, and in the 2007–08 academic year, students in Grade 8 were required to pass the state tests in both the reading and math. Students in the current study were in Grade 1 in 2001–02 (Cohort 1) or 2002–03 (Cohort 2). Thus, Cohort 1 and Cohort 2 students who were continuously promoted through Grade 8 reached the promotional grades one year following implementation of the policy. Students had three opportunities to pass each test, and schools were required to provide accelerated instruction after each test failure. Parents could appeal the decision for their child to be retained to a grade placement committee. When study participants were in high school, Texas required students to either pass an exit exam to graduate (for students who were in Grade 9 prior to the 2011–12 academic year) or pass end-of-course exams in English, Math, and Science (for students entering Grade 9 in 2011–12 or later) to obtain credit for courses required for graduation. Thus, the current sample represented one of the first cohorts of students to be impacted by the state's stricter accountability standards.

Prior Studies With Current Longitudinal Sample

The current longitudinal study, begun in 2001, has had three objectives: (a) to assess the effects of grade retention on students' academic and social-emotional outcomes; (b) to study the potential moderating effects of child, family, and school variables on the level of achievement during the primary and secondary school years; and (c) to investigate the role of ethnicity, language, and culture as they related to the first two objectives. Of the many publications that have emanated from this longitudinal study, four have investigated effects of grade retention on academic achievement (Hughes, Chen, Thoemmes, & Kwok, 2010; Moser, West, & Hughes, 2012; Wu, West, & Hughes, 2008a, 2008b). All of these publications have employed propensity score analyses to equate

retained and promoted students on a large number of relevant variables assessed in first grade, prior to any child being retained.

These studies have largely emphasized comparisons in which the performance of retained students is compared with that of retained students near the completion of the same grade (grade level comparisons). These studies support the conclusion that grade retention has a short-term positive effect on reading and math in the repeated year following retention, but that this effect diminishes over time. For example, by Grade 5, students previously retained in Grade 1 and their matched peers who were continuously promoted did not differ in reading or math skills, even though retained students were on average one year older and had been in school one year longer by Grade 5 than their matched, promoted peers (Moser et al., 2012). Similarly, prior studies with this longitudinal sample suggest that retention in the elementary grades does not harm students' psychosocial adjustment or academic motivation (Im, Hughes, Kwok, Puckett, & Cerda, 2013; Wu et al., 2010). Indeed, at the transition to high school, students retained in Grades 1–5 and matched, continuously promoted students did not differ in their self-reported motivation to complete high school or to enroll in postsecondary education (Cham, Hughes, West, & Im, 2015). Despite these findings of no significant longer term effects of retention versus promotion in the elementary grades, Hughes, Cao, West, Allee, & Cerda (in press) found that retention (vs. promotion) in the elementary grades led to an increased rate (odds ratio = 2.93) of *early drop out* which was defined as dropping out of school by prior to the September 1 of the academic year the student was 17 years of age. The authors suggested that the apparent disconnect between findings of no effect of retention on achievement or motivation through Grade 9 but an effect of dropping out of school prior to age 17 might be explained by differences in previously retained and promoted students' perceived opportunity costs associated with remaining in school. Specifically, at age 16, students previously retained were, on average, one year further away from graduating from high school than were their same age, promoted peers; yet, in Texas, opportunities for employment and for leaving school to pursue a GED become available. Thus, at 16 years of age, retained students' mental calculus of the benefits and costs of continuing in school an extra year is likely different than it is for their same age, continuously promoted peers.

The Current Study

The current study extends prior studies by estimating the effect of retention in Grades 1–5 on high school completion status (i.e., high school diploma, GED, or drop out) 14 years after students entered first grade. Specifically, we assessed the effect of retention in Grades 1–5 on high school completion status, using a prospective, longitudinal research design involving an ethnically diverse sample of students entering first grade in one of three Texas school districts in the Fall of 2001 or 2002. The school composition of the districts from which the students were drawn was demographically similar to the school population in Texas, and the mobility of students in the sample was typical to that of Texas schools. In the current study we equated students retained in these grades and students promoted in these grades on a comprehensive set of variables measured prior to grade retention that are related to both grade retention and high school completion. We minimized participant attrition through extensive tracking procedures, and used modern procedures to address missing data. The use of these procedures provides a strong test of the effect of grade retention on high school completion under contemporary grade promotion and gradation practices.

The study also examines the potential influence of child and family demographic variables as moderators of the effects of retention on school completion status: diploma, GED, and drop out. Specifically, we examined the potential moderating effect of parent education level, child ethnicity, and child gender. In studies of school populations in which minimal attempts (if any) are made to equate groups, Black and Hispanic students, boys, and children from low SES homes are more likely to be retained in grade (Willson & Hughes, 2009) and less likely to obtain a high school diploma (National Center for Education Statistics, 2015). However, to the authors' knowledge, no study has investigated whether these variables exacerbate the negative effect of grade retention on school completion. One theoretical approach to risk in children, the cumulative risk hypothesis (Appleyard, Egeland, van Dulmen, & Sroufe, 2005), suggests that, as the number of risk factors increases from childhood through adolescence, the probability of negative life outcomes increases exponentially. Accordingly, we expect the effects of retention on school completion will be more negative for Black and Hispanic students and for males than for White or female students. Furthermore, because gender roles and expectations in adolescence differ across ethnic groups (Reid & Comas-Diaz, 1990), we also explored whether ethnicity and gender interacted in moderating the effect of retention on school completion.

Method

Participants

Recruited sample. A total of 784 students were recruited into this longitudinal study when in first grade, following the research protocol approved by the Institutional Review Board of the first author. Participants were drawn from a larger sample of academically at-risk students from three school districts (one urban and two small city districts) in Texas, when the students entered Grade 1 in the fall of 2001 and 2002. The first small city school district (district enrollment = 13,558) was composed of students who were 39% White, 36% Hispanic, 25% African American, and 1% Other, with 59% economically disadvantaged, and 10% limited in English proficiency. The second small city school district (district enrollment = 7, 424) was composed of students who were 68% White, 11% Hispanic, 12% African American, and 9% Other, with 25% economically disadvantaged, and 5% limited in English proficiency. The urban school district (district enrollment = 24,429) was composed of students who were 38% White, 27% Hispanic, 29% African American, and 6% Other, with 40% economically disadvantaged, and 11% limited in English proficiency. Taken together, the districts' student enrollment was generally representative of the total population of students enrolled in Texas schools for the 2001–2002 year in terms of ethnicity (41% White, 42% Hispanic, 14% African American, and 3% Other), economic adversity (51%) and limited English proficiency (15%; Texas Education Agency, 2003).

A total of 1,374 Grade 1 students in the three school districts met the following criteria for participation: scored below the median score on a state approved district-administered measure of literacy at end of kindergarten or beginning of Grade 1, spoke either English or Spanish, were not receiving special education services other than speech and language services in Grade 1, and were not previously retained in Grade 1. Incentives (small gifts and a random chance to win to a larger prize) were instrumental to collecting 1,200 returned consent forms; of these, 784 (65.33%) parents provided consent. No significant differences were indicated between the eligible students with and without parental consent across a broad array of archival variables, including performance on the district-administered test of literacy (standardized within district, due to differences in test used), age, gender, ethnicity, eligibility for free or reduced price lunch, bilingual class placement, cohort, and school context variables (i.e., % ethnic/racial minority; % economically disadvantaged).

Procedures for tracking students. Tracking and maintaining the participation of an at-risk sample of first grade students in a longitudinal study is a challenge. This section provides a detailed description of study procedures for tracking students for 14 years starting in first grade. Special attention was given to monitoring grade retention and final status (high school graduation, GED, dropping out of school).

Each student attending a Texas public school has a unique identification number. Using these numbers, beginning in September of each year, each of the three participating school districts provided school enrollment data for all study participants who were enrolled that year. This list included information on students' school campus, grade, and parent address and phone number. This information was entered into the study's student tracking database for the given year. Nonparticipating school districts to which study participants had transferred were contacted with a request to verify whether the student was enrolled for that year.

For students who were in a given school district at the end of the prior year and were not included on the district's list, the school the student last attended was contacted and asked to complete a form requesting information on the student's whereabouts, including the student's current school (or reason for withdrawal from school, such as enrolling in a private school or home schooling, moving out of the country, obtaining a GED, graduating, or being incarcerated) as well as the student's and/or parents' most recent home address. When a public school enrolls a new student, Texas law requires the new school to send a request for the student's school records from the student's most recent school within 10 days of enrollment. Upon obtaining the name of the new school, study staff faxed a copy of the parent consent form which authorizes schools to release educational records to the study, with a request for information on the student's grade, home address, and the name of the student's teacher (classroom teacher in elementary grades and language arts teacher in secondary grades).

If students were not located using these procedures, attempts were made to obtain school enrollment information from the parent (and student after Year 10) via phone, e-mail, or U.S. postal service. Several well-supported strategies for tracking participants' addresses and phone numbers were employed (Ribisl et al., 1996). Students were sent birthday cards each year with instructions to the postal service not to forward, to ensure that our system included the most current address information. Parents and students were also contacted each year via e-mail or U.S. mail to complete annual questionnaires, which included information on the student's school enrollment status as well as current contact information for the student and the parent as well as the names of individuals whom the study may contact to obtain information about the student's whereabouts. Parents and students were each paid $25.00 for completing the annual questionnaire. Mail was sent with instructions to the postal service not to forward it. Additionally, attempts were made to contact individuals listed on the most recently returned parent questionnaire to locate the student's or parents' current contact information.

When a student's school enrollment status could not be determined for a given year, one of the three participating school districts attempted to locate the student, using the student's unique identification number, on a state-wide database. This database included all students enrolled in any Texas public school. Finally, GED status was obtained from the Texas Education Agency's (TEA) searchable website of individuals issued a GED (https://bass.tea.state.tx.us/Tea.GEDi.Web/Forms/CertificateSearch.aspx). This website permits searching by the student's TEA-identification number and date of birth. Additionally, lists of graduating students were provided by each participating school district.

Analysis sample. By the end of the study, 17 students had moved out of the United States and not returned, 2 students were deceased, and 31 students were missing retention status, leaving an analysis sample of 734 (52.7% male). At entrance into the study in first grade, the average age (in years) of the analysis sample was 6.57 ($SD = 0.38$), with 57.1% of the sample being eligible for free or reduced price lunch and 34.7% of the sample being White, 23.4% African American, 37.2% Hispanic (43.22% of whom had limited English proficiency), and 4.7% other. At Grade 1, the mean full scale IQ based on the Universal Nonverbal Intelligence Test (Bracken & McCallum, 1998) was 93.00 ($SD = 14.40$), and the mean reading and math achievement Woodcock Johnson III age-standard scores (Woodcock, McGrew, & Mather, 2001) or the comparable Spanish language test of achievement (Woodcock & Muñoz-Sandoval, 1996) were 96.51 ($SD = 18.10$) and 100.86 ($SD = 14.09$), respectively.

As shown in Figure 1, of the 734 students in the analysis sample, 549 were still active in the study at Year 9. Of these students, school completion status (i.e., diploma, GED, or drop out) was obtained for all except 3 who withdrew from the study prior to determination of their school completion status. Of the 185 inactive students approximately 90% did not turn in the required written parental consent for continued participation in the program beyond Year 5, and the remaining 10% either withdrew from the study prior to Year 9 or could not be located at Year 9. All of the students who actively withdrew from the study permitted the researchers to use their data that had been collected up to the time of their withdrawal. By the end of Year 14 (calendar year 2014–15 for Cohort 1 and 2015–16 for Cohort 2), a final graduation status was determined for 546 of the active and 62 of the inactive students.

Annual assessments were not conducted on students who had withdrawn from the study. However, publically available sources of information on high school graduation (i.e., participating school district graduation lists) and GED completion (i.e., TX Education Agency website) were available for 62 of the inactive students (of whom 57 were located on school district graduation lists and 5

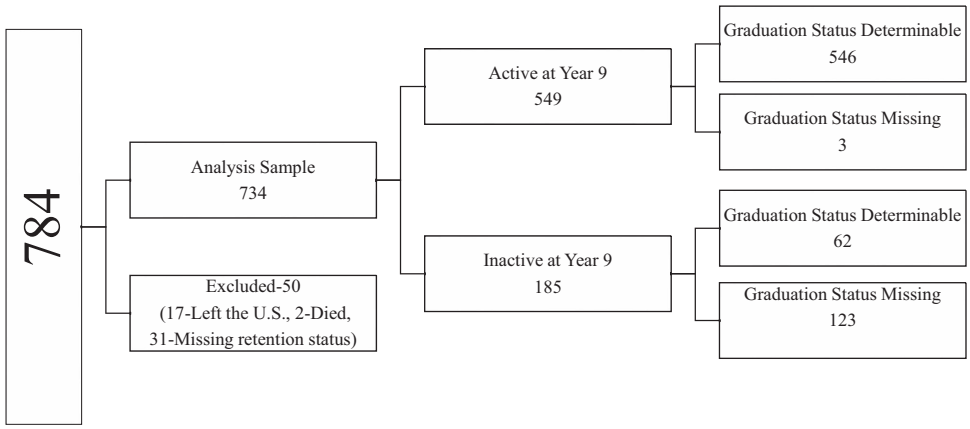

Figure 1. Sample attrition and corresponding school completion status.

were located on the GED website). For the remainder of the inactive students (N = 123), data on school completion were missing (see Figure 1).

Of those students who were active at Year 9, 372 had been continuously promoted in the elementary grades and 177 had been retained. Of those students who were inactive at Year 9, 106 had been promoted and 79 had been retained. Table 1 reports the breakdown of the active and inactive students by school completion status. Procedures for determining retention status and school completion status, as well as for handling missing data are described below.

Assessment Overview

In Years 1–9, student assessments were conducted at school in individual testing and interview sessions, in the language in which the student was more proficient. In Year 10, students had the option of completing an online or a paper version of the questionnaire. Beginning in Year 12, students were mailed a letter that included the link to the complete the survey online. Nonrespondents were contacted by phone and given the opportunity to complete the questionnaire over the phone. Students received small gifts for completing annual assessments in Years 1–5, after which they received $25.00. Parents and teachers were mailed questionnaires. Parents of children in bilingual classes and parents who reported Spanish as the home language were sent all questionnaires in English and in Spanish. Parents and teachers were each paid $25.00 for completing questionnaires.

Table 1
School Completion and Retention Status by Active Status

Group	School completion status			
	Diploma	GED	Drop out	Missing
Active Year 9	420	16	110	3
Inactive Year 9	57	5	0	123
Total	477	21	110	126

Note. GED = general education development certificate.

Definition of Retention Status

Students were considered retained in a given grade if they were in the same grade for two consecutive years. Schools provided information on students' grade placements every year. For the current study, students who were retained at least once during Grades 1–5 were classified as retained in the elementary grades, and students who were continuously promoted during Grades 1–5 were classified as promoted during the elementary grades. The decision to consider only retention prior to Grade 6 was based on two considerations. First, grade retention is more common in Grades 1–5 than it is in the next 3 grades. For example, in the 2008–2009 academic year, the percentage of students retained in Grades 1–5 ranged from 1.1 in Grade 4 to 5.6 in Grade 1. In that same year, the rates of grade retention in Grades 6, 7, and 8 were 0.8, 1.3, and 1.5, respectively (Texas Education Agency, 2011). Second, retention in the elementary grades differs structurally in important ways from grade retention in the secondary grades. In the elementary grades, a retained student repeats the entire curriculum during the repeat year and is classified at the same grade level for two years. In the secondary grades, a student who fails one or more courses repeats only the failed course(s) and is not classified at the same grade level for two years. The decision not to differentiate students retained once versus twice or more in Grades 1–5 was based on the small number of participants (N = 7; .1% of analysis sample) who were retained more than once in these grades.

Definitions of Graduation Status

Graduated. Students were considered graduated if they obtained a high school diploma from an accredited public or private school within 14 years of entering first grade for the first time. Status of a school as accredited was based on either being a state public school or being from a private school accredited by a recognized accrediting body (e.g., AdvanceEd, Southern Association of Colleges and Schools Council on Accreditation and School Improvement, TX Private School Accreditation Commission).

GED. Students were considered having completed a GED credential if they obtained a GED within 14 years of entering first grade for the first time. For in-state students, GED status was obtained from the Texas Education Agency's (TEA) searchable website of individuals issued a GED (described previously). For out-of-state participants, GED status was obtained from student or parent report on annual questionnaires.

Drop out. Students were considered to be dropouts if they did not obtain a GED or a high school diploma within 14 years of entering first grade for the first time.

Missing graduation status. Three students who were active at Year 9 withdrew from the study prior to Year 14. These students, along with 123 students who were inactive at Year 9 and were not located on a participating school's graduation list or on the TEA GED website at the end of Year 14, were classified as missing graduation status.

Selection and Assessment of Covariates Used to Calculate Propensity Scores

Selection of covariates. The covariates were 65 variables assessed in year 1, prior to any participant being retained in the elementary grades. Following the recommendation by Rubin (2001) and research by Steiner et al. (2010), we attempted to identify covariates that provided comprehensive coverage of variables that have been shown in prior research to be associated with retention and dropping out of school (Alexander, Entwisle, & Kabbani, 2001; McCoy & Reynolds, 1999; Willson & Hughes, 2006; Willson & Hughes, 2009). Consistent with bio-ecological models of risk and protection (Bronfenbrenner & Morris, 2006), the variables included factors at the levels of the individual child, the family, the school, and the home-school relationship. The Appendix includes a list of these 65 covariates, along with the measurement domain or construct and measurement source for each covariate.

Variables at the individual child level included child demographic variables, cognitive and academic functioning, social-behavioral adjustment, participation in remedial services, self-regulatory skills, motivation, and personality. Variables at the family level included family demographic variables. School-level risk variables included school level average achievement and the percentage of students who are mobile, on free or reduced lunch status, and White. Home-school relationship variables included parent involvement in school, the quality of the home-school relationship, and parents' perceptions of their role and that of the teacher. As shown in the Appendix, these variables were assessed with direct child testing and interviews, teacher and parent questionnaires, peer sociometric assessment, and school records.

Assessment of covariates used to calculate propensity scores. Student assessments were conducted in individual sessions at school by trained graduate and undergraduate students Trainees received a minimum of 18 hours of classroom instruction each semester and passed a practice examination on each measure prior to administering measures in the school, and their protocols were checked and corrected, as needed, on a weekly basis. Children who spoke any Spanish or whose parents spoke Spanish (based on teacher report) were administered the Woodcock–Muñoz Language Survey (WMLS; Woodcock & Muñoz-Sandoval, 1993) to determine whether they were more proficient in Spanish than English. Children more proficient in Spanish were administered all tests in Spanish by bilingual examiners. Parents of children in bilingual classrooms or who spoke any Spanish (based on teacher report) received both Spanish and English versions of the parent questionnaire.

Student assessments of language proficiency, academic achievement (Woodcock Johnson III Tests of Achievement; Woodcock, McGrew, & Mather, 2001) and cognitive ability (Universal Nonverbal Intelligence Test; Bracken & McCallum, 1998) were conducted in the Fall of the year. In the Spring semester tests of inhibitory control (Kochanska, Murray, & Coy, 1997; Liew, Chen, & Hughes, 2010), learning motivation (Burhans & Dweck, 1995; Liew et al., 2010) and student perceived cognitive competence (Harter & Pike, 1981; Hughes, Kwok, & Im, 2013 were administered.

Data from teachers were obtained via questionnaires administered between November and May, and teachers were paid $25 for completing each questionnaire. The teacher questionnaires included questions regarding remedial services the student received that year, the teacher's perception of the child's achievement relative to other students in the class (Gleason, Kwok, & Hughes, 2007) as well as measures of social/behavioral adjustment (i.e., Strengths and Difficulties Questionnaire, Goodman, 2001), home-school alliance and parent involvement (i.e., Teacher Report of Parent Involvement Scale; Wong & Hughes, 2006), student behavioral engagement in the classroom (i.e., Hughes, Luo, Kwok, & Loyd, 2008), the teacher–student relationship (Teacher Network of Relationship Questionnaire, Hughes, et al., 2008), student ego-control (Liew et al., 2010), and student personality (i.e., agreeableness, and conscientiousness, Kwok, Hughes, & Luo, 2007).

Data from parents were obtained from parent questionnaires and included family demographic information, child social and behavioral adjustment (i.e., the Strengths & Difficulties Questionnaires; Goodman, 2001), and the home–school relationship (i.e., positive perceptions of school, communication between parent and teachers, perceptions of teacher and parent shared responsibilities, parent involvement in school, and parent self-efficacy for involvement in school; Wong & Hughes, 2006). Parents received $25 for completing the questionnaire.

Classroom sociometric assessment procedures were used to obtain classmates' perceptions of students' social-behavioral adjustment (Gleason et al., 2007). Students were individually interviewed at school to obtain their perceptions of their classmates' behavioral adjustment (e.g., trouble in class, aggression, prosocial, hyperactive, sad and withdrawn) and their liking for the student. Scores were standardized within classrooms.

Information regarding student participants' age, gender, race/ethnicity, and familial economic adversity was obtained from school district records.

Selection and Assessment of Variables for Imputing School Completion Status

As described in the data analysis section, missing data on school completion status were imputed based on 33 selected variables assessed either at baseline (Year 1), Year 8, or Year 9. To assist in imputing missing values, we identified auxiliary variables (Graham, 2009), assessed prior to the age at which students begin to drop out of school, that have been shown in previous research to

predict school completion (Fall & Roberts, 2012; Parr & Bonitz, 2015). At Year 1 these variables included tested reading and math achievement and cognitive ability; teacher-rated school achievement, behavioral engagement, the home-school relationship, child ego control, parent-involvement in school, and expected highest level of child educational attainment. Year 1 variables also included peer-rated liking and hyperactivity and a measure of family socioeconomic adversity. At Year 8 these variables included tested reading and math achievement as well as teacher-rated teacher-student conflict and support, disciplinary infractions, classroom engagement, and conduct problems. Year 8 variables also included student-reported extracurricular participation, conduct problems, antisocial behaviors, prosocial behaviors, school membership, and school engagement. In Year 8 the mean school levels of reading and math achievement of the school the student attended were also included. Finally, students' motivation for educational attainment at Year 9 was included. These variables were assessed via direct testing, student interviews, peer sociometric procedures, teacher- and parent questionnaires, and archival school records. A list of these variables and their assessment methods are included in the supplementary file.

Assessment of Moderators

Student gender and ethnicity were based on school records. Parent education level was reported by parents, who indicated the highest educational level of any adult living in the home on a 5-point scale from *less than high school* to *doctorate or equivalent*.

Data Analysis

Equating groups: Propensity scores. Although participants at elevated risk for retention were selected based on having below median reading scores at entrance to elementary school, this design feature was not sufficient to fully equate the promoted and retained groups at baseline. Thus we used propensity score methods (Rosenbaum & Rubin, 1983; West et al., 2014) to more precisely equate the groups using 65 covariates measured in first grade prior to retention. Propensity score procedures are a popular method of equating groups in nonrandomized studies in the health sciences and are increasingly used for this purpose in educational research (Thoemmes & Kim, 2011). A detailed presentation of the current use of propensity score analysis in psychology can be found in West et al. (2014). In brief, all covariates that might be related to both treatment (here, retention vs. promotion) and the outcome are identified and measured at baseline. The goal is to be as comprehensive as possible in selecting covariates. The propensity score is the probability that the participant will be assigned to the treatment (here, retention in grade) rather than the control (promotion) condition based on their scores on the full set of baseline covariates. If the participants in the two groups can be equated on the propensity scores, then the statistical theory developed by Rosenbaum and Rubin shows that the groups are also expected to be equated on all variables entering into the calculation of the propensity score. Rubin (2001) describes the propensity score procedure as mimicking the randomized experiment, achieving balance between the groups on all variables involved in the calculation of the propensity score. It is possible that other unknown unmeasured covariates might predict both the treatment condition and the outcome and lead to bias, but that prediction must be over and above the prediction achieved by the comprehensive set of covariates.

A challenge arises in this data set because not all covariates were observed at baseline. Although missing data rates were nil or very low for most variables, missing data rates were higher for some parent report variables (up to 36.4%). To address missing data in the covariates, we used a procedure proposed by D'Agostino, Lang, Walkup, Morgan, and Karter (2001), imputation with constant plus missingness indicators. In this procedure, each unique variable having missing values is filled in with a constant and a separate dummy variable representing whether the data point is observed (*yes* = 1, *no* = 0) is added to the propensity score equation. This procedure has been shown to perform well in the estimation of propensity scores when data are missing on the covariates (Cham & West, 2016).

We explored the use of four methods of estimating propensity scores: logistic regression, random forests (using several options), generalized boosting regression model (using several different tuning parameters), and covariate balancing propensity scores (Cham & West, 2016; Imai & Ratkovic, 2014). The results of the four methods were compared in terms of two criteria: (a) the average absolute balance achieved between the retained and continuously promoted groups on the covariates; (b) the theoretical/empirical importance of the covariates that showed larger degrees of imbalance (i.e., covariates that have been shown in the literature to be related to later achievement). Using these criteria, logistic regression and covariate balancing propensity scores (CBPS) showed the best performance. Below we report the results of the logistic regression approach as it is the simplest to present and it achieved good balance on the covariates. The correlation between the estimated propensity scores of the two best methods in achieving covariate balance was high (the correlation between the estimated propensity scores from logistic regression and covariate balancing propensity scores was $r = .92$). Comparison of the estimated treatment effects of these two approaches is presented in the section Multinomial Logistic Regression.

In the logistic regression approach, propensity scores (PS) are estimated using equation (1):

$$\widehat{PS} = b_0 + b_1X_1 + b_2X_2 + \ldots + b_{67}X_{67} + b_{68}D_1 + \ldots + b_{109}D_{42} + \text{error}. \quad (1)$$

In this equation $\widehat{PS}$ is the estimated propensity score, b_0 to b_{109} are regression coefficients, X_1 to X_{67} are covariates, and D_1 to D_{42} are dummy variables (missing data indicators). In total, 67 predictor variables were used in the regression equation including 4 dummy variables for child's ethnicity. Due to redundant information in multiple dummy variables (i.e., missing information coming from same informant), only 42 of 65 dummy variables are used in Equation (1).

Figure 2 displays the standardized mean differences (SMD) and variance ratios (VR) of the retained and continuously promoted groups for 23 chosen variables deemed to be most important, both before and after the use of inverse propensity score weighting to equate the groups. Prior to weighting, a number of covariates had values of the SMD >0.25 in magnitude and a VR of lower than .50 or higher than 2.00, standards suggested by Rubin (2001). For the 23 chosen variables, SMDs and VRs ratios were inside the rec-

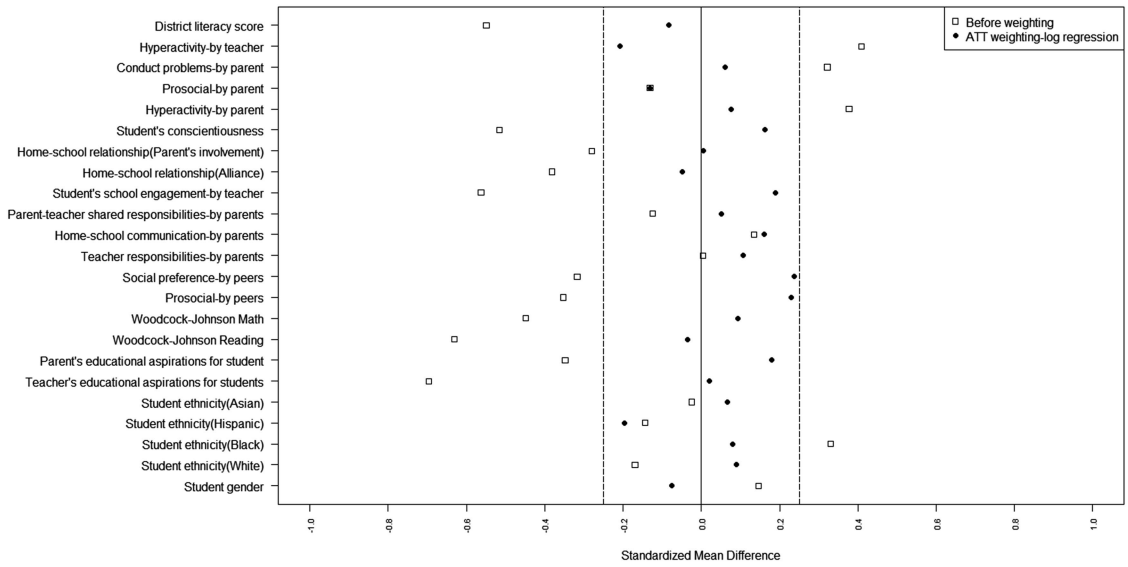

Figure 2. Standardized mean difference and variance ratio pre- and postweighting. Dotted vertical lines indicate that equating was acceptable.

ommended range after weighting. Among the 67 variables, the covariates that exceeded the balance criterion for the SMD were the Harter Competence Scale Score and three binary variables of Individual Counseling, Speech Therapy, and 1–1 Adult tutoring outside of class. We concluded that in general good balance was achieved on the baseline covariates, but additional correction was needed on the four covariates identified above.

Imputing missing data for school completion. A second challenge arose because, despite our intensive efforts to track each student, we were unable to learn the school completion status for 126 (17.2%) of the analysis sample recruited in Grade 1. School completion status was assessed two years after the expected graduation date for each student if no retention had occurred. To minimize the potential effects of missing data, we used multiple imputation with chained equations (Raghunathan, Lepkowski, Van Hoewyk, & Solenberger, 2001), the preferred method when some of the variables with missing data are categorical. We used 15 variables measured at baseline plus 18 variables measured in assessment Years 8 and 9 to impute school completion status. A drawback of the chained equations approach is that standard multiple imputation programs (e.g., SPSS, SAS) have poor model convergence diagnostic statistics. Recently, Keller and Enders (2017) have developed a program that reports Gelman and Rubin's potential scale ratio reduction statistic (PSR, Gelman & Rubin, 1992) that indicates how stable the posterior distributions are for each parameter. A PSR close to 1.00 indicates optimal convergence; a PSR <1.05 is often used as a criterion for good convergence. Using 5,000 burn in iterations and 500 iterations between draws, we computed the PSR based on 10 chains. The maximum value of the PSR that we found across all parameters was 1.002, indicating that good model convergence was achieved. Following Graham (2009), we then constructed 100 data sets with school completion status imputed. Imputing a large number of data sets minimizes the influence of imputation on the results and maximizes the statistical power of the tests.

Multinomial logistic regression analysis. Given three unordered categories (graduation, GED, drop out) of our outcome variable, we conducted a multinomial logistic regression analysis (Cohen, Cohen, West, & Aiken, 2003, Section 13.3; Long, 1997, chapter 6). In multinomial logistic regression, one outcome category (here, high school graduation) is used as reference outcome with which each of the other outcomes is compared.[1]

Following Enders (2011), we analyzed each of the 100 imputed data sets using the identical multinomial logistic regression model with Mplus (Muthen & Muthen, 1998–2016; Muthen, Muthen, & Asparouhov, 2016). The regression equation included as predictors the propensity score (PS), retention (1 = *retained*; 0 = *continuously promoted*) estimated using the logistic regression approach, and the four covariates that did not achieve adequate balance (Harter Competence Scale Score, and binary variables of Individual Counseling, Speech Therapy, Adult tutoring outside of class). The estimates of the parameters for each of the 100 imputed data sets were averaged and the overall standard error was estimated using Rubin's (1987) rules (see also Enders, 2011).

Results

Effect of Retention on School Completion

For the high school graduation versus drop out contrast, retention led to a significant increase in the likelihood of dropping out of high school, estimate = 0.98, $SE = 0.34$, $z = 2.94$, $p = .003$.

[1] Multinomial logistic regression assumes that the categorical outcomes are not ordered. This analysis allows the examination of the separate effects of grade retention on high school drop out and completion of a GED relative to graduation. We also conducted ordinal probit regression (Cohen et al., 2003; Muthén et al., 2016) which assumes that that the three outcomes are ordered on a latent continuum. Very similar results were obtained.

Retained students were much more likely than continuously promoted students to drop out rather than complete high school, odds ratio = 2.67. The contrast between students who received a GED versus completed high school did not attain statistical significance, estimate = 0.96, *SE* = 0.67, $z = 1.43$, $p = .15$, odds ratio = 2.61.

As a check on these results, we conducted a parallel multinomial logistic analysis using the propensity scores from the CBPS. The predictor scores were the CBPS propensity score, retention status, and the three covariates that did not achieve adequate balance (teacher's rating of child's anticipated education level, Woodcock-Johnson Reading, mean district literary score). Once again, the estimates of the parameters for each of the 100 imputed data sets were averaged and the overall standard error was estimated using Rubin's (1987) rules. Of importance, for the high school graduation versus dropout contrast, retention had a similar statistically significant effect, estimate = 0.86, *SE* = 0.33, $z = 2.59$, $p = .01$, odds ratio = 2.35. The effect of retention on the contrast between attainment of the GED versus high school graduation did not attain statistical significance, estimate = 0.79, *SE* = 0.66, $z = 1.20$, $p = .23$, odds ratio = 2.20.

In conclusion, retention in elementary school greatly increases the likelihood of dropping out of high school versus graduating from high school, but did not affect the likelihood of completing a GED versus graduating from high school. These results were found using two different propensity score approaches.[2]

Moderator Analyses

Using the logistic regression based propensity score weights, we also explored whether the effects of retention on school completion status were moderated by key demographic variables including ethnicity (Black, White, Hispanic), gender, the combination of gender and ethnicity, and parent highest education. For the high school graduation versus drop out contrast, a retention x ethnicity interaction was found. Blacks showed a larger effect of retention than Whites, dropping out rather than graduating from high school at a higher rate (for interaction contrast, $z = 2.05$, $p = .041$, odds ratio = 5.97). No differences were found in the effects of retention on rates of graduation versus drop out for Hispanics relative to Whites, $z = 0.18$, $p = .857$, odds ratio = 1.17. No moderator effects were found for ethnicity on the effect of retention on the rates of completion of the GED versus graduation from high school.

The overall Retention × Ethnicity × Gender interaction was significant, $\chi^2(2) = 6.94$, $p = .031$, with a trend for Hispanics ($z = -1.82$, $p = .07$, odds ratio = 0.04) and a significant effect for Blacks ($z = -2.88$, $p = .004$, odds ratio = 0.003) relative to Whites. In terms of the completion versus dropping out of high school, Hispanic males were less negatively affected by early grade retention than Black males and White males, who were similarly affected. In contrast, White females were less negatively affected by early grade retention than Hispanic females. Black females were the most negatively affected among females from the three ethnic groups. No moderator effects were found in the comparison of completing a GED versus graduating from high school. Finally, no moderator effects were found for household highest education level on either the drop out versus graduation from high school contrast or the GED versus high school completion contrast.

Discussion

Effect of Retention on School Completion

Using a prospective, 14-year longitudinal design and strong controls for potential baseline differences between students who were subsequently retained in the elementary grades and those who were continuously promoted, this study found that retention in the elementary grades increases the probability of dropping out versus graduating from high school (odds ratio 2.32), but does not increase the probability of earning a GED versus graduation. An odds ratio of 2.32 represents the ratio of the odds of dropout versus the odds of graduation for grade retention for students who were retained versus promoted in elementary school. This odds ratio controls for the effect of 65 baseline covariates measured in first grade prior to any retention taking place.

Retention and dropping out. Our finding of an effect of retention on obtaining a high school diploma versus dropping out of school within 14 years of entering first grade is consistent in two ways with the results of prior prospective studies. Note that most of these studies were conducted with samples of students entering poor urban school districts in the 1980s (Alexander et al., 2003; Ou & Reynolds, 2010; Roderick, 1994) and included only minimal controls for potential baseline differences between retained and promoted groups. Notably, most of these earlier studies reported a greater increase in the odds ratio for the effect of retention on dropping out versus graduation than found in the correct study. Alexander et al. (2003) report an odds ratio of 4.04 for students retained once by Grade 7 relative to students continuously promoted, after adjusting for the potential confounding factors of a measure of achievement in first grade and a few demographic factors. Studies of retention effects with less adequate controls for potential confounds report even higher odds ratios of dropping out of school (Jimerson, Anderson, & Whipple, 2002). In our analysis in which we did *not* adjust for any potentially confounding baseline factors, we found a substantially larger odds ratio = 3.50. Thus, one plausible explanation for the smaller increase in the odds of dropping out versus graduating from high school in the current study when a student is retained in grade is the effectiveness we achieved in equating retained and promoted students on a wide range of potential confounds. A second possible explanation is that differences in the populations and broader educational and policy context between these earlier studies and the current study contribute to the differences in the magnitude of the effect of retention on graduating from high school. Despite our substantially improved control for potential baseline confounders and changes in the educational and policy context from an earlier educational era, we still found that retention has a damaging effect on a child's likelihood of obtaining a high school diploma in a sample of

[2] If the multinomial logistic analysis is conducted without adjusting for the logistic propensity score or the four unbalanced covariates, the effect of retention is substantially larger. For the effect of retention on high school graduation versus dropping out of high school, estimate = 1.25, *SE* = 0.21, $z = 5.89$, $p < .001$, odds ratio = 3.50. For the effect of retention on high school graduation versus completing a GED, estimate = 0.86, *SE* = 0.44, $z = 1.96$, $p = .05$, odds ratio = 2.35. The failure to adjust for differences in the covariates measured at baseline prior to retention leads to an inflated estimate of the effect of retention.

contemporary students enrolled in school districts representative of the ethnic and income diversity of Texas public schools.

This important finding must be interpreted in light of prior research with this longitudinal sample. Using same grade based comparisons, we previously found that retention in first (or early) grades did not have effects on academic achievement at the end of elementary school (Moser et al., 2012) and retention in the elementary grades did not negatively impact academic achievement or engagement in the middle school grades (Hughes et al., 2013) or students' motivation to complete high school during their first year in Grade 9 (Cham et al., 2015). In other words, there is no evidence that grade retention harms students' educational achievement or motivation at the point of entry into high school; yet it increases the probability of dropping out of school prior to earning a high school diploma.

To better understand our results with respect to dropping out of school, we examined the last grade in which students were enrolled as a function of retention status. Figure 3 shows that the retained and promoted groups have different patterns of drop out. Previously retained students are most likely to drop out after Grade 9. In contrast, promoted students leave school at a more uniform rate across grades, with Grade 10 being the modal last grade of enrollment. At least two factors might potentially account for the exit of previously retained students during or following Grade 9.

First, Grade 9 is the year of transition to high school, which has been referred to as the "lynchpin year" for ultimate success in completing high school (Donegan, 2008). Academic standards increase in Grade 9. Poor performance can lead to failure to earn the number of credits needed to advance to Grade 10, likely contributing to students' leaving school during or after Grade 9. In 2012, the rate of retention in Grade 9 in Texas was 9.6%, compared to 1.1% in Grades 7 and Grade 8, 5.8% in Grade 10, and 5.1% in Grade 11 (Texas Education Agency, 2015). Further support for this interpretation is provided by a study by Pharris-Ciurej et al. (2012). Using administrative data from a West Coast metropolitan school district, they tracked the progress of four cohorts of students entering Grade 9 for the first time. At the beginning of the second semester of students' first year in Grade 9, one third of students were failing one or more of their courses. By the Spring semester of the following year, 19% of these students had dropped out of school and 14% of those still enrolled were repeating Grade 9.

Second, the retained students have different sets of available alternatives during their first year in high school. In the current study at the transition to high school, retained students were typically 15 years of age, turning 16 years of age prior to the beginning of the next school year. At age 16 new opportunities become available to students. In Texas at age 16 students can work full time (Texas Workforce Commission, 2015) and enroll in GED courses (Texas Education Agency, 2016). Thus, at age 16, the retained student who has not completed Grade 9 may conclude that pursuing an available "exit" strategy is a more attractive option than remaining in school another four or more years. These options are not available to continuously promoted students who are 14 years of age when entering Grade 9. Few exit strategies are available to youth under the age of 16. By the time the promoted students are 16 years of age, they have had more time to adjust to high school and may be more likely to view graduation as an achievable and not-too-distant prospect.

Research on adolescent risk-taking and impulsivity supports the second factor. Neuroscience research over the past decade finds that maturation of those areas of the brain associated with impulsivity and decision making continues into the late 20s (Spear, 2009). The well-documented impulsivity and poor decision-making demonstrated by many adolescents is attributed, in part, to the protracted maturation of the prefrontal cortex and associated regions of the brain. One form of impulsivity common in adolescents is a tendency to exhibit impatience when given a choice between an immediate small reward versus a larger but delayed reward (Romer, Duckworth, Sznitman, & Park, 2010). Because youth in our study were selected on the basis of academic risk at school entrance, they are likely to continue to struggle in meeting the academic demands of high school. For these youth, the decision to drop out may reflect impulsivity and poor decision making; the adolescent chooses the perceived short term rewards of dropping out of school (including both maximizing positive reinforcements such as earning money and hanging out with friends and minimizing negative reinforcements such as removal of the stress of academic failure or peer victimization) instead of the more distant but larger and enduring rewards of persisting in school and earning a diploma.

Expectancy-value theory (Wigfield & Eccles, 2000) provides another perspective on the second factor. Despite having similar expectations for graduation and placing a similar value on gradu-

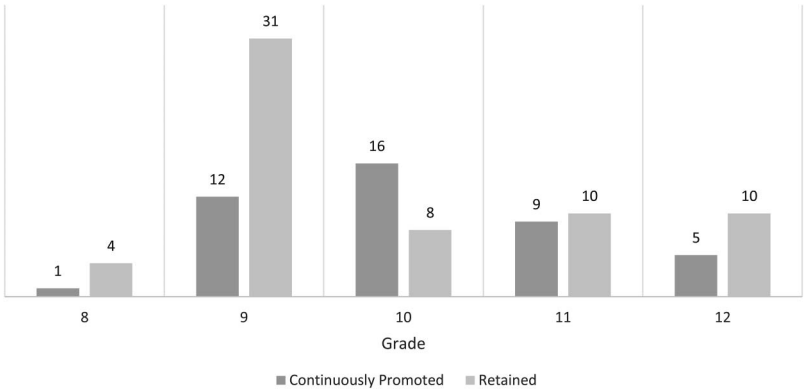

Figure 3. Drop-out grade for 106 of the 110 drop-out students presented separately for the continuously promoted ($n = 43$) and retained ($n = 63$) students.

ation as promoted students, retained students may perceive the financial costs of remaining in school as outweighing the benefits of completion. Thus, even though retention in the elementary grades does not impair students' academic achievement or educational motivation at the beginning of high school, previously retained students may be more likely to choose the short-term rewards of dropping out over the long-term rewards of persisting in school.

Retention and GED. Over the past 20 years, the GED has become more accessible to high school students and has become an increasingly popular alternative to a high school diploma (Mishel & Roy, 2006). The GED provides the credentials for the student to attend college or join the military. Indeed, many high schools offer GED certification programs for students as young as 16 years of age, as is the case in Texas (Texas Education Agency, 2016), leading some researchers to argue that such policies induce students to elect the GED rather than persist in school (Heckman, Humphries, LaFontaine, & Rodríguez, 2012; Mishel & Roy, 2006).

The present study found that retained and promoted students did not differ in their odds ratio of obtaining a GED versus high school diploma as a function of earlier grade retention. This finding begins to address the dearth of data on differences between individuals who complete high school with a GED versus a regular high school diploma. Passing the GED exam is cognitively as or more challenging than obtaining a diploma (Mishel & Roy, 2006); thus, noncognitive factors such as motivation to persist in school or life circumstances likely differentiate between these two forms of school completion. Retained and promoted students may not differ on these factors.

Effects of Retention on Dropping out Are Moderated by the Interaction of Gender and Ethnicity

There is a dearth of research on gender or ethnic moderation of the effect of retention on high school graduation. Based on the cumulative risk hypothesis (Appleyard et al., 2005), we expected the negative effect of retention on high school graduation versus dropping out would be stronger for Black and Hispanic students than for White students and for males than for females. Retention increased the odds of dropping out of school for Black (but not Hispanic) students, relative to White students. Although gender (individually) did not moderate the effect of retention on high school graduation, the overall interaction of minority status (Black, Hispanic vs. White) and gender moderated the effect of retention on graduation from high school. Focused interaction contrasts comparing each separate minority group with Whites showed a significant Gender $\times$ Minority group $\times$ Retention interaction effect. Specifically, whereas the negative effect of retention on graduation was similar for Black and White males, retention had a stronger negative effect on graduation for Black than for White females. A similar pattern of results was obtained comparing the Hispanic and White groups, but the focused interaction contrast reached only a borderline level ($p = .07$) of statistical significance.

One possible explanation for the interactive effects of ethnicity and gender in moderating the effect of retention on high school graduation is the higher prevalence of teen parenting among Black and Hispanic females, relative to White females. Black and Hispanic females ages 15–19 are approximately twice as likely to have a baby as White females (Center for Disease Control, 2014). Pregnancy and giving birth are significant contributors to high school dropout rates among females. Only about 50% of teen mothers receive a high school diploma by 22 years of age, whereas approximately 90% of females who do not give birth during adolescence graduate from high school (Center for Disease Control, 2014). Future research is needed to understand the potential moderating role of teen parenting on the effect of retention on high school graduation.

Study Strengths

The current study employed a prospective, 14-year longitudinal design. It identified students at risk for retention in grade at entrance to elementary school and effectively equated students who were subsequently retained or promoted on a large number of baseline variables associated with grade retention and dropping out of school, addressing a major limitation of most previous studies. Furthermore, the sample reflects the ethnic and income diversity of Texas schoolchildren who entered first grade at the beginning of the era of high stakes testing and grade retention policies aimed at ending social promotion, making the current results pertinent to contemporary educational practices and student demographics. Extensive tracking of participants minimized attrition in this mobile sample of children over a 14-year period. Of 784 participants recruited at the beginning of Grade 1, both retention and graduation status were known for 613, resulting in an attrition rate across the 14 years of 21.8% and an average annual attrition rate of 1.56%. State-of-the art methods for multiple imputation of data led to an analysis sample of 734 (94% of original sample).

The study is the first to consider the effect of grade retention on all three potential outcomes: graduation from high school, obtaining a GED, and dropping out of school. Prior research has either not considered the GED or has combined GED with either high school graduation or dropping out. Evidence (Jepsen et al., 2016; Tyler & Lofstrom, 2010) suggests that attainment of the GED predicts different employment and postsecondary outcomes than graduation or dropping out of school, so it can be misleading to combine the other outcomes as has been done in the prior research.

Study Limitations and Future Studies

Despite its considerable strengths, the present longitudinal study has its limitations. First, a minor limitation was that all students were given 14 years to graduate or earn a GED. Students retained in the elementary grades might take a year longer to complete high school than their continuously promoted peers. To probe the potential bias from the limitation, we tracked those students from the two cohorts (eight students in all: seven previously retained; one continuously promoted) who were still in school at the end of 14 years. Of the three previously retained Cohort 1 students still in school at the end of their 14th year of participation (classified as drop outs), one returned to school in Year 15 and graduated by the end of Year 15 (August, 2016). Of the four Cohort 2 previously retained students still in school in Year 14, two did not return to school in Year 15 (the 2016–2017 academic year) and one student did return to school in Year 15. Funding limitations precluded follow up on the graduation status of the one Cohort 2 student who was enrolled in school at the beginning of Year 15. If all three of

these previously retained students could be classified as graduated if given 15 years to graduate, the results would have remained the same in direction and substantially the same in magnitude.

Second, the sample size and relatively small number of students retained in each of the later elementary grades precluded testing whether the grade at which a student was retained moderated the effect of retention. Nearly half of the students retained in the elementary grades were retained in Grade 1. Similarly, too few students ($N = 7$) were retained multiple times to investigate the effect of multiple retentions in elementary school. Larger sample sizes are needed to address questions of timing of retention and double retentions on graduation.

Third, the study did not have the ability to track attainment of a GED on a state-level website for students who moved out of state. We did survey students who moved out of state with regard to both graduation and attainment of the GED; none of these students indicated receipt of a GED. However, the inability to track out-of-state students on a state-level website may have led to misclassification of some students who obtained a GED as drop outs. Additionally, some students classified as drop outs within the 14-year window of the study can be expected to obtain a GED in the future. According to Heckman and LaFontaine (2006), approximately one half of high school dropouts eventually receive some type of alternative certificate by age 25.

Fourth, study results may not generalize to other states with policies regarding grade retention that differ from those in Texas or to students who enter first grade with above-average literacy skills. We recruited students with low literacy skills to most effectively use the study resources given that below average literacy skills is the primary predictor of grade retention in the elementary grades (Ladd, Muschkin, & Dodge, 2014). However, our results may not generalize to the smaller population of higher ability students who are retained for nonacademic reasons such as behavioral problems or excessive school absences.

Fifth, more detailed information on the reasons youth dropped out of school would have been informative. Students drop out of school for a variety of reasons, including failure to meet graduation requirements, employment, or parenting and other family responsibilities. Although we made attempts to obtain such information from students and parents at Years 13 and 14, a low response rate among the drop out group precluded analyses of these data.

Implications

The finding that retention in the elementary grades increases the risk of dropping out of school suggests that policies and practices that reduce early grade retention would reduce dropout rates. Low academic readiness skills at entry to kindergarten and first grade are the strongest predictors of being retained in the elementary grades (Davoudzadeh, McTernan, & Grimm, 2015; Willson & Hughes, 2009). High-quality preschool programs for students at risk for low academic readiness skills due to poverty or limited English proficiency have proven to be effective in increasing these skills (Ladd, Muschkin, & Dodge, 2014). Furthermore, the positive effects of such programs on academic performance spill over to nonprogram students, reduce the risk of grade retention, and last throughout the elementary school years (Dodge, Bai, Ladd, & Muschkin, 2016; Ladd et al., 2014). Thus, increasing the availability of quality preschool education is a proven strategy for reducing grade retention.

Study results suggest that the transition to high school is a point of increased risk for dropping out of school, especially for previously retained youth. These results suggest that policies and practices that increase academic and social supports at this critical juncture could increase school graduation rates. Several comprehensive school reform efforts that focus on increased supports for entering freshmen have shown promise in increasing rates of promotion to Grade 10 and graduation (Lee & Burkam, 2003). Key elements include more personalized, smaller learning communities for first-time 9th graders, data-driven models to provide timely, enhanced academic supports to students who are failing a course, curricula specifically designed to help students catch up on credits, and professional development for teachers focused on building supporting relationships with students and addressing academic needs.

Finally, minority girls, notably Black girls, who are retained in the elementary grades clearly have a higher risk of not graduating from high school than White girls. Although the data from the present study do not address why this is the case, the higher rate of pregnancy among Black and Hispanic teens, relative to White teens (Center for Disease Control), may contribute to the increased risk of dropping out of school. High school programs tailored to the needs of pregnant and parenting teens, including vocational training, alternative schools, mentoring, and multiservice schools have been shown to increase the odds of school completion for women who are pregnant or have children (Community Preventive Services Task Force, 2015).

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(*Appendix follows*)

Appendix

List of Covariates for Propensity Score Analysis

Covariate	Domain/Construct	Source
1. Student Woodcock-Johnson III broad reading standard score	Achievement	Performance
2. Student Woodcock-Johnson III broad math standard score	Achievement	Performance
3. Teacher expected highest level of child's education	Achievement	Teacher
4. Student achievement (teacher-report)	Achievement	Teacher
5. Student Universal Nonverbal Intelligence Test score	Cognitive	Performance
6. Student ethnicity (Hispanic vs. White)	Demographic	Archival
7. Student ethnicity (Black vs. White)	Demographic	Archival
8. Student age at eligibility	Demographic	Archival
9. Student gender	Demographic	Archival
10. Student limited English proficiency status	Demographic	Archival
11. Student bilingual class status	Demographic	Archival
12. Student English as Second Language status	Demographic	Archival
13. Household employment status	Demographic	Parent
14. Household highest level of education	Demographic	Parent
15. Number of children (under age 18) living in household	Demographic	Parent
16. Family adversity	Demographic	Parent
17. Family free/reduced lunch	Demographic	Parent
18. Student Language of testing	Demographic	Teacher
19. Parent positive perceptions about school	Home-school	Parent
20. Parent satisfaction with home-school communication	Home-school	Parent
21. Parent perceived parent-teacher shared responsibilities	Home-school	Parent
22. Parent perceived school-based involvement	Home-school	Parent
23. Parent sense of responsibility for child's education	Home-school	Parent
24. Parent perceived teacher responsibility for child's education	Home-school	Parent
25. Parent self-efficacy for helping child in school	Home-school	Parent
26. Home-school alliance	Home-school	Teacher
27. Parent involvement in school	Home-school	Teacher
28. Student academic self-efficacy	Motivation	Child
29. Student Dweck puzzles task choice	Motivation	Performance
30. Student agreeableness (teacher-report)	Personality	Teacher
31. Student's conscientiousness (teacher-report)	Personality	Teacher
32. Teacher-student conflict (teacher-report)	Relation with teacher	Teacher
33. Teacher-student support (teacher-report)	Relation with teacher	Teacher
34. Child attended a Pre-K school program	Remedial services	Parent
35. Student receives teacher instruction in reduced class size	Remedial services	Teacher
36. Student receives tutoring by an adult	Remedial services	Teacher
37. Student receives tutoring by a peer	Remedial services	Teacher
38. Student receives remedial instruction outside classroom	Remedial services	Teacher
39. Student receives instruction with an aide	Remedial services	Teacher
40. Student receives remedial instruction before/after school	Remedial services	Teacher
41. Student receives 1–1 tutoring by an adult before/after school	Remedial services	Teacher
42. Student receives individual counseling	Remedial services	Teacher
43. Student receives speech therapy	Remedial services	Teacher
44. Student's receives small group tutoring	Remedial services	Teacher
45. School % mobility	School risk	Archival
46. School level % free or reduced lunch	School risk	Archival
47. School level % White school	School risk	Archival
48. District average literacy score	School risk	Archival
49. Student inhibitory control	Self-regulation	Performance
50. Student ego control (teacher-report)	Self-regulation	Teacher
51. Student trouble	Social/Behavioral	Sociometrics
52. Student aggression	Social/Behavioral	Sociometrics
53. Student prosocial behaviors	Social/Behavioral	Sociometrics
54. Student ADHD behaviors	Social/Behavioral	Sociometrics
55. Student sad/withdrawn	Social/Behavioral	Sociometrics
56. Student liking by peers	Social/Behavioral	Sociometrics
57. Student social preference by peers (peer-report)	Social/Behavioral	Sociometrics

(*Appendix continues*)

Appendix (*continued*)

Covariate	Domain/Construct	Source
58. Student ADHD behaviors	Social/Behavioral	Parent
59. Student's prosocial behaviors	Social/Behavioral	Parent
60. Student conduct problems	Social/Behavioral	Parent
61. Student internalizing behaviors	Social/Behavioral	Parent
62. Student school engagement (teacher-report)	Social/Behavioral	Teacher
63. Student ADHD behaviors (teacher-report)	Social/Behavioral	Teacher
64. Student prosocial behaviors (teacher-report)	Social/Behavioral	Teacher
65. Student conduct problems (teacher-report)	Social/Behavioral	Teacher

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