

Revisiting the Age-Old Question: What Are the Effects of Relative Age and Gender on Young Children in School Settings?

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This review of current literature revisits the "age-old question" of whether relative age and gender differences affect school readiness and success. An integrated and holistic understanding of readiness is postulated whereby every child is viewed as ready and able to learn, with parents, educators, and communities being responsible for nurturing optimal development and appropriate assessments accommodating for age and gender differences. Findings from numerous studies exploring the effects of age and gender on social/emotional, behavioural, and cognitive/academic skills are described. Recommendations are suggested regarding potential changes in school entry, instruction, and evaluation policies and the need for further research.

Keywords: school readiness, early school success, age, gender

In many jurisdictions, as is currently the case in Ontario, children are entering school at an earlier age and are attending school for longer periods of time than in previous decades (Bell, Greenfield, & Bulotsky-Shearer, 2013; Bulotsky-Shearer, Wen, Faria, Hahs-Vaughn, & Korfmacher, 2012; Ensar & Keskin, 2014). In Canada, for most school systems, admission and eligibility are determined solely by birthdate. In each province, there is most commonly one cut-off date, such as December 31 in Ontario, causing some children born just after the cut-off date to be a full year older than classmates who were born just before the cut-off date. The age-old question of whether birthdate, along with gender, has an effect on later school success is of great interest to educators, parents, and policymakers. This complex issue is debated both in the popular press (Gladwell, 2008; Hu, 2011) and in research studies (Boardman, 2006; Cantalini, 1987; Furlong & Quirk, 2011; Son, Lee, & Sung, 2013; Whitehead, 2006). It is important to revisit this issue since research shows that children who are youngest in a grade, especially males, demonstrate developmental differences and, often, lower academic achievement in school (Boardman,

2006; Cantalini, 1987; Ensar & Keskin, 2014; Furlong & Quirk, 2011). This literature review examines the concept of readiness and current studies related to age and gender effects on the social/emotional and cognitive development of young children, thus exploring the presence and persistence of these effects in school. Recommendations are suggested to address the educational issue of birthdate and gender effects. It is incumbent on all stakeholders in early learning to ensure smooth transitions and successful progress in school for every child.

The Concept of Readiness

The concept of readiness has been studied since the middle of the 20th century (Smith, 1950). The well-known Gesell readiness studies (Ilg, Ames, Haines, & Gillespie, 1978) found significant effects of age on measures of readiness for school. In practice, as LaParo and Pianta (2000) and others have described, readiness is usually defined in terms of children's skills or characteristics. This concept assumes that children's readiness is typically a function of reaching a certain age or of progressing through specific stages of development that are influenced almost entirely by chronological growth and children's inherent characteristics. Another body of research has questioned the notion of a lockstep fashion of development arriving at a stage of being "ready to learn." Some research strongly suggests that children can benefit from learning opportunities that may not have been expected (Bowman, Donovan, & Burns, 2001). From this perspective, communities, parents, and schools are responsible for providing children with experiences that will promote development and learning.

In the literature, there is also a concept named "school readiness" which implies the social, emotional, and cognitive development of skills that are essential for learning and that help foster overall academic success (Janus & Duku, 2007; Lemelin et al., 2007). Such skills are often measured at school entry and may predict later school adjustment and success (Okado, Bierman, & Welsh, 2014). The pivotal Canadian study conducted by Janus and Duku (2007) using the Early Development Instrument (EDI) measured children's readiness for school success as reported by teachers' perceptions of children's development. Demographic, health, and family variables were also examined. This study unequivocally showed that young age (due to month of birth) and male gender were significant factors increasing risk for lower scores on the EDI measures. The authors report that the impact of relative age on children's readiness and later school success is persistent and real. There is much discussion in the literature regarding whether the child should be ready for school or the school should be ready for any child who is eligible to attend. Some believe that the "ready for school" philosophy places an undue burden on children by expecting them to meet the expectations of school (Rafoth, Buchenauer, Crissman, & Halko, 2014, p. 1). Of equal importance, some very recent research indicates that classroom structure and quality influence children's readiness outcomes (Winterbottom & Piasta, 2015). According to Rafoth et al. (2014), "a more constructive way to consider school readiness is to remove the expectations from the child and place those expectations onto the schools and the families" (p. 1) thereby suggesting that communities consider the range of learning needs and potential supports that benefit young children when preparing them for school entry.

The authors of the present article assume an integrated view of readiness whereby the variables of relative age and gender are seriously considered as risk factors for early and ongoing school success, but, at the same time, it is recognized that parents, communities, schools, and policymakers have important responsibilities for ensuring the optimal growth, development, and learning of all children. Interestingly, the very well-known writer Malcolm Gladwell (2008) discussed this issue in his famous book *Outliers: The Story of Success*, confirming through references to many academic studies that age differences due to month of birth not only affect academic achievement, but also greatly affect achievement in sports, with the older children, born just after cut-off dates in each year, performing better over time. This issue merits further exploration and discussion. The following sections will describe studies examining effects of relative age and gender on social/emotional and cognitive/academic skill areas.

Relative Age Differences

A child's early learning experiences in school set the foundation for academic careers and are dependent on several individual characteristics. Both developmental and academic factors play a key role in learning readiness and a child's early school success. Developmental factors include social, emotional, and behavioural skills that help children adapt to their environment and build positive relationships with peers and teachers (Ziv, 2013). Academic skills involve cognitive abilities that allow a child to experience academic success; these include literacy, numeracy, and learning skills (Ziv, 2013). Studies show that significant school readiness differences exist between the youngest and oldest students in primary classrooms (Boardman, 2006; Cantalini, 1987; Ensar & Keskin, 2014; Furlong & Quirk, 2011). A deeper understanding of the relationship between a child's age and capacity to benefit from school experiences is important because negative experiences could impact the initial perceptions of the youngest learners, their families, and their educators.

Relative age effects on social, emotional, and behavioural development

Children need a combination of intellectual and social-emotional skills to succeed in school (Thompson, 2002). However, research suggests that a student's age may significantly influence social and emotional development (Bassett, Denham, Mincic, & Graling, 2012; Winsler et al., 2012). Further, age may also be related to some students' behavioural concerns. Winsler et al. (2012) conducted a study to measure the influences of several demographic variables on delayed entry and kindergarten retention using a large sample size of kindergarten students. An analysis of the results indicated that kindergarten delay and retention were significantly more likely for

younger children (Winsler et al., 2012). Additionally, both parents and teachers rated younger students' social skills significantly lower than those of older students. Accordingly, younger students also scored significantly higher on behavioural problem scores (Winsler et al., 2012). This evidence implies that younger children may lack many important developmental skills, preventing them from being successful in the perceptions of their parents and kindergarten teachers and influencing the likelihood of kindergarten delay and retention. Such negative early school outcomes could be damaging to children's self-esteem, and greater attention to emotional development is necessary from educators. In another study, Bassett et al. (2012) used emotional knowledge as a key measure of school readiness. From a sample of 324 preschoolers, they measured the effect of age on emotional knowledge. Results indicated that older children had a significantly better understanding of emotion compared to their younger classmates. Ensar and Keskin (2014) measured the relationship between socio-emotional adjustment and age. A significant positive correlation between these two variables indicated that older children appeared to demonstrate higher levels of socio-emotional adjustment (Ensar & Keskin, 2014). Likewise, Bulotsky-Shearer, Wen, Faria, Hahs-Vaughn, and Korfmacher (2012) conducted a study to examine the various relationships between gender, age, and school readiness skills. They found that younger children displayed significantly more problem behaviours and poorer social skills. These results suggest that older children have a better understanding of expectations and more well-developed social and emotional skills in comparison to younger children. Further, younger children tend to display more behavioural issues than older children within a school grade. Student relative age has been found as a key school readiness factor and plays an important role in the development of a student's social, emotional, and behavioural skills, which are crucial to early school success.

Relative age effects on cognitive development and academic skills

Cognitive development and academic skills are equally important variables to consider when examining children's adjustment to school. Many studies have supported the belief that younger students may be at an academic disadvantage upon school entry in comparison to their older peers due to delays in cognitive development.

Boardman (2006) examined the relationship between children's age and gender on measures related to school/academic areas. The sample comprised a very large group of kindergarten students ranging from five to six years of age. The younger students had significantly lower math, reading, and phonics scores in comparison to the older children, who were closer to six years of age. In the same study, teacher interviews indicated that there is a belief that this difference in test scores is due to a developmental difference between the youngest and oldest students (Boardman, 2006). This finding can be further supported by a study conducted by Murray and Harrison (2011), who found that a child's age was significantly related to literacy and numeracy competencies. These findings, taken together, may suggest that some academic expectations that are set in kindergarten may be unrealistic for the youngest students and their developmental capabilities (Boardman, 2006).

In a similar study, Ziv (2013) examined the relationship between age, gender, and family income on children's school readiness and social development for kindergarten students. Ziv (2013) found a significant negative correlation between age and attention/persistence scores. This would signify that higher persistence and attention were significantly associated with older age. Further, age was significantly negatively correlated to scores measuring attitude toward learning, indicating that younger children may have more difficulty paying attention and persisting academically than older children. In addition, Bulotsky-Shearer et al. (2012) found that younger students scored significantly lower on dictation, applied problem, and word identification measures in the primary grades. In a study of vocabulary development, Biemiller and Slonim (2001) found that a student's age is related to root vocabulary scores and that large gains in vocabulary are made in the primary grades. These results suggest that age may impact a student's vocabulary and, in doing so, affect their language development. Further, these results are supported by Winsler et al. (2012), who found that younger children had significantly poorer cognitive, language, and fine motor skills. Such findings strengthen the position that younger students are at a developmental disadvantage in terms of early academic success and are possibly more vulnerable to early school failure. Another large-scale study (Biemiller & Cantalini-Williams, 2000) analyzed the effects of age (month of birth) and gender on the standards-based provincial assessment results of 31,000 third-grade students in Ontario in the areas of reading, writing, and mathematics. The effects of age and gender were significant, with younger students, especially boys, receiving lower assessment scores and experiencing a greater percentage of retentions and a higher need for accommodations and/or special education support (Biemiller & Cantalini-Williams, 2000). These results challenge the practice of using standard assessments and the same expectations for all students within a grade, regardless of age and gender.

Younger students may experience significant developmental and academic challenges in their early schooling; moreover, this disadvantage may continue to be evident years later. In a Canadian study conducted many years ago, Cantalini (1987) found that 42% of boys who were born in months just before the cut-off date and who were thereby youngest in the class, had failed a grade by the time they had

reached grade 6 and 27% of the youngest girls had suffered the same rate of retention. These rates of retention were much higher than those for older students born just after the cut-off date. Even though retention is not currently a common practice today, the issue of age and gender disadvantages persists without a change in present school entry policies. Furlong and Quirk (2011) investigated the relationship between age at school entry and children's school readiness following a large sample of Hispanic children from kindergarten to grade 2. They found a significant effect exists between school readiness and season of birth, whereby the oldest children born just after the cut-off date achieved greater school success; age at kindergarten entry was a significant predictor of grade 2 academic achievement (Furlong & Quirk, 2011). These results shed light on the issue of students' birthdate/age and school readiness, whereby older students outperform younger students on cognitive measures and school achievement scores and are less prone to retention; this effect still holds in later grades (Furlong & Quirk, 2011; Quirk, Nylund-Gibson, & Furlong, 2013). The longitudinal evidence from various studies further strengthens the argument that age influences readiness at the kindergarten level and that some of these effects persist over time.

In conclusion, socio-emotional, behavioural, and cognitive/academic skills seem to be related to a child's relative age, with younger students at greater risk. Research has repeatedly found that younger children are at a significant disadvantage both developmentally and academically in comparison to their older peers. Furthermore, some of these disadvantages may persist into a student's academic future and have a strong effect on later school success. Additional research is needed to determine if educational interventions can mitigate the effects of relative age differences in schools.

Gender Differences

Research suggests that significant gender differences may exist in terms of social/emotional development, behavioural regulation, and academic achievement among primary grade students. Such gender differences can influence a child's readiness level and could explain why girls are performing better than boys in early development measures (Janus & Duku, 2007) and in provincial standard assessments at the grade 3 level, with boys consistently scoring lower than girls in both language and mathematics areas (Education Quality and Accountability Office, 2014; Ontario Ministry of Education, 2004). There is long-time evidence that boys do not mature as quickly as girls (Ilg et al., 1978; Killgore & Yurgelun-Todd, 2004; Lenroot et al., 2007; Tanner, 1978) and this fact may, on average, be causing their inability to score as high as girls on school-based and large-scale assessments (Biemiller & Cantalini-Williams, 2000; Cantalini, 1987). This area of gender differences in education is currently undergoing much study, but further investigation into the effects of gender compounded by relative age in grade needs to be conducted to address this inequity for the youngest males.

Gender effects on social, emotional, and behavioural development

Young boys and girls may differ in terms of their behavioural regulation, which is considered to be an important school readiness factor (Valloton & Ayoub, 2011). School engagement can be characterized by the effort and investment students have toward learning, which involves a commitment and enthusiasm for knowledge (Whitehead, 2006). These gender differences in areas of social, emotional, and behavioural attributes have been shown to affect school success. Whitehead (2006) compiled a literature review to help explain the many reasons why girls typically outperform boys on readiness scores and experience greater early school success. Overall, a variety of studies have indicated that girls across grade levels demonstrate significantly higher school engagement than boys and this may be due to specific gender role differences (Finn & Cox, 1992; Lee & Smith, 1995; Marks, 2000). These studies found that girls tended to be more engaged in school and were more intrinsically motivated than young boys (Frawley, McCoy, Banks, & Thornton, 2014; Whitehead, 2006). Riley (2014) suggests that teachers tend to treat students differently based on their gender. Such academic and behavioural gender expectations can influence a student's self-perception in an academic environment and thus help manifest gendered behaviours (Wolter, Glüer, & Hannover, 2014).

Moreover, Ziv (2013) found that girls scored significantly higher on attitudes toward learning, postulating that young girls may possess more positive views toward academics due to their early experiences and the gender expectations of society. Girls also demonstrated higher behavioural regulation scores (Denham, Warren-Khot, Bassett, Wyatt, & Perna, 2012; Valloton & Ayoub, 2011). Further, according to Cooper, Osborne, Beck, & McLanahan (2011), male students are more likely to experience verbal and behavioural problems in kindergarten. These results suggest that girls may possess higher school engagement and more advanced behavioural skills, and such results could explain why girls appear to be more successful in early schooling than boys. Additionally, it is possible that greater problems with verbal communication in male students may lead to more problem behaviours due to the frustration of miscommunication (Cooper et al., 2011).

Early school success may be strongly related to gender differences in school engagement and behavioural regulation. Great gains could

potentially be made to the engagement of young boys in school and in their attitudes toward learning given appropriate early educational and parental support. Just as there is currently an increased emphasis on girls entering the science and technology fields, there may be a need for educational communities to work collaboratively to promote boys' overall success and competence in school-related endeavours.

Gender effects on cognitive development and academic skills

Students' cognitive development and academic skills are clearly important to early school success, and gender is found to affect adjustment and achievement in school as indicated by various studies. Girls are consistently outperforming boys academically, with the compounded effect of relative age causing young boys to be achieving the lowest levels on provincial assessments (Biemiller & Cantalini, 2000). Some of the differences in literacy levels may be due to parental influence since parents have been found to foster the literacy skills of young girls more than those of young boys (Eccles, 1993; Whitehead, 2006). In these studies, parents reported that they were more likely to foster early communication skills in girls by encouraging them to read and by responding positively to their verbal attempts. In addition, Frawley et al. (2014) suggest that boys may typically perform more poorly on literacy skills at the kindergarten level since they deem that these skills and activities are feminine and are afraid of failure. Son, Lee, and Sung (2013) conducted a large study to examine the relationship between the behavioural regulation of preschoolers, gender, and school readiness skills. They investigated the impact of gender on school readiness skills and found that girls significantly outperformed boys on early reading, social, and academic-related skills.

In a previously mentioned study, Boardman (2006) found that girls scored significantly higher on math, reading, and phonics than did boys. Further, teacher interviews indicated a gender difference in activity choice between boys and girls where, significantly, girls actively engage in reading and writing games during play and boys direct themselves to more hands-on games and have less interest in books (Boardman, 2006). Additionally, in a previously mentioned study, Bulotsky-Shearer et al. (2012) found that male students had significantly lower dictation and word identification scores. Male students also experienced significantly more problem behaviours and significantly lower social skills (Bulotsky-Shearer et al., 2012). Further, it was found that boys are significantly more likely to experience delayed school entry and to be retained in kindergarten (Winsler et al., 2012). As previously described, Janus and Duku (2007) examined how risk factors influence school readiness and found that gender caused boys to have 2.3 times higher vulnerability than girls to low school readiness scores provided by kindergarten teachers. Similarly, Furlong and Quirk (2011) found a significant main effect between gender and school readiness where male students scored significantly lower on measures of school readiness. These results suggest that male students are at an increased risk for poor academic achievement, school entry delay, and retention.

There exists in the literature a consistent relationship between male students and early and ongoing school challenges. This is especially concerning for boys who are relatively younger than peers in the same grade. Greater effort is needed to help identify the reasons for such gender discrepancies and to create successful early learning experiences for all children.

Conclusions and Recommendations

The studies cited in this literature review overwhelmingly indicate that it is time to address the effects of relative age and gender on developmental differences and thus on school success. Furthering an understanding of the discrepancies that exist among the young learners of our schools has great value for all stakeholder groups. Educators, parents, practitioners, and policymakers have a responsibility to more closely examine the variables which may affect adjustment and achievement in school. It seems entirely unfair and a human rights issue that relative age and gender may adversely affect some children's progress and attitudes toward formal learning. This issue has been studied for many years, but changes in policy have only involved the moving of cut-off entry dates in some provinces, which has not alleviated the relative age and gender effects. With greater insights and attention to differences caused by birthdate and gender, educational communities would better serve these disadvantaged children. The previously mentioned research demonstrates that these effects appear to be robust, cross-cultural, and present in areas such as Canada (Biemiller & Cantalini-Williams, 2000; Cantalini, 1987; Janus & Duku, 2007; Riley, 2014), the United States (Bell et al., 2013; Bulotsky-Shearer et al., 2012; Furlong & Quirk, 2011; Winsler et al., 2012), Turkey (Ensar & Keskin, 2014), Korea (Son et al., 2013), and Australia (Boardman, 2006). Further, the described age and gender differences persist over time (Furlong & Quirk, 2011). This relationship exists among various ethnicities and is present across various family-income levels (Bassett et al., 2012; Ensar & Keskin, 2014; Janus & Duku, 2007; Winsler et al., 2012). The previously presented research also used large sample sizes, and genders were equally presented within these studies. These studies reinforce the very eloquent point made by Malcolm Gladwell (2008) in his book *Outliers: The Story of Success*:

Most parents, one suspects, think that whatever disadvantage a younger child faces in kindergarten eventually goes away. But it doesn't. It's just like hockey. The small initial advantage that the child born in the early part of the year has over the child born at the end of the year persists. It locks children into patterns of achievement and underachievement, encouragement and discouragement, that stretch on and on for years. (Gladwell, 2008, p. 27)

The presented literature review strengthens the position that age and gender significantly influence learners' school success in educational systems. Importantly, it is acknowledged that the readiness of the school to promote every child's development is equally important as the readiness of the child to learn from school experiences (Boethel, 2004). It is for this reason that educational systems need to strongly consider the recommendations below and adjust school entry policies, curriculum, and pedagogical and assessment practices to meet the needs of all learners, recognizing age and gender differences. In conclusion, the previous research, over decades, provides important insights into age and gender influences that may affect the school success of our young children. This evidence is concerning because many young boys might wrongly experience unrealistic challenges, retention, and special education referrals. Clearly, there is a need for change in the way we perceive, instruct, and assess our youngest learners. Evidently, age and gender can significantly influence students' school success, and the age-old question has been substantially answered: there are real and persistent effects of relative age and gender on measures of school readiness and school success. It is imperative to address the need for adjusted entry policies, differentiated instruction, intervention programs, age- and gender-related standardized assessments, and increased resources for further research and advocacy efforts. It is necessary to honour the abilities and competencies of our young—especially male—learners in schools by heeding the perceptions and advice of teachers, parents, writers, researchers, and children themselves who have echoed the words of Gladwell (2008): "If we chose to, we could acknowledge that cut-off dates matter" (p. 33).

Gladwell continues to postulate potential changes to the school system and states:

They could let students learn with and compete against other students of the same maturity level. It would be a little bit more complicated administratively. But it wouldn't necessarily cost that much more money, and it would level the playing field for those who—through no fault of their own—have been dealt a big disadvantage by the educational system. We could easily take control of the machinery of achievement, in other words—not just in sports but, as we will see, in other more consequential areas as well. But we don't. And why? Because we cling to the idea that success is a simple function of individual merit and that the world in which we all grow up and the rules we choose to write as a society don't matter at all. (Gladwell, 2008, p. 33)

Conclusively, relative age and gender effects matter in schools. There is no better time than the present in Canada to develop policies and practices to address and attenuate the effects of age and gender to ensure readiness and success for all of our children.

Some strategies that could be attempted to address the effects of relative age and gender are suggested below.

1. Recent changes in Ontario have developed a more open-ended and play-based approach to the pedagogy of learning in both child care and kindergarten (Ministry of Education, 2014). This approach is encouraging, but curriculum across primary grades (junior kindergarten-grade 3) needs to address age and gender differences. More professional development should be provided to educators regarding differentiated curriculum and instruction.
2. Age and gender differences need to be taken into account in the expectations and assessments across primary grades. Our school systems should allow for realistic socio-emotional and academic expectations for children, differentiated by age (birthdate) and by gender. Provincial assessments could analyze results based on month of birth effects in addition to gender effects.
3. The presented research findings reinforce the need to have differentiated entry policies. The Education Act of Ontario allows for a beginner class for older students born in the first half of the year and provides delayed entry for children born after the first day of September (Education Act, Sections 21[1] and 34[3]). Both of these provisions should be better known to parents and school administrators. A full review of school entry policies across Canada should be conducted to ensure that the policies address choice and attention to the needs of all children entering formal schooling. In addition, international school entry practices could be studied for comparative purposes.
4. Communities and partners in early learning can work collaboratively to become better informed of the potential effects of age and gender, thereby being prepared to attenuate these effects through stimulating and engaging learning experiences for young children and their families. The transition to school can be smooth and successful, through individualized approaches, meeting the needs of diverse families.

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