Journal of Educational Psychology
2009, Vol. 101, No. 1, 101–114

0022-0663/09/$12.00 DOI: 10.1037/a0013100

Age Appropriateness and Motivation, Engagement, and Performance in High School: Effects of Age Within Cohort, Grade Retention, and Delayed School Entry

Andrew J. Martin
University of Sydney

The present study examined the relative salience of age within cohort, grade retention, and delayed school entry (3 dimensions of age appropriateness) in 3,684 high school students' academic motivation, engagement, and performance. Structural equation modeling revealed that after the effects of demographic characteristics and grade retention were taken into account, little significant variance was explained by the linear effects of age within cohort. However, subsequent modeling incorporating nonlinear effects showed that the markedly older-for-cohort students (i.e., over the "standard" 12-month age range for a given cohort) and delayed-entry students (i.e., academic "red shirts") experienced some academic disadvantage in motivation, engagement, and performance while the age-appropriate students (particularly the younger ones) fared best. Over and above demographic and age-within-cohort effects, the effects of grade retention were consistently negative. Taken together, data suggest that there appear to be little or no motivation, engagement, or performance advantages to being markedly older-for-cohort, having delayed-entry status, or being retained in a grade.

Keywords: age effects, grade retention, delayed entry (red shirting), motivation, performance

Within any school cohort (or grade level), there is quite a range in age, often spanning up to 2 years. Although most students are "age appropriate" (i.e., they fall within the "standard" 12-month age range for their cohort), others are markedly older for their cohort (i.e., over the 12-month age range for a given cohort). Indeed, within this latter group are students whose entry to school has been delayed (i.e., they have been held out or "red-shirted") or who have been retained in (i.e., have repeated) a particular grade level. Although there has been a good deal of research examining effects of age appropriateness among elementary school students, little further work has been conducted into the academic lifespan among high school students across a wide variety of salient educational factors. Moreover, relatively little work has brought together in the one study three key dimensions of age appropriateness (age within cohort, grade retention, delayed school entry) to most appropriately assess the effects of age appropriateness on academic outcomes.

The present study was conducted to address these gaps with an examination of the relative salience of age within cohort, grade retention, and delayed entry in high school students' academic motivation, engagement, and performance. Implications of the findings are relevant to (a) theorists conceptualizing about child development and its interface with students' effectiveness at school, (b) practitioners who must teach to a diverse student body, (c) policy makers recommending starting ages and retention criteria, and (d) parents or caregivers who are, to varying degrees, relevant to decisions regarding school readiness and grade retention.

Age Appropriateness and Different Orientations to Child Development

Any consideration of age appropriateness in school is underpinned by theories and attitudes about child development and how these interface with views on school readiness, when to start a child at school, and on what bases a child is deemed to "fit" with his or her cohort (see Meisels, 2002). There are four views on child development that are particularly relevant to these considerations. The nativist ("internal clock") view holds that children are ready for school when they are mature enough to sit quietly, engage with peers, and accept direction. The environmental view holds that children's readiness is defined in terms of practical characteristics of behavior such as their knowledge of colors, shapes, counting, and the letters of the alphabet. The social constructivist view holds that school readiness is defined in social and cultural terms such that readiness depends on the individual child and his or her background. The interactionist position holds that readiness is bidirectional, focusing on the child's learning, skills, and knowledge but also taking into consideration the capacity of the school to meet the child's needs (Meisels, 2002).

To varying degrees, all four views underpin decisions and advice regarding the age of entry for an individual child. The nativist view is often the basis for the decision to enter a child when he or she is relatively older (e.g., delay a child's entry) and to retain child in a particular grade—if children are pushed beyond

This article was in part prepared while Andrew J. Martin was Visiting Senior Research Fellow in the Department of Education at the University of Oxford, Oxford, UK.

Correspondence concerning this article should be addressed to Andrew J. Martin, Faculty of Education and Social Work, A35–Education Building, University of Sydney NSW 2006, Australia. E-mail: a.martin@edfac.usyd.edu.au

their abilities or do not fit with their environment, there is greater risk of academic failure. The social constructivist view would predict delayed entry, for example, on the basis of prior links to socioeconomic status and ethnicity (see Jones & Mandeville, 1990). On the other hand, the environmental and interactionist views are often the basis for on-time entry or decisions not to retain a child because there is a great range of normal variation in development that can be accommodated by the school (see May & Kundert, 1997). Hence, these theories and orientations toward child development drive some very specific issues and challenges that children, parents, and schools face. The present study examines three such issues—age within cohort, grade retention, and delayed school entry—and their role in academic motivation, engagement, and performance at high school.

The Effects of Age Within Cohort on Educational Outcomes

Most research investigating the effects of age on motivation, engagement, and performance tends to focus at the broader level spanning years and grade levels. However, other research addresses age within cohort (i.e., within a particular grade level) with particular focus on the effects of being younger for cohort, at age for cohort, and older for cohort. The findings in relation to such effects are mixed, with some research finding positive effects of being younger in a cohort, some research showing little or no difference between younger and older students, while other research reports maladaptive outcomes as a result of being young for one's cohort. As an important context to the present study, indicative research along these lines is briefly reviewed.

In terms of the negative effects of being young for one's cohort, research has shown that children with late birthdays perform more poorly academically and evince poorer adjustment at school (Kinard & Reinherz, 1986; Sweetland & de Simone, 1987). Similarly, findings among children in kindergarten have shown academic advantages to being older in the cohort (West, Denton, & Germino-Hausken, 2000). Moreover, reports by teachers and school leaders indicate younger children experience more social and academic difficulties than their older peers and that they tend to lag behind the older students through their schooling (Griffin & Harvey, 1995). In contrast, research on the positive effects of being young in one's cohort demonstrates that younger students in the cohort are more likely to go on to higher/further education after school (Peck & Trimmer, 1995) while other research finds literacy advantages to being younger in the cohort (Crone & Whitehurst, 1999).

Set against these findings, however, is the bulk of research that has found little or no effect of being young in the cohort. Such research finds no disadvantage to being young for one's cohort in terms of academic, social, or behavioral referrals at school (DeMeis & Stearns, 1992), little or no difference in IQ and academic progress (Buntaine & Costenbader, 1997), equivalent academic social progress (Jones & Mandeville, 1990; Morrison, Griffith, & Alberts, 1997), no difference in phonological awareness in the early grades (McNamara, Scissons, & Simonot, 2004), and relatively low correlations between assessments of developmental maturity upon school entry and subsequent indices of academic progress and school adjustment (de Lemos & Mellor, 1994).

Moreover, what research finds early advantages to being older for one's cohort then goes on to show that by (around) third grade, many differences that may have been evident no longer exist (Crone & Whitehurst, 1999; Shepard & Smith, 1986; Stipek & Byler, 2001). Indeed, behavioral and social variability is often highest at times of entry and transition, and this variability naturally reduces as the year moves on and the child progresses through the grade levels (Alexander & Entwisle, 1988; Spitzer, Cupp, & Parke, 1995). Moreover, age aside, a consistent feature of cognitive and developmental research is the high heterogeneity of developmental levels within any single class of children—particularly in the early stages of school (Bond, 2001).

On balance, findings in relation to the effects of age within one's cohort have led to the conclusion that age in itself is not a particularly good predictor of learning or at-risk status (Morrison et al., 1997). In support of this, it has been found that preschool teachers and parents generally fail to accurately identify young children who go on to experience difficulties at school (de Lemos & Mellor, 1994). Indeed, gender, socioeconomic status, race, and school factors tend to yield markedly higher effects than age within cohort (Bentin, Hammer, & Cahan, 1991; Jones & Mandeville, 1990; Martin, 2007a).

As is evident from the research reported above, the bulk of research has focused on the early years at school. Not a great deal is known about the effects of age within cohort in high school. Furthermore, much of the research has tended to focus on relatively narrow sets of outcomes. The present study, then, assesses the effects of age within cohort in high school across a diversity of motivation, engagement, and performance measures.

The Effects of Entry Status on Educational Outcomes

Many parents deal with late birthdays (i.e., children who would be young for their cohort) by delaying their child's entry to school (Routley & de Lemos, 1993), thereby rendering the child older (and often overage) for the cohort. It also turns out that most delayed children are boys (May, Kundert, & Brent, 1995). There appear to be two reasons for delaying a child's entry to school. Consistent with orientations to child development summarized in the previous section, the first is to provide the extra time needed to mature for some children who are deemed to be behind. The second, partly underpinned by orientations to child development, is to give an otherwise ready child the competitive edge among a younger cohort (Zill, 2002). Indeed, to avoid the dilemmas that are presented as a result of having a late-birthday child, some parents' attempts to conceive their child are timed with school entry age in mind (Graue, 1993). As with the effects of age within cohort, the findings in relation to delayed entry are mixed, with some research finding positive effects of being delayed, some research showing little or no difference between delayed and on-time students, and other research reporting maladaptive outcomes as a result of being held out from school.

On the positive side of the ledger, some have argued that (a) delayed entry can yield adaptive outcomes if used to enhance ability rather than to reduce failure (Frick, 1986), (b) delayed entry can reduce the chances of grade retention/repetition (Holloway, 2003), (c) parents of delayed-entry students report receiving less negative feedback from the teacher and fewer performance problems (West, Meek, & Hurst, 2000), and (d) delayed entry reduces

the need for additional individual instruction and increases the learning of the class as a whole (Prais, 1997). Notwithstanding these positive effects, however, the benefits of delayed entry have been found to diminish over time (similar to the effects of age within cohort). For example, West, Meek, and Hurst (2000) found that by second grade, differences in performance were nonexistent. Moreover, although delayed-entry students are less likely to be retained in a grade, they are more likely to be referred for special support (Graue & DiPerna, 2000; May et al., 1995).

In terms of its negative effects, the (U.S.) National Association of Early Childhood Specialists (2000) reports that delaying children's entry to school labels them failures before they start school; increases the heterogeneity of the classroom, thereby making it more difficult to teach the class; denies the opportunity for cognitive growth that would occur through interactions with age mates; and leads to higher odds of referral to special education. In terms of behavior, delayed-entry students tend to be overrepresented among the students with behavior problems (Zill, Loomis, & West, 1997), and research examining the effects of delayed entry in adolescence has found increased probability of behavior problems and risk of drug use (Byrd, Weitzman, & Auinger, 1997; Byrd, Weitzman, & Doniger, 1996). Similarly, delayed entry renders a child overage for his or her grade, and overage status is historically linked to school dropout (Grissom & Shepard, 1989). Other research has found that although delayed-entry students perform at the same level as the young on-time entry students, they perform more poorly than the grade as a whole (Cameron & Wilson, 1990). Indeed, reviews of the effects of delayed entry conclude that the benefits claimed for this strategy are not supported by the literature (Charllton & Winsler, 1999).

As with the effects of age within cohort, a line of research suggests little, diminishing, or no effect of delayed entry on educational outcomes. As reported above, the benefits of delayed entry have been found to decline over time such that by second or third grade, differences in performance are minimal (Bickel, Zigmond, & Strahorn, 1991; Shepard & Smith, 1986; West, Meek, & Hurst, 2000). Other research finds delayed-entry students do not outperform peers in the same grade (Cameron & Wilson, 1990; Cosden, Zimmer, Reyes, & Gutierrez, 1995; Morrison et al., 1997); they do not outperform children young in the cohort who were not delayed (Cameron & Wilson, 1990; Morrison et al., 1997); they do not attract higher teacher ratings of social and emotional development (Zill, 2002); they do not make significantly greater academic progress (Deitz & Wilson, 1985; Kundert, May, & Brent, 1995); and they achieve in comparable ways to the grade cohort and the younger students (Graue & DiPerna, 2000).

Taken together, the bulk of evidence finds no, little, diminishing, or negative effects of delaying a child's entry to school. Although a small body of work has studied its effects among adolescents (with an emphasis on behavior), most research has focused on students' early years. Hence, not a great deal is known about the longer term effects of delayed entry in high school—an issue identified as in need of further data (Frey, 2005). Nor has the research adopted a wide scoping of educational outcomes. The present study, then, assessed the effects of delayed entry among high school students across a diversity of motivation, engagement, and performance measures.

The Effects of Grade Retention on Educational Outcomes

The broad issue of age appropriateness also brings into consideration the role of grade retention and its effects on academic outcomes. Specifically, any study of age appropriateness and delayed entry must also account for the students who were retained in a particular grade. As such, it is not surprising that grade retention/repetition is a salient construct in this type of research. Research shows a direct link between age and grade retention/repetition. For example, teachers are less inclined to retain an older child (May et al., 1995) and more likely to retain a younger child even when the younger child is of equivalent academic achievement (Shepard & Smith, 1986). Although continuing to be an issue of debate, the weight of evidence suggests that the effects of retention are negative. Retention has been associated with negative effects on performance trajectories—particularly for those held back in the postkindergarten years (Hong & Yu, 2007; Silberglitt, Jimerson, Burns, & Appleton, 2006), a greater likelihood of school dropout (Fine & Davis, 2003; Jimerson, Anderson, & Whipple, 2002), and greater inattentive, anxious, and disruptive classroom behavior (Pagani, Tremblay, Vitaro, Boulerice, & McDuff, 2001), with such findings generally upheld in meta-analyses (Jimerson, 2001). Alongside the effects of age within cohort and delayed entry, then, grade retention is an important consideration in age appropriateness research.

Controlling for Gender and Grade Level

To most appropriately examine the effects of age within cohort, delayed entry, and grade retention, one must control for the roles of gender and grade level—particularly given that gender and grade level are significantly associated with numerous outcome constructs under focus in the present study. For example, findings show that boys are more likely to be delayed in their entry to school (May et al., 1995), while gender seems to interact with the effects of delayed entry such that there appear to be different effects of delayed entry for boys compared with girls (Crosser, 1991). In terms of grade level, studies of adolescents show that as students make the transition into high school, domain-specific changes in subjective task value are present (Wigfield, Eccles, MacIver, Reuman, & Midgley, 1991). The transition from elementary to middle school has been found to pose difficulties and challenges unique to that time (Anderman & Midgley, 1997; Roeser, Eccles, & Sameroff, 2000), and a decline in student motivation, engagement, and performance is typically found to emerge after this transition (see Wigfield & Tonks, 2002) and to continue into the middle years of high school (Martin, 2001, 2003c, 2004, 2007a). Hence, in examining the effects of age within cohort, delayed entry, and grade retention, it is vital to control for the effects of gender and grade level.

Aims of the Present Study

The focus of the present study was age appropriateness and its relationship with a set of motivation, engagement, and performance factors, with particular interest in the relative salience of age within cohort, grade retention, and delayed entry. In this context, then, a number of research questions were posed. What are the effects of age within cohort on motivation, engagement,

and performance? Does the fact that prior work has found different outcomes as a function of being markedly older for cohort, at age for cohort, or younger for cohort suggest possible nonlinear effects for age within cohort? What are the effects of grade retention on motivation, engagement, and performance? What do retention and age-within-cohort data indicate about the relationship between delayed school entry and academic motivation, engagement, and performance? These questions were pursued using structural equation modeling; in the present study, this modeling tested structural paths among (a) gender, grade level, and their interaction; (b) age within cohort and grade retention (and by inference, delayed entry); and (c) academic motivation, engagement, and performance. Figure 1 shows details. Although elementary school students are typically the focus in most studies of age appropriateness and its cognate issues, in the present study, a series of multivariate analyses were conducted to shed light on these questions in the

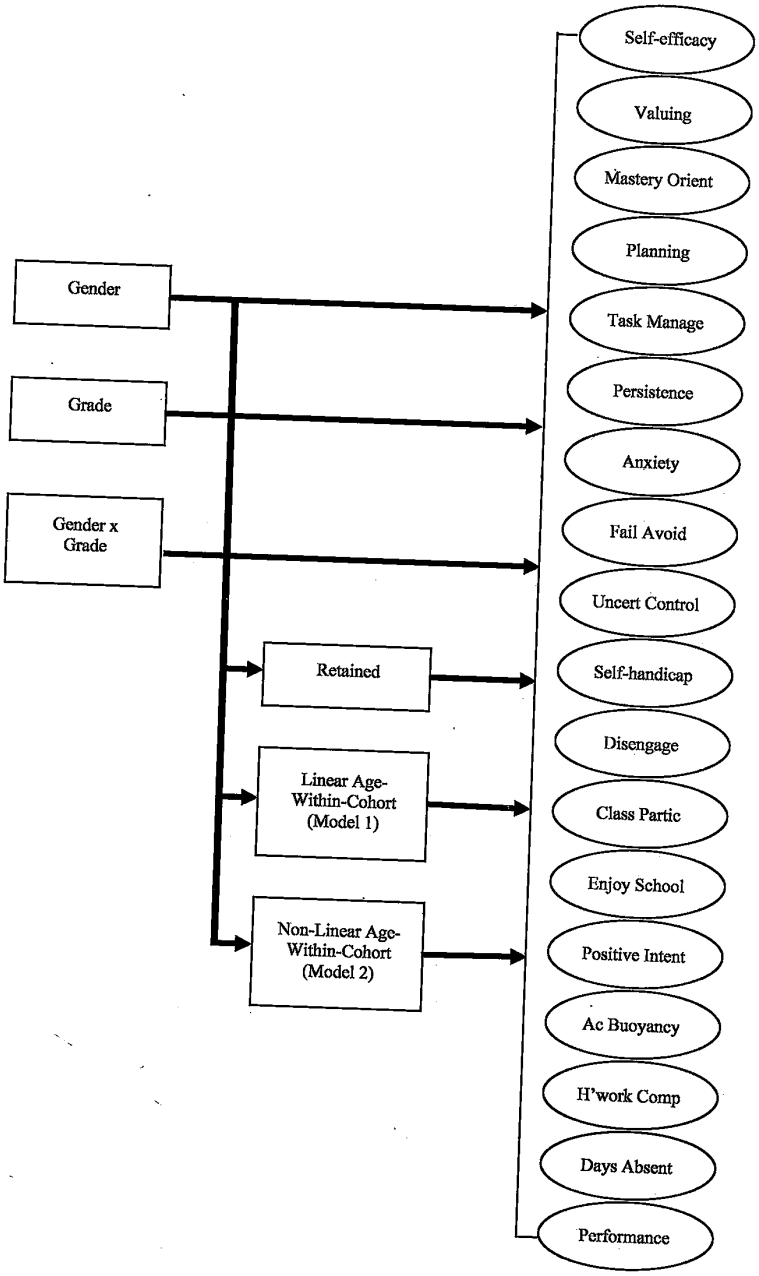


Figure 1. Hypothesized structural model.

high school context. At a broader level, the goal of the present study was to provide further information on seminal orientations (nativist, social constructivist, environmental, and interactionist) toward child development that are relevant to age appropriateness in the academic context.

Method

Sample and Procedure

The sample comprised 3,684 high school students in junior high school (Grades 7 and 8: 51%; approximate age, 12–14 years), middle high school (Grades 9 and 10: 36%; approximate age, 14–16 years), and senior high school (Grades 11 and 12: 13%; approximate age, 16–18 years) from seven Australian high schools. Of the total sample, approximately 25% was markedly older for cohort—that is, older than the standard 12-month age range for that cohort (because data did not definitively indicate when these students entered school or the educational jurisdiction in which they entered, these figures are approximate but are proposed as accurate to within a 1-month range). Of the age-appropriate students (i.e., students within the standard 12-month age range for that cohort), approximately 10% were relatively younger for cohort (the lower 3 months of the standard 12-month age range for that cohort) and approximately 90% were at age for cohort (the upper 9 months of the standard 12-month age range for that cohort). In all, 5% of students reported being retained/having to repeat a grade at some stage in their schooling, a figure that is in the (approximately) 5%–10% range reported elsewhere (Dawson, 1998; Fine & Davis, 2003). Most retentions occurred in the first 3 years of elementary school (47%), with a further 42% in the final 4 years of elementary school, 9% in the first 4 years of high school, and 2% in the final 2 years of high school.

After retentions have been taken into account, delayed-entry students were estimated to represent approximately 20%, a figure slightly higher than the 9%–16% (Charllton & Winsler, 1999; Zill, Loomis, & West, 1997) estimated in some research but below the upper ranges (e.g., 50%; Gnezda, Garduque, & Schultz, 1991) reported elsewhere. Indeed, the fact that the sample was relatively more socioeconomically advantaged might explain the higher delayed-entry estimation, as it has been found that such advantage is significantly associated with higher rates of delayed entry (Jones & Mandeville, 1990).

Table 1 presents the distributional properties (skewness, kurtosis) of central constructs that show all measures were approximately normally distributed and that the sample as a whole was not idiosyncratic and can be considered relatively mainstream. All schools in the study were, in fact, mainstream schools and not designated as "special schools" serving clinical populations. Where excessive kurtosis and skewness occur, they point to low absenteeism, again reflecting a sample that was connected to school to an extent that was not considered idiosyncratic or unusual. Indeed, markedly older-for-cohort and retained students reflected similar distributions: absenteeism (markedly older-for-cohort students: skewness = 3.41, kurtosis = 18.40; retained students: skewness = 2.85, kurtosis = 11.48) and other constructs (markedly older-for-cohort students: skewness range = from −1.32 to 1.07, kurtosis range = from −0.55 to 1.85; retained students skewness: range = from −1.11 to 0.78, kurtosis range = from −0.64 to 1.23).

Six of the seven schools were comprehensive, serving students of mixed ability. Three were fee-paying comprehensive schools with students who had a slightly higher aggregate ability level than most comprehensives (but did not screen or select students on entry by ability) and the other three were systemic comprehensive

Table 1
Descriptive and Distributional Statistics, Cronbach's Alphas, and Confirmatory Factor Analysis (CFA) Factor Loadings

Factor	*M*	*SD*	Skewness	Kurtosis	Cronbach's α	CFA loading	
						Range	*M*
Motivation and Engagement Scale—High School							
Self-efficacy	5.79	0.99	−1.08	1.48	.78	0.62–0.75	0.69
Valuing (school)	5.80	1.00	−1.15	1.63	.79	0.56–0.76	0.69
Mastery orientation	5.83	0.98	−1.10	1.61	.82	0.65–0.80	0.73
Planning	4.38	1.27	−0.19	−0.38	.78	0.55–0.77	0.70
Task management	5.01	1.30	−0.57	−0.16	.83	0.70–0.86	0.75
Persistence	4.96	1.14	−0.49	0.06	.81	0.60–0.80	0.72
Anxiety	4.17	1.38	−0.09	−0.55	.77	0.59–0.73	0.68
Failure avoidance	3.08	1.35	0.46	−0.38	.79	0.58–0.81	0.70
Uncertain control	3.31	1.31	0.27	−0.48	.78	0.61–0.74	0.69
Self-handicapping	2.78	1.31	0.53	−0.41	.80	0.60–0.76	0.71
Disengagement	2.33	1.20	1.04	0.76	.79	0.60–0.82	0.70
Other engagement and performance measures							
Class participation	5.24	1.24	−0.69	0.26	.90	0.79–0.88	0.84
Enjoyment of school	5.07	1.40	−0.78	0.16	.91	0.73–0.88	0.84
Positive intentions	5.80	1.11	−1.34	1.99	.81	0.66–0.81	0.73
Academic buoyancy	4.72	1.25	−0.48	0.08	.80	0.68–0.73	0.70
Homework completion	4.35	0.75	−1.18	1.67	—	1.00	1.00
Days absent	4.06	5.00	5.91	73.95	—	1.00	1.00
Aggregate performance	0	1.00	−0.41	0.22	—	1.00	1.00

Note. The scale for most factors ranged from 1 to 7; the exception was the scale for homework completion, which ranged from 1 to 5.

schools. One school was academically selective. Two of the largest schools were single-sex boys' schools (hence, the higher male representation), two schools (including the smallest school) were single-sex girls' schools, and three were coeducational schools. In the context of the present study, all schools were located in the same educational jurisdiction, adhered to the same standard starting and cutoff dates for enrollment at the outset of school, and subscribed to the same mandatory curriculum and external examinations. Just over one third (38%) of the respondents were female, and 62% were male. The mean age of respondents was 14.03 (SD = 1.58) years. Teachers administered the instruments to students during class.

Materials

It was proposed that a thoroughgoing assessment of the effects of age appropriateness was best conducted in the context of a wide variety of educational measures—indeed, much of the previous research has been centered on relatively narrow sets of educational factors. It was further contended that academic motivation, engagement, and performance constitute a good scoping of educational measures that would be sensitive to effects of age in cohort and/or delayed entry if such effects were to exist. It was in this context that the present study included (a) all factors from the Motivation and Engagement Scale (Martin, 2001, 2003c, 2007a, 2007b), (b) educational constructs shown to be useful in recent construct validity research (Martin, 2007a, 2008b), and (c) objective performance comprising literacy and numeracy achievement.

Motivation and Engagement Scale–High School (MES-HS). The Motivation and Engagement Scale–High School (MES-HS; Martin, 2001, 2003c, 2007a, 2007b) is an instrument that measures high school students' motivation and engagement through three adaptive cognitive dimensions, three adaptive behavioral dimensions, three impeding/maladaptive cognitive dimensions, and two maladaptive behavioral dimensions. For detailed information about the development of this scale, see Martin (2001, 2003c, 2007a, 2007b).

Adaptive cognitions include *self-efficacy* (e.g., "If I try hard, I believe I can do my schoolwork well"), *mastery orientation* (e.g., "I feel very pleased with myself when I really understand what I'm taught at school"), and *valuing of school* (e.g., "Learning at school is important to me"). Adaptive behaviors include *persistence* (e.g., "If I can't understand my schoolwork at first, I keep going over it until I understand it"), *planning* (e.g., "Before I start an assignment, I plan out how I am going to do it"), and *task management* (e.g., "When I study, I usually study in places where I can concentrate"). Impeding/maladaptive cognitive dimensions are *anxiety* (e.g., "When exams and assignments are coming up, I worry a lot"), *failure avoidance* (e.g., "Often the main reason I work at school is because I don't want to disappoint my parents"), and *uncertain control* (e.g., "I'm often unsure how I can avoid doing poorly at school"). Maladaptive behavioral dimensions are *self-handicapping* (e.g., "I sometimes don't study very hard before exams so I have an excuse if I don't do as well as I hoped") and *disengagement* (e.g., "I often feel like giving up at school").

Each of the 11 factors comprises four items—hence, the MES-HS is a 44-item instrument. For each item, students rate themselves on a scale from 1 (*strongly disagree*) to 7 (*strongly agree*). Martin (2001, 2003c, 2007a, 2007b) has confirmed a strong factor structure and has also shown that scores on the MES-HS are reliable with approximately normally distributed dimensions and are significantly associated with literacy, numeracy, and achievement in mathematics and English, as well as being sensitive to age and gender-related differences in motivation.

Other engagement and performance measures. Because the present study aims to conduct a broad scoping of educational measures associated with age appropriateness issues, a number of other measures were included in the study that addressed additional engagement and performance dimensions. Hence, students were also administered items that explored their *enjoyment* of school (four items; e.g., "I like school"), *class participation* (four items; e.g., "I get involved in things we do in class"), *positive academic intentions* (four items; e.g., "I intend to complete school"), and *academic buoyancy* (four items; e.g., "I think I'm good at dealing with schoolwork pressures"). These measures were rated on a scale ranging from 1 (*strongly disagree*) to 7 (*strongly agree*) and were adapted directly from Martin (2007a, 2008b; see also Martin & Marsh, 2006, 2008a, 2008b) who has shown them to be reliable, a good fit to the data in confirmatory factor analysis, and significantly associated with motivation and engagement in other performance domains such as sport and music (Martin, 2008b, in press). *Homework completion* ("How often do you do and complete your homework and assignments?") was a single item assessed on a scale ranging from 1 (*never*) to 5 (*always*). *Days absent from school* ("About how many days were you absent from school last term?") was a single item. The objective *performance* task comprised a subset (due to class time restrictions) of literacy and numeracy items shortened and adapted from the Wide Range Achievement Test 3 (Wilkinson, 1993) standardized by grade level.

Prior research using the motivation, engagement, and performance measures. Demonstrating sound factor structure and comprising reliable and valid factor scores, these outcome constructs have been central in recent model development (Martin, 2002, 2006b, 2007a), testing the effects of educational interventions (Martin, 2005, 2008a), understanding gender differences in education (Marsh, Martin, & Cheng, 2008; Martin, 2003a, 2004; Martin & Marsh, 2005), examining academic domain specificity (Green, Martin, & Marsh, 2007; Marsh, Martin, & Debus, 2001; Martin, 2008b, in press), understanding academic resilience and buoyancy (Martin & Marsh, 2006, 2008a, 2008b), assessing parenting and pedagogy (Martin, 2003b, 2006c), and investigating motivation, engagement, and performance in nonacademic domains including physical activity (Martin, Tipler, Marsh, Richards, & Williams, 2006), music (Martin, 2008b, in press), sport (Martin, 2008b, in press), and work (Martin, 2006a). Taken together, then, they represent a wide-ranging and robust means of assessing the important issue of age within cohort, grade retention, and delayed school entry among high school students.

Grade retention, age within cohort, and determination of delayed-entry status. Grade retention was assessed by asking students if they had repeated a grade at any stage of their schooling. Age within cohort was quantified on a linear scale in which the first eligible month of entry for the cohort was set at 0 with positive values indicating the number of months a student was older than the first standard month a child was eligible for school and negative values indicating the number of months a student was below the first standard month a child was eligible for school.

Thus, for example, a value of 0 indicates that the child was among the oldest for the age-appropriate cohort; a value of + 5 indicates a child was approximately 5 months above the oldest age-appropriate child; a value of −6 indicates a child was in the mid-range of the age-appropriate cohort.

Entry status was inferred through the joint operation of age within cohort and retention, with markedly older-for-cohort students (i.e., with positive values on the age-within-cohort linear scale) who had not been retained deemed to be delayed-entry students. However, the present data were anonymized, so it was not possible to check individual school records to reliably ascertain entry status (indeed, for the senior high school students, access would have been required to date back over 10 years for entry status to be ascertained reliably). Thus, entry status for students in this study was only inferred. Notwithstanding this, it is argued that inferred entry status is a defensible construct on two bases. First, this study's retention rates and inferred delayed entry rates were broadly in line with figures reported elsewhere (Charllton & Winsler, 1999; Gnezda et al., 1991; Zill et al., 1997), and so it is proposed that the data and subsequent inferences drawn on delayed entry are reliable. Second, all schools in this study were in the same educational jurisdiction, which specifies, within a 1-month range, the same minimum age on entry—hence, through knowing age, year level, and retention status, one can reliably infer entry status (indeed, using a linear age-within-cohort scale rather than categorizing students as delayed entry ensured that students would not be inappropriately or incorrectly assigned). However, this latter point raises the possibility that some students may have moved from other educational jurisdictions that had different minimum entry ages. It is important to note that all but a few of the smaller educational jurisdictions in Australia have the same 3-month range for minimum age on entry—hence, children moving from one jurisdiction to another are most likely to fall under similar age-on-entry criteria.

Data Analysis

Confirmatory factor analysis (CFA). Confirmatory factor analysis (CFA), performed with LISREL Version 8.80 (Jöreskog & Sörbom, 2006), was used to test the factor structure of the proposed measures. In CFA, the researcher posits an a priori structure and tests the validity of a solution on the basis of this structure to fit the data by showing that (a) the solution is well defined, (b) the parameter estimates are consistent with theory and a priori predictions, and (c) the subjective indices of fit are reasonable (McDonald & Marsh, 1990). Maximum likelihood was the method of estimation used for the CFA. In evaluating goodness-of-fit of alternative models, the root-mean-square error of approximation (RMSEA) is emphasized. Although the RMSEA is apparently the most widely endorsed criterion of fit, other measures of fit considered are the nonnormed fit index (NNFI), the comparative fit index (CFI), the chi-square test statistic, and an evaluation of parameter estimates.

For RMSEAs, values at or less than .08 are taken to reflect an acceptably close fit and values at or less than .05 are taken to reflect an excellent fit (see Jöreskog & Sörbom, 1993; Marsh, Balla & Hau, 1996; Schumacker & Lomax, 1996). The NNFI and CFI vary along a 0-to-1 continuum in which values at or greater than .90 and .95 are typically taken to reflect, respectively, acceptable and excellent fits to the data (McDonald & Marsh, 1990). The CFI contains no penalty for a lack of parsimony so that improved fit due to the introduction of additional parameters may reflect capitalization on chance, whereas the NNFI and RMSEA contain penalties for a lack of parsimony. In the CFA, 18 first-order factors were hypothesized—11 MES-HS factors and an additional 7 engagement and performance factors. All multi-item scales were estimated as latent factors, and single-item measures were estimated as observed variables with the loading fixed to unit value and the uniqueness fixed to 0.

Structural equation modeling (SEM). Structural equation modeling (SEM) was used to test the relative salience of age within cohort, grade retention, and delayed entry, with appropriate controls for demographic factors. Specifically, the hypothesized SEM was one in which (a) demographic factors predict (b) age within cohort, grade retention, motivation, engagement, and performance, and (c) age within cohort and grade retention predict motivation, engagement, and performance. Figure 1 shows details. Delayed-entry status is inferred through assessment of the effects of age within cohort after grade retention has been controlled; markedly older-for-cohort students who had not been retained were inferred to have delayed-entry status. As suggested by the literature, it is possible that there are nonlinear effects of age within cohort. For example, younger-for-cohort students or markedly older-for-cohort students may evince motivation, engagement, and performance profiles different from the students who are at age for cohort. Hence, SEMs assessed the linear and nonlinear effects of age within cohort in the (a) to (c) process described above. A conservative $p < .001$ significance level was set to avoid capitalizing on chance in the context of the multiple parameters being estimated. As with the CFA, maximum likelihood was used for estimation, and CFI, NNFI, and RMSEA were used to test goodness of fit.

Missing data. For large-scale studies, a potentially important problem is posed by the inevitable missing data, particularly when the amount of missing data exceeds 5% (e.g., Graham & Hoffer, 2000). A growing body of research has emphasized potential problems with traditional pairwise, listwise, and mean substitution approaches to missing data (e.g., Graham & Hoffer, 2000), leading to the implementation of the expectation maximization (EM) algorithm, the most widely recommended approach to imputation for missing data, as operationalized with missing value analysis in LISREL. In fact, 2.3% of the data were missing, and so the EM algorithm was considered an appropriate procedure. Also explored were alternative approaches to this problem, which showed that results based on the EM algorithm used here were very similar to those based on the traditional pairwise deletion methods for missing data—as would be expected to be the case when there was so little missing data.

Results

Descriptive Statistics and Preliminary Psychometric Properties of Measures

Table 1 presents means, standard deviations (*SD*s), and reliability coefficients (Cronbach's α) for each of the 11 MES-HS factors and the 7 other engagement and performance measures. All multi-item factor scores are reliable. The 18-factor model was examined with CFA to test the dimensionality and factor structure of the measures. The CFA yielded a very good fit to the data, $\chi^2(1740, N = 3684) = 10{,}053.60$, $p < .001$, CFI = .98, NNFI = .98, RMSEA = .04. Factor-loading ranges and means are also presented in Table 1. Taken together, the loadings are acceptable.

Effects of Linear Age Within Cohort and Retention (Model 1)

The first SEM (Model 1) assessed the linear effects of age within cohort and also grade retention. This SEM tested (a) the effects of demographics on linear age within cohort, retention, motivation, engagement, and performance and (b) the effects of linear age within cohort and retention on motivation, engagement, and performance. All hypothesized relationships were estimated in the one step and all factors comprising more than one item were modeled as latent factors, with single-item variables (e.g., gender, age etc.) estimated as observed factors.

This model fit the data very well, $\chi^2(1965, N = 3684) = 11{,}532.10$, $p < .001$, CFI = .98, NNFI = .98, RMSEA = .04. Standardized beta coefficients for all paths are presented in Table 2. When considering Table 2 findings in terms of effect sizes, one should bear in mind that the completely standardized solution in LISREL can be interpreted in the manner of traditional effect size, such that a change of 1 *SD* in the independent variable will result in a change of .zz (where .zz is the completely standardized beta coefficient) *SD* in the dependent variable. Gender significantly predicted retention and age within cohort such that males were more likely to be retained/required to repeat a grade ($\beta = -.19$, $p < .001$) and more likely to be older for cohort ($\beta = .24$, $p < .001$). After accounting for the effects of demographic factors and retention, age within cohort predicted two motivation and engagement factors such that older-for-cohort students were higher in homework completion ($\beta = .08$, $p < .001$) and lower in uncertain control ($\beta = -.27$, $p < .001$). The effects of grade retention were more salient, with retained students significantly lower in self-efficacy ($\beta = .13$, $p < .001$), mastery orientation ($\beta = .08$, $p < .001$), valuing of school ($\beta = .11$, $p < .001$), persistence ($\beta = .13$, $p < .001$), positive intentions ($\beta = .16$, $p < .001$), academic buoyancy ($\beta = .12$, $p < .001$), homework completion ($\beta = .18$, $p < .001$), enjoyment of school ($\beta = .09$, $p < .001$), class participation ($\beta = .10$, $p < .001$), school attendance ($\beta = -.12$, $p < .001$), and performance ($\beta = .21$, $p < .001$). Students retained in a grade were also higher in failure avoidance ($\beta = -.11$, $p < .001$), uncertain control ($\beta = -.27$, $p < .001$), self-handicapping ($\beta = -.16$, $p < .001$), and disengagement ($\beta = -.12$, $p < .001$).

Effects of Nonlinear Age Within Cohort, Retention, and Inferred Entry Status (Model 2)

The previously described SEM tested for the linear effects of age within cohort. However, it is possible that there are nonlinear effects for age within cohort. For example, younger-for-cohort students or markedly older-for-cohort students may evince motivation, engagement, and performance profiles different from the students who are at age for cohort. Hence, a subsequent SEM (Model 2) was conducted to assess the nonlinear effects of age within cohort in a model testing the same processes as those used to test for linear effects earlier. This model fit the data very well, $\chi^2(1965, N = 3684) = 11{,}310.38$, CFI = .98, NNFI = .98, RMSEA = .04, and provided a significantly better fit than the linear model, χ^2 difference = 221.72. At $p < .001$, the nonlinear

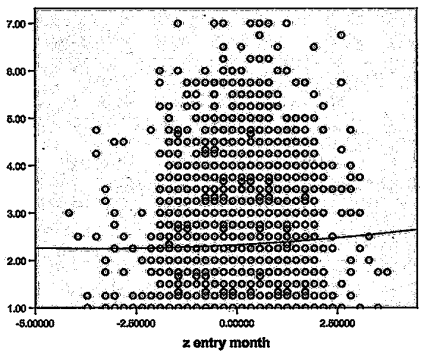
Table 2
Structural Equation Model of Demographics, Grade Retention, and Age Within Cohort on Motivation, Engagement, and Performance

	Gender: F/M		Grade		Gender × Grade		Retained: Y/N		Linear age-within-cohort	Nonlinear age-within-cohort
Variable	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2
Retained: Y/N	−.19***	−.19***	.02	.02	−.01	−.01				
Linear age	.24***		−.06***		.04*					
Nonlinear age		−.05		.11***		−.10				
Self-efficacy	.03	.04	−.06**	−.07***	−.05**	−.04*	.13***	.13***	.04	.06**
Mastery orientation	−.09***	−.09***	−.06**	−.06**	−.08***	−.08***	.08***	.07***	.03	.02
Valuing (school)	−.07***	−.06*	−.23***	−.24***	−.05**	−.04*	.11***	.10***	.06*	.05**
Planning	−.09***	−.09***	−.16***	−.16***	−.04*	−.03	−.01	.02	−.02	.05**
Task management	−.01	.01	−.04*	−.04*	−.04*	−.04*	.04	.06**	.01	.04*
Persistence	−.10***	−.08***	−.12***	−.13***	−.07***	−.06**	.13***	.11***	.07**	.06**
Anxiety	−.23***	−.23***	.07***	.07***	−.06**	−.05**	−.05*	−.01	−.05	.03
Failure avoidance	.03	.02	.05**	.05*	.03	.03	−.11***	−.07***	−.07**	.01
Uncertain control	−.08***	−.10***	.01	.01	.06***	.05**	−.27***	−.14***	−.21***	−.03
Self-handicapping	−.10***	−.11***	.08***	.09***	.05**	.04*	−.16***	−.12***	−.08**	−.04*
Disengagement	.01	−.01	.20***	.21***	.06***	.06**	−.12***	−.13***	−.02	−.07***a
Enjoyment of school	−.07***	−.06**	−.05**	−.06**	.01	.01	.09***	.13***	.01	.09***b
Class participation	.05**	.06**	−.12***	−.13***	−.04*	−.03	.10***	.10***	.03	.05*
Academic buoyancy	.14***	.15***	−.13***	−.14***	.06**	.06**	.12***	.09***	.07**	.03
Positive academic intentions	−.08***	−.06**	−.01	−.02	−.01	.01	.16***	.20***	.01	.10***c
Days absent from school in previous term	.01	.01	.06***	.07***	−.03	−.04*	−.12***	−.14***	−.03	−.09***d
Homework	−.02	.01	−.16***	−.17***	−.04**	−.03	.18***	.16***	.08***	.08***e
Standardized (by grade) literacy and numeracy performance	−.16***	−.14***	.00	.00	.01	.01	.21***	.29***	−.01	.17***f

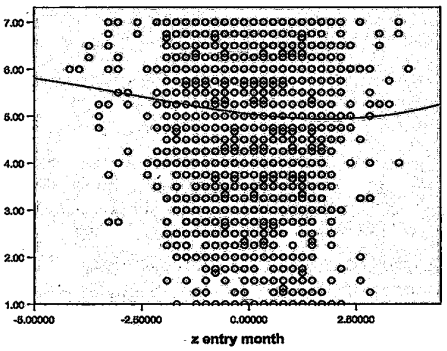
Note. Model 1 = linear age-within-cohort model; Model 2 = nonlinear age-within-cohort model. Betas in the range of −.01 and .01 are capped at ±.01.
[a] See Figure 1a. [b] See Figure 1b. [c] See Figure 1c. [d] See Figure 1d. [e] See Figure 1e. [f] See Figure 1f.
* $p < .05$. ** $p < .01$. *** $p < .001$.

effect of age within cohort significantly predicted a number of motivation, engagement, and performance factors—more factors than the linear effect of age within cohort. Table 2 shows that after the effects of demographic factors and grade retention were adjusted, nonlinear age within cohort predicted disengagement ($\beta = -.07$, $p < .001$), enjoyment of school ($\beta = .09$, $p < .001$), positive intentions ($\beta = .10$, $p < .001$), days absent from school ($\beta = -.09$, $p < .001$), homework completion ($\beta = .08$, $p < .001$), and performance ($\beta = .17$, $p < .001$).

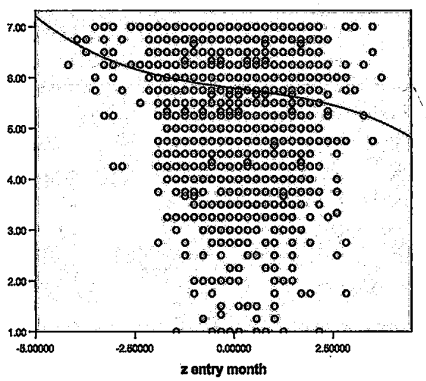
The nonlinear effects were followed with curvilinear regression lines fitted to the data. Figures 2a–2f show the models that are significant at $p < .001$ in the SEM and that represent the line (quadratic or cubic) at which the nonlinear effect is most significant. These models show that (relative to at-age-for-cohort students), markedly older-for-cohort students were higher in disengagement, lower in positive intentions, lower in homework completion, and lower in literacy and numeracy performance. Younger-for-cohort students scored higher in enjoyment of school, higher in positive intentions,



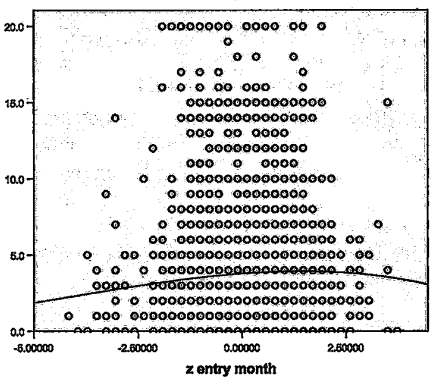
A. Disengagement: Quadratic



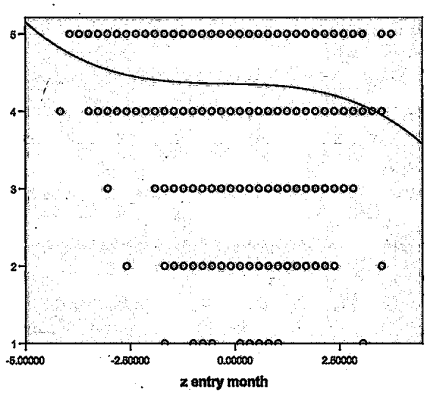
B. Enjoyment of School: Cubic



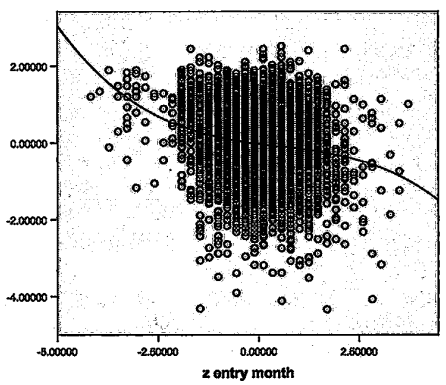
C. Positive Intentions: Cubic



D. Days Absent from School: Cubic



E. Homework Completion: Cubic



F. Performance: Cubic

Figure 2. Nonlinear effects of age within cohort, significant at $p < .001$.

higher in attendance (fewer days absent), higher in homework completion, and higher in literacy and numeracy performance. The effects of grade retention control for the presence of age within cohort, while age-within-cohort findings are controlled for grade retention—hence, for example, regardless of whether a child has been retained in a grade, being markedly older-for-cohort has negative effects. Similarly, for example, regardless of whether a child is an older-for-cohort or younger-for-cohort student, the effects of having to repeat a grade are negative. It can be inferred on the basis of the effect of a student being markedly older for cohort (and after grade retention has been controlled) that in cases in which the role of delayed entry status is significant, this role tends to be negative.

Discussion

The present study examined the relative salience of age within cohort, grade retention, and delayed entry in high school students' academic motivation, engagement, and performance. SEM of data from 3,684 high school students showed that after accounting for the effects of demographic characteristics and grade retention, little significant variance was explained by the linear effects of age within cohort. However, subsequent modeling incorporating nonlinear effects yielded significantly better model fit. The nonlinear model also yielded more significant effects such that markedly older-for-cohort students were higher in disengagement, lower in positive intentions, lower in homework completion, and lower in performance scores, while younger-for-cohort students scored higher in valuing school, higher in positive intentions, higher in attendance (fewer days absent), higher in homework completion, and higher in performance. Over and above demographic and age-within-cohort effects, the effects of grade retention were consistently and more substantially negative. Taken together, data suggest that there appears to be little to no academic advantage to being markedly older for cohort (and, by implication, to delaying entry) or to being retained in a grade.

Findings of Particular Note

Although few significant linear effects for age within cohort emerged, there were numerous significant nonlinear effects. Consistent with some prior research (e.g., Crone & Whitehurst, 1999; Peck & Trimmer, 1995), data demonstrated that the markedly older-for-cohort students experienced academic disadvantage while age-appropriate students generally fared best (particularly the younger-for-cohort students). In terms of (inferred) delayed entry, where significant effects emerged, they tended to favor students who had not been delayed, consistent with a good deal of previous research that has found negative effects of delayed entry in the early years (Cameron & Wilson, 1990; Charllton & Winsler, 1999; National Association of Early Childhood Specialists, 2000; Zill et al., 1997) and also later when students are in high school (Byrd et al., 1996, 1997). Moreover, younger-for-cohort students who were entered on time (hence, an important comparison with students who had been delayed) reflected higher levels of motivation, engagement, and performance.

Taken together, these findings support the body of research reporting little or no academic advantage to being markedly older for cohort or delayed at school entry. Where age-within-cohort benefits are evident, they tend to reside with the younger-for-cohort and at-age-for-cohort students. On balance, then, the present findings would lean toward a recommendation of on-time entry for all mainstream students (with the possible exception of those in clinical ranges on educationally relevant dimensions)—students such as those in the present study (see Method)—and with appropriate and targeted support and resources for those for whom it is needed (see also Leinhardt, 1980). This is discussed in more detail in the following section.

Aspects of age within cohort that significantly predict motivation, engagement, and performance were identified; however, the effects of grade retention were more salient. This set of findings is important to consider because these effects represent the role of retention over and above gender, grade level, and age within cohort. Thus, for example, irrespective of whether the retained student was relatively older or younger or was male or female, the effects of retention were primarily negative. Although grade retention is often the subject of heated debate, the present data are broadly consistent with the line of research that has found the effects of grade retention to be negative (see also Fine & Davis, 2003; Hong & Yu, 2007; Jimerson, 2001; Jimerson et al., 2002; Pagani et al., 2001; Silberglitt et al., 2006). Indeed, in follow-up analyses, the effects of grade retention were found to be negative irrespective of the grade in which a student was retained (and by implication, irrespective of when a student's age in cohort may have changed as a result of being retained in a grade), with no significant difference on the set of dependent variables as a function of grade retained, $F(180, 1320) = 1.07$, $p = ns$. It is also important to note that male students were more likely to be retained than female students (see Fine & Davis, 2003). Given the salient negative effects of grade retention after gender and age within cohort have been controlled, the data suggest that even if a child is young for his or her cohort or is male, it is best for the child to remain with the cohort rather than to be retained in that grade for another year.

Implications for Theory, Practice, and Policy

At the outset of the study, it was proposed that issues and challenges relevant to age appropriateness are underpinned by theories and attitudes about child development (see Meisels, 2002). Four orientations toward child development were summarized: nativist, social constructivist, environmental, and interactionist. Data appear to provide the least support for the nativist view and the most support for the environmental and interactionist views, the latter two being the basis for on-time entry or decisions not to retain/not to require a child to repeat a particular grade. As described earlier, from environmental and interactionist perspectives, because there is a great range of normal variation in development that can be accommodated by the school (see May & Kundert, 1997), students are better served by residing with their age-appropriate cohort and receiving any necessary intervention in that context. Although the present data could not fully test the social constructivist view (which requires socioeconomic data and the like), partial support for this view was also demonstrated in that gender significantly predicted age within cohort, grade retention, and, by inference, delayed entry.

If, as the data suggest, there is little or no academic advantage for students to be markedly older for cohort or to have their

school entry delayed and if more academic benefits reside with the age-appropriate cohort, it seems that students should be entered into school on time and should not be delayed or retained in the grade for another year. Moreover, if this is the case, then what is needed is (a) clear guidance as to how to help parents/caregivers and schools to prepare children for school, (b) effective school and classroom strategy to deal with a range of students, (c) relevant and targeted resources to assist students of all ages within a cohort, and (d) educational policy to provide a basis for the effective administration and implementation to meet each of these needs.

It is also important for schools to consider the implications of markedly older-for-cohort children in the classroom. Under many educational systems that allow (or foster) delayed entry and grade retention, the age range of the class can be as much as 2 years. This leads to pedagogical challenges and difficulties in terms of selecting the level at which the teacher should pitch the lesson. It seems that teachers respond to these challenges by gearing instruction toward the older children, thereby escalating the academic curriculum for that cohort. Increasingly, teachers cannot effectively deal with the dissonance between curriculum and students (Spitzer et al., 1995), and this leads to further difficulties for individual students and further entrenches the logic of delayed entry and grade retention.

In terms of policy, there are implications for recommended and official start and cutoff dates for school entry. Educational policy must be developed such that parents do not feel compelled to delay their child's entry to school. It has been suggested that the increasing shift to school accountability can lead to an escalation of the academic curriculum in even the early grades, and this may place increasing pressure on parents to delay their child's entry to school for fear the child will not cope (Stipek & Byler, 2001). While accountability has potential benefits, there must be due policy-related consideration given to the effects of accountability at younger and younger ages.

From a policy perspective, it is also important to recognize that delaying children's entry to school does not reduce heterogeneity in the classroom, and by implication, in the education system more broadly (Shepard & Smith, 1986). In fact, quite the contrary since, as noted earlier, there can be as much as a 2-year age range in any one class under a system that allows delayed entry or excessively fosters grade retention. One suggestion has been to adjust the cutoff dates for school entry; however, this simply means the normative comparisons would be readjusted and new subgroups of younger and older students (relative to the cohort) would be created (Shepard & Smith, 1986). Another suggestion is to adjust the start dates; however, the relative effects of being younger for cohort or markedly older for cohort have been reported to be the same across countries where the age at which children start school can vary from 4 years old to 7 years old (Shepard & Smith, 1986).

Limitations and Future Directions

The present study provides important insights into the roles of age within cohort, grade retention, and delayed entry in high school students' motivation, engagement, and performance. However, a number of potential limitations are important to consider when interpreting findings, and these provide some direction for further research. The data posed a mix of contemporaneous self-report and performance and retrospective reports such as grade retention. Although there were longitudinal connotations to the data in that it spanned a student's academic life (i.e., relating to previous grade retention and inferred age on school entry), original (i.e., verifiable) records of retention and age on school entry were not available, so interpretations must be made in this context. Of particular relevance to this is the fact that there were no data to definitively identify a student as a delayed-entry child. Asking students (particularly the younger ones) if their entry had been delayed may not be meaningful to them or possible for them to answer. In contrast, they can more readily respond to questions about retention in earlier grades. Hence, their delayed-entry status was inferred from their age within cohort and from information indicating that they had been retained in an earlier grade—with markedly older-for-cohort students who had not been retained inferred as delayed-entry students. Although in the Method section it was argued that inferred entry status could be considered a reliable construct, the present study emphasizes findings related to age within cohort and grade retention more than findings related to delayed entry. In future research, accurate data on students' school entry status should be collected to allow direct assess to delayed entry effects in high school on the range of educational constructs assessed here.

In the present study, the precise reasons for delayed entry are also unclear. Was it that parents wanted a competitive edge? Was it that parents feared their younger-for-cohort child might struggle? Had they moved from one educational jurisdiction to another that now rendered their child older for cohort? If it is predominantly the first, then the present findings are counter to parents' aims. If it is predominantly the second, then the present findings suggest the child still struggles. To the extent that it is the latter, there is now movement into transitions to new educational jurisdictions (indeed, in the Australian context, there is movement toward a uniform school entry age across jurisdictions). Indeed, as discussed in the earlier review of literature, there are also philosophies regarding child development that underpin decisions that parents make about their child's entry to school—and advice practitioners provide to parents about their child. Future research is needed to gain a clear sense of the reasons for delayed entry and the differential impact of different motivations to delay entry on educational outcomes.

Alongside these data, future researchers should also collect prior performance data to control for the effects of ability in SEM. Related to this is the variance in motivation, engagement, and performance unexplained in the model; thus, demographics, age within cohort, entry status, and retention do not capture the totality of these educational outcome variables. There is, therefore, a need for more expansive models that would encompass other predictors of these educational outcomes. Such factors would include home- and parent-/caregiver-related factors, teacher- and class-related factors, and school-related factors. Of interest then would be the salience of age on entry to school and retention in predicting educational outcomes in the context of these more proximal factors involving home, class, teacher, and school.

Longitudinal research is also needed to track the same students over time. Assessing interrelationships from a longitudinal perspective would shed further light on the developmental and transitional processes relevant to age appropriateness. Additionally,

examining reliability and stability of the constructs over time and the causal ordering (made possible through longitudinal data collection) of the central constructs are other issues of interest in longitudinal work. Indeed, without such data, researchers cannot conclude definitively that age within cohort, delayed entry, or grade retention are the factors that "cause" motivation, engagement, and performance. Although descriptions of and language used in SEM often imply causality, longitudinal data are needed to establish this.

The nature of quantitative survey-based methods also warrants some further comment. Although Martin, Marsh, Williamson, and Debus (2003) conducted qualitative work among students that focused on many of this study's constructs, future research might encompass qualitative work that can more fully scope the detailed nature and extent of age within cohort and its attendant issues across the academic lifespan. The present study focused on high school students. Much other research focuses on elementary school students. Hence, there is a need for long-term tracking across both contexts. It is also important to recognize that the measures in the present study are domain general. Although Martin (2008b, in press; see also Green et al., 2007; Marsh et al., 2001) has shown that many of the present measures assessed in mathematics, English, and science demonstrate properties along the lines of the present study, there is a need to extend domain-specific work to the issue of age within cohort, delayed entry, and grade retention. Also in relation to the data, although the inclusion of objective literacy and performance data was a significant strength of the study, it must be recognized that many measures were self-report. Although this is defensible for the more intrapsychic measures such as motivation, other measures such as class participation would benefit from validation by other sources such as teacher reports.

Conclusion

The research presented here sheds light on the relative salience of age within cohort, grade retention, and delayed entry in high school students' motivation, engagement, and performance. Because age appropriateness (and by implication, age within cohort, grade retention, and delayed entry) has potentially far-reaching implications for the child, the home, the school, and policy makers, it should be the subject of large-scale quantitative research that can appropriately assess its role across a diversity of academic measures. The present study has done so in the context of the relatively understudied high school population. The findings of this investigation hold substantive and methodological implications for researchers studying age- and school-entry-related issues relevant to motivation, engagement, and performance across the academic lifespan. The findings also present new insights and opportunities for educators, parents, caregivers, and policy makers seeking to enhance the educational outcomes of students—outcomes that rely in large part on the extent to which their students are cognitively and behaviorally motivated and engaged.

References

Alexander, K. L., & Entwisle, D. R. (1988). Achievement in the first 2 years of school: Patterns and processes. *Monographs of the Society for Research in Child Development, 53* (2, Serial No. 218).

Anderman, E. A., & Midgley, C. (1997). Changes in personal achievement goals and the perceived classroom goal structures across the transition to middle level schools. *Contemporary Educational Psychology, 22,* 269–298.

Bentin, S., Hammer, R., & Cahan, S. (1991). The effects of aging and first-grade schooling on the development of phonological awareness. *Psychological Science, 2,* 271–274.

Bickel, D. D., Zigmond, N., & Strahorn, J. (1991). Chronological age at entrance to first grade: Effects on elementary school success. *Early Childhood Research Quarterly, 6,* 105–117.

Bond, T. G. (2001). Ready for school? Ready for learn? An empirical contribution to a perennial debate. *Australian Educational and Developmental Psychologist, 18,* 77–80.

Buntaine, R., & Costenbader, V. (1997). The effectiveness of a transitional prekindergarten program on later academic achievement. *Psychology in the Schools, 34,* 41–49.

Byrd, R. S., Weitzman, M., & Auinger, P. (1997). Increased behavior problems associated with delayed school entry and delayed school progress. *Pediatrics, 100,* 654–661.

Byrd, R. S., Weitzman, M., & Doniger, A. S. (1996). Increased drug use among old-for-grade adolescents. *Archives of Pediatrics & Adolescent Medicine, 150,* 470–476.

Cameron, M. B., & Wilson, B. J. (1990). The effects of chronological age, gender, and delay of entry on academic achievement and retention: Implications for academic red-shirting. *Psychology in the Schools, 27,* 260–263.

Charllton, M. P., & Winsler, A. (1999). School readiness: The need for a paradigm shift. *School Psychology Review, 28,* 338–352.

Cosden, M., Zimmer, J., Reyes, C., & Gutierrez, M. (1995). Kindergarten practices and first-grade achievement for Latino Spanish-speaking, Latino English-speaking, and Anglo students. *Journal of School Psychology, 33,* 123–141.

Crone, D., & Whitehurst, G. (1999). Age and schooling effects on emergent literacy and early reading skills. *Journal of Educational Psychology, 91,* 604–614.

Crosser, S. L. (1991). Summer birth date children: Kindergarten entrance age and academic achievement. *Journal of Educational Research, 84,* 140–145.

Dawson, P. (1998). A primer on student grade retention: What the research says. *Communique, 26,* 28–30.

Deitz, C., & Wilson, B. J. (1985). Beginning school age and academic achievement. *Psychology in the Schools, 22,* 93–94.

de Lemos, M. M., & Mellor, E. J. (1994). A longitudinal study of developmental maturity, school entry age, and school progress. *Australian Research in Early Childhood Education, 1,* 42–50.

DeMeis, J., & Stearns, E. (1992). Relationship of school entrance age and academic achievement. *Journal of Educational Research, 86,* 20–27.

Fine, J. G., & Davis, J. M. (2003). Grade retention and enrollment in post-secondary education. *Journal of School Psychology, 41,* 401–411.

Frey, N. (2005). Retention, social promotion, and academic redshirting: What do we know and need to know? *Remedial and Special Education, 26,* 332–346.

Frick, R. (1986). In support of academic redshirting. *Young Children, 41,* 9–10.

Gnezda, M. T., Garduque, L., & Schultz, T. (1991). *Improving instruction and assessment in early childhood education.* Washington, DC: National Academy Press.

Graham, J. W., & Hoffer, S. M. (2000). Multiple imputation in multivariate research. In T. D. Little, K. U. Schnable, & J. Baumert (Eds.), *Modeling longitudinal and multilevel data: Practical issues, applied approaches, and specific examples* (pp. 201–218). Mahwah, NJ: Erlbaum.

Graue, M. E. (1993). Expectations and ideas coming to school. *Early Childhood Research Quarterly, 8,* 53–75.

Graue, M. E., & DiPerna, J. (2000). Redshirting and early retention: Who gets the "gift of time" and what are its outcomes? *American Educational Research Journal, 37,* 509–534.

Green, J., Martin, A. J., & Marsh, H. W. (2007). Motivation and engagement in English, mathematics and science high school subjects: Towards an understanding of multidimensional domain specificity. *Learning and Individual Differences, 17,* 269–279.

Griffin, M., & Harvey, D. (1995). When do principals and teachers think children should start school? *Australian Journal of Early Childhood, 20,* 27–32.

Grissom, J. B., & Shepard, L. A. (1989). Repeating and dropping out of school. In L. A. Shepard & M. L. Smith (Eds), *Flunking grades.* London: Falmer.

Holloway, J. H. (2003). When children aren't ready for kindergarten. *Educational Leadership, 60,* 89–90.

Hong, G., & Yu, B. (2007). Early-grade retention on children's reading and math learning in elementary years. *Educational Evaluation and Policy Analysis, 29,* 239–261.

Jöreskog, K. G., & Sörbom, D. (1993). *LISREL 8: Structural equation modeling with the SIMPLIS command language.* Chicago: Scientific Software International.

Jöreskog, K. G., & Sörbom, D. (2006). *LISREL 8.80.* Chicago: Scientific Software International.

Jimerson, S. (2001). Meta-analysis of grade retention research: Implications for practice in the 21st century. *School Psychology Review, 30,* 420–438.

Jimerson, S., Anderson, G. E., & Whipple, A. D. (2002). Winning the battle and losing the war: Examining the relationship between grade retention and dropping out of high school. *Psychology in the Schools, 39,* 441–457.

Jones, M. M., & Mandeville, G. K. (1990). The effect of age at school entry on reading achievement scores among South Carolina students. *Remedial and Special Education, 11,* 56–62.

Kinard, E. M., & Reinherz, H. (1986). Birthdate effects on school performance and adjustment: A longitudinal study. *Journal of Educational Research, 79,* 366–372.

Kundert, D. K., May, D. C., & Brent, D. (1995). A comparison of students who delay kindergarten entry and those who are retained in Grades K–5. *Psychology in the Schools, 32,* 202–209.

Leinhardt, G. (1980). Transition norms: Promoting maturation or reducing education? *Journal of Educational Psychology, 72,* 55–61.

Marsh, H. W., Balla, J. R., & Hau, K. T. (1996). An evaluation of incremental fit indices: A clarification of mathematical and empirical processes. In G. A. Marcoulides & R. E. Schumacker (Ed.), *Advanced structural equation modeling techniques* (pp. 315–353). Hillsdale, NJ: Erlbaum.

Marsh, H. W., Martin, A. J., & Cheng, J. (2008). A multilevel perspective on gender in classroom motivation and climate: Potential benefits of male teachers for boys? *Journal of Educational Psychology, 100,* 78–95.

Marsh, H. W., Martin, A. J., & Debus, R. (2001). Individual differences in verbal and math self-perceptions: One factor, two factors, or does it depend on the construct? In R. Riding & S. Rayner (Eds.), *International perspectives on individual differences.* London: Greenwood.

Martin, A. J. (2001). The Student Motivation Scale: A tool for measuring and enhancing motivation. *Australian Journal of Guidance and Counselling, 11,* 1–20.

Martin, A. J. (2002). Motivation and academic resilience: Developing a model of student enhancement. *Australian Journal of Education, 14,* 34–49.

Martin, A. J. (2003a). Boys and motivation: Contrasts and comparisons with girls' approaches to schoolwork. *Australian Educational Researcher, 30,* 43–65.

Martin, A. J. (2003b). The relationship between parents' enjoyment of parenting and children's school motivation. *Australian Journal of Guidance and Counselling, 13,* 115–132.

Martin, A. J. (2003c). The Student Motivation Scale: Further testing of an instrument that measures school students' motivation. *Australian Journal of Education, 47,* 88–106.

Martin, A. J. (2004). School motivation of boys and girls: Differences of degree, differences of kind, or both? *Australian Journal of Psychology, 56,* 133–146.

Martin, A. J. (2005). Exploring the effects of a youth enrichment program on academic motivation and engagement. *Social Psychology of Education, 8,* 179–206.

Martin, A. J. (2006a). Exploring key dimensions of motivation and engagement in the workplace. In R. G. Craven., J. S. Eccles, & T. M. Ha (Eds.), *Self-concept, motivation, social and personal identity for the 21st century: Proceedings of the Fourth International Biennial SELF Research Conference.* Ann Arbor: University of Michigan.

Martin, A. J. (2006b). Personal bests (PBs): A proposed multidimensional model and empirical analysis. *British Journal of Educational Psychology, 76,* 803–825.

Martin, A. J. (2006c). The relationship between teachers' perceptions of student motivation and engagement and teachers' enjoyment of and confidence in teaching. *Asia-Pacific Journal of Teacher Education, 34,* 73–93.

Martin, A. J. (2007a). Examining a multidimensional model of student motivation and engagement using a construct validation approach. *British Journal of Educational Psychology, 77,* 413–440.

Martin, A. J. (2007b). *The Motivation and Engagement Scale.* Sydney, Australia: Lifelong Achievement Group. Available at http//:www.lifelongachievement.com

Martin, A. J. (2008a). Enhancing student motivation and engagement: The effects of a multidimensional intervention. *Contemporary Educational Psychology, 33,* 239–269.

Martin, A. J. (2008b). Motivation and engagement in music and sport: Testing a multidimensional framework in diverse performance settings. *Journal of Personality, 76,* 135–170.

Martin, A. J. (in press). How domain specific are motivation and engagement across school, sport, and music? A substantive–methodological synergy assessing young sportspeople and musicians. *Contemporary Educational Psychology.*

Martin, A. J., & Marsh, H. W. (2005). Motivating boys and motivating girls: Does teacher gender really make a difference? *Australian Journal of Education, 49,* 320–334.

Martin, A. J., & Marsh, H. W. (2006). Academic resilience and its psychological and educational correlates: A construct validity approach. *Psychology in the Schools, 43,* 267–282.

Martin, A. J., & Marsh, H. W. (2008a). Academic buoyancy: Towards an understanding of students' everyday academic resilience. *Journal of School Psychology, 46,* 53–83.

Martin, A. J., & Marsh, H. W. (2008b). Workplace and academic buoyancy: Psychometric assessment and construct validity amongst school personnel and students. *Journal of Psychoeducational Assessment, 26,* 168–184.

Martin, A. J., Marsh, H. W., Williamson, A., & Debus, R. L. (2003). Self-handicapping, defensive pessimism, and goal orientation: A qualitative study of university students. *Journal of Educational Psychology, 95,* 617–628.

Martin, A. J., Tipler, D. V., Marsh, H. W., Richards, G. E., & Williams, M. R. (2006). Assessing multidimensional physical activity motivation: A construct validity study of high-school students. *Journal of Sport and Exercise Psychology, 28,* 171–192.

May, D. C., & Kundert, D. K. (1997). School readiness practices and children at-risk: Examining the issues. *Psychology in the Schools, 34,* 73–84.

May, D. C., Kundert, D. K., & Brent, D. (1995). Does delayed school entry reduce later grade retentions and use of special education services? *Remedial and Special Education, 16,* 288–294.

McDonald, R. P., & Marsh, H. W. (1990). Choosing a multivariate model: Noncentrality and goodness-of-fit. *Psychological Bulletin, 107,* 247–255.

McNamara, J. K., Scissons, M., & Simonot, S. (2004). Should we "redshirt" in kindergarten? A study of the effect of age on kindergarteners' reading readiness. *Alberta Journal of Educational Research, 50,* 128–140.

Meisels, S. J. (2002). Assessing readiness. In R. C. Pianta & M. J. Pianta (Eds:), *The transition to kindergarten.* London: National Center for Early Development and Learning.

Morrison, F. J., Griffith, E. M., & Alberts, D. M. (1997). Nature–nurture in the classroom: Entrance age, school readiness, and learning in children. *Developmental Psychology, 33,* 254–262.

National Association of Early Childhood Specialists. (2000). *Still! Unacceptable trends in kindergarten entry and placement.* Chicago: Author.

Pagani, L., Tremblay, R. E., Vitaro, F., Boulerice, B., & McDuff, P. (2001). Effects of grade retention on academic performance and behavioral development. *Development and Psychopathology, 13,* 297–315.

Peck, B., & Trimmer, K. (1995). The late birthday effect in Western Australia. *Issues in Educational Research, 5,* 35–52.

Prais, S. J. (1997). Whole-class teaching, school readiness, and pupils' mathematical attainments. *Oxford Review of Education, 23,* 275–290.

Roeser, R., Eccles, J. S., & Sameroff, A. J. (2000). School as a context of early adolescents' academic and social-emotional development: A summary of research findings. *Elementary School Journal, 100,* 443–471.

Routley, V., & de Lemos, M. M. (1993). Changing trends in school entry age in Victoria. *Australian Journal of Early Childhood, 18,* 30–37.

Schumacker, R. E., & Lomax, R. G. (1996). *A beginner's guide to structural equation modeling.* Mahwah, NJ: Erlbaum.

Shepard, L. A., & Smith, M. L. (1986). Synthesis of research on school readiness and kindergarten retention. *Educational Leadership, 44,* 78–86.

Silberglitt, B., Jimerson, S. R., Burns, M. K., & Appleton, J. J. (2006). Does the timing of grade retention make a difference? Examining the effects of early versus later retention. *School Psychology Review, 35,* 134–141.

Spitzer, S., Cupp, R., & Parke, R. D. (1995). School entrance age, social acceptance, and self-perceptions in kindergarten and 1st grade. *Early Childhood Research Quarterly, 10,* 433–450.

Stipek, D., & Byler, P. (2001). Academic achievement and social behaviours associated with age of entry into kindergarten. *Applied Developmental Psychology, 22,* 175–189.

Sweetland, J. D., & de Simone, P. S. (1987). Age of entry, sex, and academic achievement in elementary school children. *Psychology in the Schools, 24,* 406–412.

West, J., Denton, K., & Germino-Hausken, E. (2000). *American kindergartners: Findings from the Early Childhood Longitudinal Study, kindergarten class of 1998–99.* Washington, DC: National Center for Education Statistics.

West, J., Meek, A., & Hurst, D. (2000). *Children who enter kindergarten late or repeat kindergarten: Their characteristics and later school performance. Stats in brief.* Washington, DC: National Center for Education Statistics.

Wigfield, A., Eccles, J., MacIver, D., Reuman, D., & Midgley, C. (1991). Transitions at early adolescence: Changes in children's domain-specific self-perceptions and general self-esteem across the transition to junior high school. *Developmental Psychology, 27,* 552–565.

Wigfield, A., & Tonks, S. (2002). Adolescents' expectancies for success and achievement task values during middle and high school years. In F. Pajares & T. Urdan (Eds.), *Academic motivation of adolescents.* Greenwich, CT: Information Age.

Wilkinson, G. A. (1993). *Wide Range Achievement Test.* Wilmington, DE: Wide Range.

Zill, N. (2002). Promoting educational equity and excellence in kindergarten. In R. C. Pianta & M. J. Pianta (Eds.), *The transition to kindergarten.* London: National Center for Early Development and Learning.

Zill, N., Loomis, L. S., & West, J. (1997). *The elementary school performance and adjustment of children who enter kindergarten late or repeat kindergarten: Findings from the National Surveys.* (NCES 98–097). Washington, DC: U.S. Department of Education, National Center for Education Statistics.

Received October 9, 2007
Revision received March 11, 2008
Accepted March 16, 2008 ■