THE EDUCATIONAL OPPORTUNITY GAP: A COMPARISON OF READING ABILITY AND COMPONENT LITERACY SKILLS BETWEEN AFRICAN NOVA SCOTIAN STUDENTS AND THEIR PEERS.

by

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Dedication Page

"Trust in the Lord with all your heart; do not depend on your own understanding. Seek his will in all you do, and he will show you which path to take." *Proverbs 3:5-6*

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Abstract

Reading proficiency is fundamental for student success. However, students of African descent are at-risk for reading difficulties. The purpose of this study was to determine if students of African descent and African Nova Scotian students have lower scores on measures of reading ability, vocabulary, phonological awareness, morphological awareness, syntactic awareness, and prosodic sensitivity compared to a sample of other Nova Scotian students. Participants were 338 1st grade students from 18 schools across Nova Scotia. Students of African descent and African Nova Scotian students had lower scores on word reading, phonological awareness, morphological awareness, and syntactic awareness skills compared to a sample of all other Nova Scotian students. Additionally, African Nova Scotian students scored lower than students of African descent for word reading, morphological awareness, and syntactic awareness suggesting African Nova Scotians have unique challenges. These findings practical implications for those working in the education system and educational policymakers.

Keywords: Word reading, reading ability, vocabulary, phonological awareness, morphological awareness, syntactic awareness, prosodic sensitivity, educational opportunity gap, African descent, African Nova Scotian, Canada, elementary students

List of Abbreviations and Symbols Used

ANS: African Nova Scotian

NS: Nova Scotia(n)

PPVT-5: Peabody Picture Vocabulary Test – Fifth Edition

SES: Socioeconomic status

TOWRE-2: Test of Word Reading Efficiency – Second Edition

WASI-II: Weschler Abbreviated Scale Intelligence – Second Edition

WRMT-III: Wide Range Achievement Test – Third Edition

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CHAPTER 1: RACIAL EDUCATIONAL OPPORTUNITY GAP

Student academic success relies on students becoming proficient readers (American Federation of Teachers, 1990; Cooper et al., 2014; Whitten et al., 2016). As students progress grades, the focus of instruction for reading ability moves from learning to read to reading to learn (Chall, 1967; Gatlin & Wanzek, 2015), making overall reading ability a fundamental skill for future learning. Not only is reading ability necessary for future learning and academic success but also vocationally and navigating daily life. Proficient reading ability is required for everyday tasks such as following a recipe, assembling furniture, safely taking a prescription, or understanding a bus schedule. However, some groups of students are disproportionately affected by low reading ability. Disparities in reading ability between Black and White learners have been observed as early as kindergarten and continue into college and university (Snow et al., 1998; U.S. Department of Education, 2001). As a result, one of the populations identified as at-risk for poor reading ability outcomes is Black learners (Snow et al., 1998; Thomas-Tate et al., 2004; U.S. Department of Education, 2001). Disparities in reading ability among Black learners are also observed in the local context. It is suggested by various reports that African Nova Scotians have not achieved the same rates of educational and financial attainment as other populations in the province due to various systemic barriers, mainly in the forms of discrimination and racism, within governmental, economic, educational, and judicial spaces and systems (Black Learners Advisory Committee, 1994; Hamilton-Hinch et al., 2017; Hamilton-Hinch et al., 2021; Sefa Dei, 2008; United Nations, 2014). Although we know that Black learners are at risk for poor reading ability, understanding why or what contributes to these disparities is complex and ongoing. The historical context of the disparities in reading ability, and the literature on the mechanisms speculated to contribute to these disparities are discussed herein.

The US Historical Context and the Racial Achievement Gap

In 1954 in the United States, the monumental decision from the Brown versus Board of Education cases (Brown v. Board of Education, 1954; Rowley & Wright, 2011) declared race-based segregation of schools unconstitutional. Brown v. Board of Education was the collective name given to five separate cases presented to the U.S. Supreme Court related to race-based segregation in public schools (Brown v. Board of

Education, 1954; United States Courts, n.d.). The central argument of the cases was that school systems that segregated White and Black students were "inherently unequal" (p. 11) and thus violate the Fourteenth Amendment to the U.S. Constitution (Brown v. Board of Education, 1954). The key violation was to section one of the Fourteenth Amendment which, in summary, granted citizenship and equal legal and civil rights to "all persons born or naturalized in the United States" (U.S. Const. art. I, §2). Schools for Black children were described as having lower quality buildings, reduced transportation, sub-par curriculum, and less qualified teachers compared to schools for White children, which negatively affected the academic achievement of Black children. The Equality of Educational Opportunity Study, referred to as the Coleman (1966) report, was the first study to link academic outcomes to student ethnic background. The discrepancy in scores on measures of academic outcomes or performance between groups of students is historically known as the academic achievement gap (Ansell, 2011).

Despite the desegregation of US schools after the Brown versus Board of Education decision, differences in academic achievement have continued. The differences in academic achievement observed between Black and White students were first documented nationally in 1992 as a discrepancy in test scores between low-income and minority learners compared to their middle-class, White peers (see National Assessment of Education Progress, 2019; Rowley & Wright, 2011; U.S. Department of Education, 2001). As a result, the No Child Left Behind (NCLB) Act was legislated in 2001 to uphold accountability within the public school system in the United States. The NCLB Act was designed to improve primary and secondary schools, and ultimately, as a result, improve reading ability and mathematics scores. It was meant to achieve this goal by making changes to school curriculums, improving standards for teacher qualification, conducting annual testing of reading ability and mathematics ability, and allowing schools flexible use of federal and state school funding opportunities (U.S. Department of Education, 2001). However, despite this legislation, Black students continued to receive substandard education (Darling-Hammond, 1998; 2013) and have lower scores on measures of academic achievement compared to White students (Grey, 2019; National Assessment of Education Progress, 2019).

The academic achievement gap refers to "the measured disparity in intellective competence and academic ability that separates students of colour and low-income from more affluent, primarily White students" (Lynch, 2006, p. 105). Some theories of the academic achievement gap emphasize socioeconomic factors while others emphasize the role of bias in measures of academic success such as standardized tests and IQ testing (Mayor & Suarez, 2019). Other explanations of the academic achievement gap have also suggested that genetics and natural ability influence academic differences (Ansell, 2011; Herrnstein & Murray, 1994), suggesting certain groups are genetically inferior, resulting in differences in academic achievement. Due to concerns surrounding the implication of the meaning of the term "academic achievement gap," the term "educational opportunity gap" is suggested as a preferred alternative (Mayor & Suarez, 2019, p. 45) since it focuses on the systemic disparities rather than focusing on the individual (Darling-Hammond, 2013; Mayor & Suarez, 2019). Accordingly, this paper will use the term educational opportunity gap moving forward.

The educational opportunity gap suggests educational inequities within academic institutions result in systemic differences in learning opportunities between groups of students. Specifically, access to resources and opportunities are not equitably distributed between groups, thus leading to gaps in educational opportunity ultimately affecting academic success (Brown, 2020). The theoretical underpinning of the educational opportunity gap posits that multiple factors concerning available resources to specific groups contribute to observed differences between groups. The factors contributing to poorer educational outcomes between groups of students include coming from a lower socioeconomic background, less access to good health care, inadequate nutrition, and fewer educational resources at home (Ansell, 2011). Of note, the latter factors are also heavily influenced by socioeconomic background.

Another concept discussed in relation to educational disparities is the opportunity to learn gap. The opportunity to learn gap posits that in addition to student ability and effort, opportunities to learn must also be present for students to learn (Sørensen & Hallinan, 1977). The difference between the educational opportunity gap and the opportunity to learn gap is that the former focuses on unequitable access to resources that affects academic outcomes, and the latter focuses on what is needed in the immediate environment for in-the-

moment or classroom learning. Although the opportunity to learn gap is not comprehensively studied, Minor et al. (2015) suggest that "systematic differences in teacher characteristics and instruction constitute an opportunity-to-learn gap and may help to explain achievement gaps" (p. 241). As such, this connects the concepts of academic achievement, educational opportunity, and opportunity to learn gaps. Additionally, similar to the academic achievement and educational opportunity gaps, Black and low-income students are more likely to experience barriers to their opportunities to learn, thus resulting in a gap in academic outcomes between Black and low-income students compared to their peers (Boykin & Noguera, 2011).

The reality of these gaps in academic outcomes is well-demonstrated in national assessments of reading ability and mathematical ability in the United States for students in grades 4, 8, and 12. These assessments are conducted by the U.S. Department of Education International Centre for Education Statistics to observe trends in education and address high-priority needs. The data from these assessments are considered the best source of information on the educational opportunity gap (Reardon et al., 2015). Although not initially created to observe trends between Black and White students, the results of these assessments began to be stratified by race/ethnicity in the 1990s (National Assessment of Education Progress, 2019) and pointed out significant gaps in reading ability between Black and White students. These reports provide clear evidence of a long-standing gap in reading ability scores between Black and White students. In 1992, average reading ability scores (on a 500-point scale) for White and Black students in grade 4 were 224 and 192 respectively (a 32-point gap) compared to 230 and 204 respectively in 2019 (a 26-point gap); see Figure 1. A similar gap is clear for grade 8 students; average reading ability scores between White and Black students in 1992 were 267 and 237, respectively (a 30-point gap) compared to 272 and 244 (a 28-point gap), respectively in 2019 (National Assessment of Education Progress, 2019); see Figure 2. Overall, although average scores on the national assessment of reading ability are rising, the educational opportunity gap is still large between Black and White students and remains almost unchanged after nearly 30 years. It does not seem to be closing anytime soon (U.S. Department of Education, 2009). Furthermore, the National Assessment of Education Progress (2019) also reported that basic reading levels – meaning that reading ability (including understanding words, reading fluently, and literal comprehension) is typical for children of the same age - for

4th graders were not achieved by 52% of Black students compared to 23% of White students in 2019. In 1992, basic reading levels among 4th graders were not achieved by 68% of Black Students compared to 29% of White students. In 8th grade, the National Assessment of Education Progress (2019) reports that basic reading levels were not achieved by 18% of White students compared to 46% of Black students. In 1992, basic reading levels among 8th graders were not achieved by 55% of Black students compared to 23% of White students. Ultimately, this indicates that Black students are below typical basic reading levels for their age when compared to White students, a gap that has continued for decades.

Canadian Context

Empirical Evidence

Educational Quality and Experiences. Much of the literature on the educational opportunity gap stems from the United States (US); however, the phenomenon has been documented in the Canadian education system (Mayor & Suarez, 2019). In 1994, the Black Learners Advisory Committee conducted a "comprehensive study of the educational realities and learning needs of the Black Learners in Nova Scotia" (p. 371) resulting in a three-volume report with many recommendations based on their findings and implications for the future if the recommendations were not implemented. One component of this report was a census-style socio-demographic survey with 3,369 respondents from Black communities across seven regions in Nova Scotia (Halifax, Dartmouth, Annapolis Valley, Southwest, Northern, Antigonish Guysborough, and Cape Breton). The socio-demographic survey included questions about respondents' socio-demographic information, school experiences, academic achievements, and needs specific to the Black communities (see Appendix A of the Black Learners Advisory Committee report, 1994). Overall, results from the socio-demographic survey demonstrated low levels of educational attainment for Black Nova Scotians. For instance, grade 9 was the average highest grade completed among survey respondents, with the average age of school dropout being 16. Comparable data for white Nova Scotians at the time is not available; the best available comparable data is from the year 2000, at which point most Nova Scotians (77%) had a high school education or higher (Statistics Canada, 2021b). This suggests that rates of high school completion were quite low in Black Nova Scotians a the time. The leading reasons for school dropout reported by survey

respondents were that they did not feel connected to the school curriculum (76%), seeking employment (69%), other undisclosed familial or personal reasons (43%), racism (12%), and being forced to dropout (4%) – typically by repetitive repetition and failing of grades. The authors of the report describe these reasons for school dropout as "symptoms rather than causes" (p. 394) related to a history of discrimination within the education system and increased rates of poverty in the Black communities. As it related to school suspensions, Black students comprised 20.6% of all suspensions in the Halifax School System (Halifax Regional School Board, 2016) despite making up only 8% of the overall student population. The Black Learners Advisory Committee (1994) report further describes the lack of educational attainment among the local Black community as due to "extreme unemployment and poverty" (p. 26).

Additional factors noted by the socio-demographic survey related to why Black student's leave school early include discrimination, stereotyping and harassment, segregation (formal and informal), and a lack of culturally representative staff, curriculum and materials (Black Learners Advisory Committee report, 1994). Furthermore, the socio-demographic survey identified eight meaningful themes affecting Black learners in Nova Scotia: racism, teacher insensitivity and low expectations, curriculum deficiencies, ineffective pedagogical approaches, student factors, parental issues, student support, and community issues (Black Learners Advisory Committee, 1994). When asked about school environment, the majority of respondents agreed (either completely or somewhat) that their school experience would have been more meaningful if there were more Black teachers in their school (80%), more references to Black contributions in textbooks (83%), teachers were sensitive to their learning styles and culture (73%) and were not subjected to racism discrimination (66%). When respondents were asked if they believed their teachers understood their needs as a Black student, only 36% agreed (either completely or somewhat). The results from socio-demographic survey indicate that schools in Nova Scotia were not considered functional or positive spaces for members of the Black communities.

Enidlee Consultants Inc. (2009) completed a follow-up to the Black Learners Advisory Committee report, which reviewed 12 of the recommendations from the report related to resources, supports and programs that provide services for African Nova Scotian students (including public schools in Nova Scotia)

since the publication of the Black Learners Advisory Committee report. They conducted focus groups, interviews, and school observations across five school boards in the province (Halifax, Tri-County, Annapolis Valley, Cape Breton-Victoria, and Chignecto-Central), with participants including students, parents, various school personnel, tutors, members of education and cultural committees or programs, tenants associations, and African Nova Scotian organizations. Focus group participants reported experiencing racism that often went unaddressed or unsatisfactorily addressed by school personnel. However, in almost all cases, school administrators reported that were very few or no incidents of racism within their schools and observations in schools appeared "pleasant [and] harmonious" (p. 45) – a stark contrast compared to what was reported by students. When reflecting on African heritage and history classes, students expressed that being able to read new, colorful books about their culture made them feel valued and important, and administrators commented that these courses provided unique, meaningful, opportunities during student instruction. However, the courses are only offered to students in grades 11 and 12 and are restricted to students enrolled in academic programs, so they are not accessible to younger students, students who have lower grades and are thus not streamed into academic courses, or those with individualized program plans. All of the students taking the courses that were interviewed indicated they wished they were exposed to similar material at a much earlier grade, indicating the need to teach such content much earlier. Additionally, this suggests that students feel more engaged with materials that reflect their cultural experiences. Unfortunately, there were also reports of non-African Nova Scotian students enrolled in the courses making racist comments related to the course material, and also that teachers sometimes inaccurately presented the material. These responses suggest that the experience was not entirely positive and might be further improved by teachers receiving adequate training on effectively teaching African history, and more accountability from schools to enforce the Racial Equity (Nova Scotia Department of Education, 2002) and Inclusive Education (Nova Scotia Department of Education and Early Childhood Development, 2019) policies. Altogether, these accounts support the notion raised by the Black Learners Advisory Committee (1994) that schools are not functional or positive spaces for Black students, even in courses related to African history and culture.

Enidlee Consultants Inc. (2009) provided 68 overall recommendations based on their findings and recommendations for specific programs and services. Ultimately, the Department of Education accepted all 68 recommendations related to governance, accountability, staffing, communication, professional development, curriculum, student and community engagement, program review, and roles and responsibilities. Furthermore, the Minister of Education agreed to provide annual reports to the House of Assembly on the status of implementing the recommendations from the Black Learners Advisory Committee report (Nova Scotia Department of Education, 2010). However, there is no evidence publicly reporting how these promises by the Department of Education and the Ministry of Education are being upheld. An overview of the recommendations, cross-referencing the Enidlee Consultants report, can be found in Appendix A of the Department of Education report.

Furthermore, garnering international attention, the UN Human Rights Council (2017) acknowledged the educational opportunity gap in NS. As part of the UNs mission to investigate anti-Black racism in Canada, they visited Nova Scotia and reiterated the negative ongoing experiences of African Nova Scotians. They stated that educational opportunities for African Nova Scotians remain "unchanged after 30 years of school integration" (p. 12). They also reported that systemic racism persists in social, economic, and cultural domains and that the "socioeconomic conditions in the Black communities across the province remain deplorable" (p. 12).

Reading Levels. The dearth of available data on the educational opportunity gap in Canada is further highlighted through inspection of a scoping review conducted by Mayor (2019) into evidence of and contributing factors to Canada's educational opportunity gap. This review targeted studies with a primary focus on disparities in academic achievement for students in grades primary/kindergarten to 12; they captured a range of various demographic and contextual factors including socioeconomic status (SES), gender, language, immigrant status, family structure, and Indigenous status. Notably, their results found that SES was the predominant contributing factor associated with the educational opportunity gap (Mayor & Suarez, 2019). Specifically, students from higher SES backgrounds outperformed students from lower SES backgrounds. Furthermore, none of the studies included in their scoping review specifically compared Black Canadian

students to their peers. The listed demographics factors assessed in the study did not include race or ethnicity besides Indigenous status. Thus, this scoping review is not a comprehensive investigation of various demographic and contextual factors contributing to the educational opportunity gap in Canada.

The Nova Scotia Department of Education has documented that students of African descent consistently score lower on core measures of reading ability, writing and mathematics than all other students in Nova Scotia. The Nova Scotia Department of Education and Early Childhood Development conducts annual assessments on reading levels, writing, and mathematics for students in grades 3, 6, 8, and 10. Provincial assessments occur in the classroom during regularly scheduled class time, typically over a couple of days. Students are assessed on measures of reading levels, in which they read various texts and answer questions about what they have read (reading comprehension) and writing, by completing two writing tasks (Nova Scotia Department of Education and Early Childhood Development, 2020). Each assessment is graded based on five levels of performance: Not enough evidence (too few questions attempted), level 1 (below the expectation), level 2 (approaching the expectation), level 3 (at the expectation), and level 4 (above the expectation).

The results from provincial assessments demonstrate that across all grades students of African descent have lower scores compared to all Nova Scotian students in each assessment year, dating back to 2013-2014 when results stratified by ancestry became available. Notably, students of African descent as reported in this data includes all students of African heritage, combining together African Nova Scotian and African students. Reading levels in the 2013-2014 academic year indicate that at grade 3, 70% of all Nova Scotian students were at or above the assessment expectation, compared to 55% of students of African descent. Very similar numbers emerged in the most recent available grade 3 reading level assessment (2018-2019), with 71% of all Nova Scotian students are at or above the expectation compared to 57% of students of African descent. Reading levels in the 2013-2014 academic year indicate that at grade 6, 75% of all Nova Scotian students were at or above the expectation, compared to 68% of students of African descent. Similarly, the most recent available grade 6 reading level assessment (2018-2019) reports that 75% of all Nova Scotian students are at or above the expectation, compared to 59% of students of African descent. Similar disparities are observed

for students of African descent in grades 8 and 10 when compared to all other Nova Scotian students for the 2013-2014 and 2018-2019 assessment years. See Figure 3 for the percentage of students at or above the expectation for reading levels for all grades in 2013-2014 and 2018-2019. Between 2013 to 2018, the disaggregated assessment results showed similar discrepancies in pattern and size for the writing assessment results and have remained consistent over time. Ultimately, students of African descent, are not performing as well as their peers on provincial assessments of reading levels and writing. However, the results of these assessments are not further stratified to look at the data for African Nova Scotian and African students separately.

These gaps in reading levels between students of African descent and all other Nova Scotian students are reflected in other aspects of participation in society particularly when looking at the data for African Nova Scotian students. African Nova Scotian learners are less likely to finish high school and pursue post-secondary education compared to their peers (African Nova Scotian Affairs, 2021; Black Learners Advisory Committee, 1994; Enidlee Consultants Inc., 2009; Nova Scotia Department of Education, 2003, 2010; Nova Scotia Department of Education and Early Childhood Development, 2014; UN Human Rights Council, 2017) demonstrating disparities extending beyond just reading levels. Based on the most recent National Household Survey (Statistics Canada, 2013), 77.7% of African Nova Scotians compared to 85.3% of all Nova Scotians had some sort of certificate, diploma, or degree of those aged 25 to 64 years of age. Looking at university degrees only (minimum bachelor's level), the statistics indicate 18% of African Nova Scotians had a minimum bachelor's level university degree compared to 22% of all Nova Scotians from the same age range. These numbers are concerning considering education is one of the social determinants of health (Government of Canada, 2020).

Notably, educational attainment affects future employment and ultimately income (Organisation for Economic Cooperation and Development, 2012). Results from the National Household Survey (Statistics Canada, 2013) also indicates that African Nova Scotians also have higher rates of unemployment (14.5%) compared to all Nova Scotians (9.9%). Furthermore, 34.8% of African Nova Scotians are classified as low-income compared to 16.5% of all Nova Scotians (Statistics Canada, 2013). In relation, African Nova Scotians

have one of the highest child poverty rates in the province, with 39.6% of children of African heritage (thus, including African Nova Scotian children) in Nova Scotia living in poverty (Frank & Fisher, 2020), no doubt having an effect on educational opportunities. These statistics from the National Household Survey correspond with what was reported in the socio-demographic survey conducted by the Black Learners Advisory Committee (1994) nearly three decades ago. Responses from the socio-demographic survey indicated only two-thirds (64.4%) of respondents from the participating Black communities were employed or self-employed, and one-third (35.6%) were unemployed. This reveals a greater unemployment rate than what was reported by Statistics Canada (2021) for all Nova Scotians aged 15 and over at the time of the survey, which was 13.5%. As it relates to poverty, average household income for respondents in the Black Learners Advisory Committee survey was $20,500. The total household income for the average Nova Scotian family at the time was $46,870 – more than double that of the survey respondents. As reported by Statistics Canada, the poverty line for a three-person family at the time of the survey was a household family income of $25,163 indicating that the average Black household participating in the survey was living in poverty. Notably, Statistics Canada does not provide data for African Nova Scotians specifically outside of the National Household Survey, thus no current demographic information is available for African Nova Scotians leading to a gap in accurate reporting and observation of long-term trends.

Considering the Nova Scotia provincial assessment data reports on all students of African descent, it is warranted to discuss the population differences between African Nova Scotians and Africans. Using the same data from the National Household Survey (Statistics Canada, 2013), people of African heritage, or Africans-countries of birth included the Democratic Republic of the Congo, Egypt. Ethiopia, Ghana, Morocco, Nigeria, Somalia, and South Africa - formed less than 1% of the population at the time of the survey. Related to educational attainment, 42% had some sort of certificate, diploma, or degree and 32% had at least a bachelor's degree. There numbers are compared to 77.7% and 18% respectively for African Nova Scotians. Noticeably, a larger proportion of people of African heritage have at least a bachelor's degree compared to African Nova Scotians, but more African Nova Scotians had some sort of certificate, diploma, or degree. This data suggests that African Nova Scotians are more likely to have a certificate or diploma than university

degrees when compared to populations of African heritage. This may be due to fewer people of African heritage being able to immigrate with only a certificate or diploma, or that people of African heritage are more interested in pursuing university degrees. Additionally, considering students of African descent in Nova Scotia are reported to have lower overall academic achievement based on provincial assessment data (Nova Scotia Department of Education and Early Childhood Development, 2014, 2021), they may not have the required grade point average to qualify for admittance to university. The starkest comparison is related to unemployment. As previously indicated, 35.6% of African Nova Scotians were unemployed; only 5% of Africans were unemployed (Statistics Canada, 2013). Notably, 27% of people of African heritage were classified as low-income compared to 34.8% of African Nova Scotians. Since the time of the National Household Survey, the African population in Nova Scotia has increased by 50% (Statistics Canada, 2017). Given these differences in educational and employment statuses, it seems important to investigate the educational opportunity gap separately for students of African Nova Scotian and African heritage in particular and those of African descent more generally.

Historical Context

The current statistics related to educational and financial attainment amongst African Nova Scotians should be interpreted within their historical context. African Nova Scotians (African Nova Scotians) make up the largest Black population in Canada (Mensah, 2002). The term “African Nova Scotian” refers to people who identify as descending from the historical migrations and settling of Black Loyalists, Black Refugees, and the Marrons across the province of Nova Scotia dating back to the 1700s (African Nova Scotian Affairs, 2021). Segregated schools in Nova Scotia for Black and White students were legally sanctioned in 1865 and the practice was referred to as “the color line” (Canadian Race Relations Foundation, n.d., p. 2). Despite legal segregation ending in 1954, the practice continued. In 1963, the province of Nova Scotia filed its first Human Rights Act to end the discriminatory practice, but the last segregated school did not close until 1983 (Henry, 2019; Nova Scotia Human Rights Commission, n.d.). Accounts of the conditions of some of the segregated schools describe them as having multiple functional problems like poor heating and ventilation, excessive dust and dirt, no toilet paper or towels in the bathrooms, poor plumbing, lighting issues, insufficient or poor-

quality materials and resources, inadequate libraries, cafeterias and gymnasiums, and nonexistent or poor audio-visual supports (Black Learners Advisory Committee, 1994). Despite the history of segregated schools in Nova Scotia and the recency of the closure of the last segregated schools, there have been no case laws or policies enacted that trace the effects of racial segregation on the educational opportunity gap or whether racially discriminatory practices may still be upheld systemically.

Unsatisfied with their experiences in segregated schools, African Nova Scotian communities have attempted to combat their negative experiences in schools and being subjected to poor school conditions. In striving for equitable educational opportunities, the Black community attempted to file a class-action suit against the Halifax County Municipal School Board in 1975. The Preston Area Education Task Force (comprised of the communities of East Preston, North Preston, and Cherry Brook) filed a complaint with the Human Rights Commission against the School Board stating that the School Board discriminated against the communities based on race and colour, providing over 800 individual complaints to support the claim. Although described as a class action suit, the case never went to court. Instead, the settlement came to an agreement that a request would be made to address a number of needs, including increasing the number of specialist teachers and services, bringing the schools up to appropriate standards, consulting with preschool programs, increase funds for teaching and learning, providing culturally reflective reading material, and to establish a monitoring committee (Black Learners Advisory Committee, 1994). However, the final outcome of the settlement was negotiated between the Human Rights Commission and the School Board, without involving the Black community. Most critically, the School Board did not have to uphold its legal obligation to address the inadequate education received by learners in the Black communities.

Notably, broadening to the larger Canadian historical context, segregated schools also existed in Southwestern Ontario for Catholics, Protestants, and Blacks. Racially segregated schools were established after an influx of freedom seekers – recently liberated Blacks that were formerly enslaved – settled in the province (Gaffield & Millette, 2015; Henry, L., 2019). Since the desegregation of public schools in Ontario, the Ontario Ministry of Education (2012) published a resource guide on best practices on how to close the educational opportunity gap between different groups of students. Although not as comprehensive as the

NCBL Act from the United States, and not a federally enacted guide, the guide loosely parallels what the NCLB Act attempted to accomplish. However, there was no mention of students of African descent in particular, and no data was provided in the report. This suggests, taken together with the empirical literature, that there is an exclusion or even erasure of the Black schooling experience in the larger Canadian context outside of Nova Scotia.

The broader historical context tells us that persons of African descent have systemically been excluded from participating fully in the education system in Canada. In conjunction with the empirical evidence, the historical context tells the story that African Nova Scotian students have a long history of negative experiences in schools, poorer educational attainment, lower socioeconomic status, lower scores on measures of academic achievement compared to all other NS students, and the discrepancy has remained relatively unchanged. Yet, there is a dearth of Canadian literature investigating the specific mechanisms that may be upholding the educational opportunity gap specifically between learners of African descent compared to other Canadian student populations.

Theories Related to the Educational Opportunity Gap

In the sections that follow, I review some of the core theories that are relevant to the educational opportunity gap. Each puts forward factors that could be considered when understanding the educational opportunity gap.

Dialect

The Mismatch Theory, also known as the Linguistic Interference Theory, posits that when significant differences exist between one's spoken language and the mainstream language, this leads to disruptions to the acquisition of overall reading ability and component literacy skills, specifically phonological awareness and morphological awareness (Gatlin & Wanzek, 2015; Lablov, 1995). Nonmainstream American English refers to any dialect that is not "standard" or Mainstream American English; concerning the educational opportunity gap, the most studied Nonmainstream American English dialect is African American English which is the most often spoken dialect by Black American learners (Fogel & Ehri, 2006). African American English differs from from Nonmainstream American English at the morphological, phonological, and syntactic levels.

Morphology refers to “the branch of linguistics that deals with words, their internal structure, and how they are formed (Arnoff & Fudeman, 2011, p. 1).”. At the morphological level, a key feature of African American English is variable differences to the s-marker for nouns, possessive pronouns, and verbs related to third-person singular contexts (e.g., “she saw three cat in the window”). Phonology refers to “the branch of linguistics which investigates the ways in which sounds are used systematically… to form words and utterances” (Katamba, 1989, p. 1). At the phonological level, a common feature is dropping the “g” at the end of words (e.g., “goin” instead of “going) and replacing /d/ for the voiced /th/ sound when preceding a vowel (e.g., “dis” instead of “this”). Syntax refers to “the branch of grammar dealing with the ways in which words … are arranged to show connections of meaning within [a] sentence” (Van Valin, 2001, p. 1). A common feature of African American English at the syntax level is variable subject-verb agreement (e.g., “My friends was runnin’ fast to catch the bus.”). For more detailed information on the characteristics of African American English, see Washington & Seidenberg (2021). The Mismatch Theory posits that there are phonological, morphological, and syntactic differences, or mismatches, between Mainstream American English and Nonmainstream American English that make acquiring overall reading ability and component literacy skills more difficult (Gatlin & Wanzek, 2015; Lablov, 1995). Empirical evidence in support of the Mismatch Theory would detect negative correlations between the frequency of dialect use or variation and scores on assessments of reading ability (Gatlin & Wanzek, 2015), particularly when compared to scores of Mainstream American English speakers.

The metalinguistic theory or linguistic awareness/flexibility hypothesis posits that a student’s ability to dialect shift (change the frequency of dialect use depending on context), rather than dialect use alone, has a more significant effect on the acquisition of overall reading ability and component literacy skills (Gatlin & Wanzek, 2015; Holt, Méndez, Mills, & O’Brien, 2021**;** Terry & Scarborough, 2011). Support for this theory comes from the idea of metalinguistic awareness, the ability to think about and manipulate language (Scarborough & Brady, 2002), wherein dialect speakers who are more adept at reading and writing have a better recognition of contextual differences that have different linguistic expectations (Gatlin & Wanzek, 2015). In other words, children with stronger reading and writing skills that have better developed

metalinguistic awareness would appropriately dialect shift in certain linguistic environments, such as at school where Mainstream American English is the expected dialect. Evidence in support of this theory in the literature would be a bit more complex as one would expect to see varying correlations between dialect use in different contexts on reading ability, likely following a curvilinear pattern (Connor & Craig, 2006**;** Gatlin & Wanzek, 2015).

The literature on dialect related to reading ability dates back to the 1970s, and the evidence indicates that dialect use negatively influences academic achievement in relation to specific reading outcomes (e.g., Craig et al., 2014; Edwards et al., 2014; Gatlin & Wanzek, 2015; Jarmulowicz et al., 2012; Kohler et al., 2007; Labov, 1972; McDonald Connor & Craig, 2006; Mitri & Patton Terry, 2014; Patton Terry, 2014; Patton Terry & McDonald Connor, 2012; Patton Terry & Scarborough, 2011; Sligh & Conner, 2003; Snow et al., 1998; Washington et al., 2018) but the extent of this relationship is unclear (Gatlin & Wanzek, 2015). Jarmulowicz et al. (2012) investigated how Mainstream American English dialect users compare to Nonmainstream American English (African American English and Southern American English, which has significant overlaps with African American English) dialect users on measures of word reading, morphological awareness, and phonological awareness. All participants were typically developing students in grade 3 with typically developed language abilities based on the Clinical Evaluation of Language Fundamentals, 4th edition (see Semel et al., 2003). No Black students were part of the Mainstream American English-speaking group, but the Nonmainstream American English-speaking group was comprised of Black and White students. The authors results found that Mainstream American English speakers had significantly higher scores on measures of word reading, morphological awareness, and phonological awareness compared to Nonmainstream American English dialect speakers. Notably though, both groups of students had scores that were typical for other children their age. Other studies have also found similar results where Nonmainstream American English dialect speakers have lower scores on assessment measures compared to Mainstream American English speakers (e.g., Kohler et al., 2007; Sligh & Conner, 2003).

A meta-analysis by Gatlin & Wanzek (2015) synthesized the literature on the role of dialect use on reading ability as well as spelling and writing. Overall, there was a significant, moderate, negative

relationship between dialect use and reading ability meaning that the more frequently students use dialect, the lower their word reading scores and, the less frequently they use dialect, the higher their reading ability scores. For spelling and writing tasks, the relationship was also significant and negative, but the effect was small (Gatlin & Wanzek, 2015). Interestingly, the meta-analysis also found that rates of reading and writing ability were similar across all levels of SES. The authors suggest that dialect use may have a negative relationship with reading and writing ability regardless of SES. Thus, dialect use alone is negatively correlated with reading ability and writing and spelling skills. Taken together, dialect use alone contributes to the educational opportunity gap, and Black students from lower SES backgrounds are more likely to use dialect and have lower reading ability and component literacy skills (Gatlin & Wanzek, 2015; Snow et al., 1998). Thus, the results from this meta-analysis suggest Black students who use dialect and come from lower SES backgrounds may be the most at-risk for poor reading ability.

Although the literature on dialect, particularly African American English, stems from the United Stems, there are dialect variations in Nova Scotia that differ from Mainstream American English. African Nova Scotian English has been documented as a distinct dialect derivative of African American English (Poplack & Tagliamonte, 1991; Walker, 1995). However, dialect differences have not been considered in the Canadian literature in relation to reading ability generally or specifically in the context of the educational opportunity gap. Local dialect differences may be a consideration for future studies in Canada considering the relationship between reading ability, component literacy skills and dialect use.

Teacher and School Bias

The Teacher Bias theory posits that teachers' implicit racial bias affects the learning outcomes of minority students (Kozlowski, 2015; Lumpkin, 2008; Peterson et al., 2016; St. Mary et al., 2018); similar to the other literature in this review, much of the literature on the Teacher Bias theory stems from the United States. Many qualitative studies document the experiences of Black and other minority youth as feeling less supported, less cared for and treated differently by their teachers compared to White students. Additionally, Black and other minority youth feel as though teachers put less enthusiasm into teaching them or making the

curriculum content culturally relevant (Barnes & Eadens, 2014; Bottiani et al., 2016; Codjoe, 2006; Howard, 2002; Nash & Miller, 2015; St. Mary et al., 2018; Vega et al., 2015; Wiggan, 2008).

Recently, similar feelings related to teacher bias have been documented in Nova Scotia. Hamilton-Hinch et al. (2021) qualitatively studied the experiences of elementary-school aged African Nova Scotian students and their families in Nova Scotia. The researchers conducted focus groups with African Nova Scotian parents in rural and urban parts of the province across the seven regions. The researchers report on a thematic analysis to produce a "storyline" of families' experiences in the public education system. The results of their study found a dominant storyline of "Our Families' Experiences in School" with four overarching themes (see Hamilton-Hinch et al., 2021, p. 74). Within the overall story, all African Nova Scotian families reported experiencing various challenges while they were in a public school in Nova Scotia, regardless of whether or not they enjoyed school.

In the first identified theme of "We are treated differently (as a consequence of racism)," several participants discussed implicit and explicit experiences of racism including being ignored or excluded, excessively judged, or punished compared to other students, and hearing or being direct targets of negative comments. Under the theme of "We don't feel connected (to the school community or personnel in relation to their child's education)," parents discussed the experience of overly exerting themselves in their children's education to attempt to ensure they are not being treated differently. In relation, several parents stressed the importance of having a relationship with school staff so potential problems would be communicated immediately and addressed promptly. Furthermore, several parents reported miscommunication or feeling misunderstood by their child's school. One parent indicated that they felt the school assumed they were unemployed based on their interactions, while others reported feeling like schools assumed Black parents were disengaged from their child's learning and educational experiences. Notably, several parents reported that their children were streamed into non-academic courses. Related to the third theme, "We know there are challenges: The resistance of parents (unequitable distribution of school resources)," some parents stated that advocating for their child to have access to certain resources or supports was a "fight" (p. 80). Additionally, parents also reported that they felt less resources were available from the school to support Black students

compared to other groups. For the last identified theme, “We deal with injustices, but we persevere (coping strategies to manage negative experiences”. Many parents, despite the identified challenges, endorsed the benefits of Africentric resources, curriculum, and organization on their children’s school engagement and acknowledged the support of the Black community and organizations. However, some parents reported that their children were more successful academically when they participated in Africentric programs in the community, but academic successes achieved with community organizations did not translate to the classroom.

Notably, Black students are disproportionally less likely to be enrolled in academic programs compared to White and other racialized student groups, providing support for the notion that teachers act as “gatekeepers” for student success (Black Learners Advisory Committee, 1994; Carter, 2008; Cheng, 2016; Hamilton-Hinch et al., 2017; Haslanger, 2014; Nova Scotia Department of Education, 2010; St. Mary et al., 2018; UN Human Rights Council, 2017) as additional factors believed to stem from bias and a lack of cultural competence. The act of gatekeeping or streaming has also been identified as an act of teacher bias (Kozlowski, 2015; Haslanger, 2014; Parekh et al., 2021). Qualitative reports from Nova Scotia have also described the practice of streaming Black students into non-academic or vocational courses and gatekeeping student success, with reports that guidance counsellors have explicitly told Black students that they would not be successful in post-secondary education because they are Black (Black Learners Advisory Committee, 1994; Hamilton-Hinch et al., 2021; Millman, 2017; UN Human Rights Council, 2017). Additionally, the Toronto District School Board (2014) released a report looking at specific achievement outcomes and found that 53% of Black students were enrolled into academic program streams compared to 81% of White students and 80% of other racialized students. Conversely, Black students comprise 39% of non-academic (applied) programs compared to 16% of White students and 18% of other racialized students (James & Turner, 2017). To contextualize these numbers, Black students in the Toronto District School Board only represent 12% of the population (James & Turner, 2017) indicating Black students are overrepresented in non-academic classrooms while being underrepresented in academic programs. Taken together, these data suggest that there is gatekeeping of access to educational opportunities or streaming Black students into courses below their

actual academic ability. A question asked by a high school teacher in Toronto supports this possibility: “why do my applied classes have a lot of Black students and my academic classes don’t? And it’s not a skills thing (Kinnon, 2016, p. 47)!”. Despite the educational program streaming policy based on student ability being abolished in 1999, data from the Toronto District School Board (2014) indicates that the practice still occurs, disproportionately affecting Black students.

Data from the Toronto District School Board (2014) further suggests that negative teacher attitudes towards Black students contribute to the observed gaps. For instance, Gay (2002) reported that many teachers perceive Black students as having lower intelligence and academic ability, and more behaviour challenges than other students. This is affirmed by a quote from a Toronto teacher that stated, in relation to streaming, “It’s almost like the teacher – the teachers – don’t have that part of their brain wired to say, ‘maybe she’s gifted.’ They’re all saying, ‘poor, black” (Kinnon, 2016, p. 48). Additionally, even among students who are achieving at or above expected levels academically, Black students are less likely to receive grades of “Excellent” on indicators of academic success used to recommend streaming pathways in Toronto compared to white students (19% compared to 39%, respectively; Parekh et al., 2021).

In addition to these differences in program enrolment, Black students are often disproportionately affected by disciplinary actions and practices within schools compared to other students. The Toronto District School Board reported that almost half (42%) of Black students had been suspended at least once by the time they graduate high school, and almost half (48%) of students expelled from schools in the Toronto District School Board between 2011-2012 and 2015-2016 were Black; these numbers are starkly higher than 10% of White students being expelled. Similarly, Black students in Nova Scotia accounted for 18% of suspensions while only accounting for 7% of the student body at the time (Halifax Regional School Board, 2016). The report, unfortunately, did not provide information on the length of suspensions stratified by ethnicity. Additionally, an independent analysis completed by CBC News (2016) found that Black students are 1.2 to 3 times more likely to receive an out-of-school suspension than other Nova Scotian students based on data from 5 out of the 8 school boards.

The Role of Socioeconomic Status

The literature investigating the educational opportunity gap also discusses the effect of poverty, or more generally socioeconomic status (SES), and the overrepresentation of Black people living in poverty or low SES. In the United States, Black students are more than two times more likely to come from low-income households compared to White students (Baumann & Thomas, 1997; Brooks-Gunn, Klebanov, & Duncan, 1996; Entwisle & Alexander, 1988; Washington, 2001). SES is a way of determining or measuring social class and typically considers individuals, families, or groups' education, income, and occupation (American Psychological Association, 2021). Investigations of SES often expose several systemic inequities and effects on future outcomes related to access to resources and services, health distribution and outcomes, quality of life, development, and educational attainment (American Psychological Association, 2017). Children from lower SES backgrounds have fewer opportunities to engage in reading-encouraging experiences before beginning formal education at home and in preschool environments (Hagans & Good, 2013; Washington, 2001). These various experiences include shared reading activities with a more experienced reader, library access, experience engaging with different types of print materials, and an emphasis on social-emotional learning rather than academic skills in preschool or daycare environments (see Baker et al., 1995; Goldenberg, 1996; Hagans & Good, 2013; Hart & Risley, 1995; Kowalski et al., 2001; McGill-Franzen et al., 2002; Roberts et al., 2005).

Craig (2016) investigated the relationship between SES and reading levels in a sample of Black elementary students living in an urban-fringe community in Detroit. Participating students were from both low- and middle-income households. Craig (2016) observed a direct effect of SES on reading ability, even when controlling for students' oral language skills. Notably, there were no significant differences in cognitive skills between differing SES groups. Similarly, Nievar and Luster's (2006) analyses of data from the National Longitudinal Survey of Youth revealed that coming from a lower-income household had a direct effect on reading ability among Black students between the ages of 4 and 9 years.

Additional empirical literature also indicates SES is predictive of future reading ability, and the educational opportunity gap for children with early reading difficulties widens as children progress through

school (Catts et al., 2008**;** Hagans & Good, 2013). Fryer and Levitt (2005) investigated the role of SES on the educational opportunity gap between Black and White students in kindergarten through 3rd grade with data from the Early Childhood Longitudinal Study Kindergarten Cohort. The researchers found a gap of 0.400 standard deviations between Black and White students for reading level scores. Moreover, they found the gap in scores for reading levels increased to 0.771 standard deviations by the end of grade 3 (Fryer & Levitt, 2006) providing further evidence of the educational opportunity gap. This also suggests that as the difficulty of required readings and independence increases, Black students experience greater challenges. As it relates to SES, SES only fully mediated the relationship between academic achievement in reading levels between Black and White students at school entry. By 3rd grade, a gap in reading levels emerged, but SES accounted for only a part of this relationship (Fryer & Levitt, 2006). More recently, analyses by Henry et al. (2020) with the same database observed that disparities between Black and White students in reading ability existed at school entry and continued to develop throughout the primary grades. Additionally, they noted that SES was linked to achievement growth. Notably, gaps in SES at school entry had the largest impact on long-term educational outcomes. However, the educational opportunity gap only closed for Black students from affluent households.

The literature thus suggests that SES is a contributing factor to the educational opportunity gap, but other factors may be confounding the relationship. Notably, the literature suggests that differences accounted for by SES may only exist in the early elementary years, suggesting other factors may contribute to the relationship. For example, higher quality schools or early intervention for struggling readers may reduce disparities. It is also speculated that school environment and culture may play a role in influencing the educational opportunity gap (Reardon et al., 2015) in addition to SES. Thus, SES needs to be considered when investigating factors contributing to the educational opportunity gap considering that 39.6% of children of African heritage in Nova Scotia are living in poverty (Frank & Fisher, 2020).

Health and Socioeconomic Consequences

Considering education is identified as one of the most dominant social determinants of health (Finigan-Carr & Abel, 2015), I think it is essential to consider the consequences of the educational

opportunity gap for Black students from this lens. Social determinants of health refer to specific social and economic factors that impact one's health and contribute to health inequalities (Government of Canada, 2020). Education as a social determinant of health looks at how educational experiences, including reading ability acquisition and education quality, contribute to one's health (Government of Canada, 2020). Furthermore, disparities in educational opportunities not only contribute to poorer academic achievement, but also poorer mental health outcomes, increased risk for school dropout, increased risk for future incarceration, higher rates of chronic diseases, higher rates of mortality, and less overall access to opportunities that contribute to one's success (Finigan-Carr & Abel, 2015). Considering the link between SES and the acquisition of component literacy skills (e.g., Apel & Diehm, 2014; Foster & Miller, 2007; McCabe & Champion, 2010; White et al., 1990) and knowing that Black students have poorer scores on measures of reading ability (Snow et al., 1998; Thomas-Tate et al., 2004; U.S. Department of Education, 2001), the consequences of the educational opportunity gap likely go well beyond the elementary and secondary school years and are long-lasting.

There are a number of long-term consequences associated with low reading ability, a consequence of the educational opportunity gap. Reading ability is a fundamental skill that a person needs to engage and navigate the spaces they reside fully and functionally. Occupationally, individuals with low reading ability are more likely earn the lowest wages, are more likely to need financial aid, as well as live in poverty, (Green & Riddell, 2007; Gunn, 2021; Lynch, 2006; Wood, 2010). Furthermore, individuals with low reading ability have more workplace accidents (Literacy Pittsburgh, 2021), likely at least in part from challenges related to the ability to read operating manuals, safety policies, and other occupational health and safety documents. These employability challenges for individuals with low reading ability also impacts the types of employment available and limitations to career advancement which may contribute to less desirable, safe, or even legal, options for employment. The literature provides support for the notion that individuals with lower reading ability also have higher rates of incarceration (see Becker Patterson, 2018; Gunn, 2021; McKinsey & Company, 2009; Robinson, 2018; Rocque & Paternoster, 2011; Wilson, 1996). For instance, Proliteracy (2017) asserts that 75% of people incarcerated in the United States have not completed high school or can be

classified as having extremely low reading and writing skills. Furthermore, African Nova Scotians are overrepresented in the Nova Scotian justice system, comprising nearly 14% of the incarcerated population despite representing approximately 4% of the overall NS population (Luck, 2016; Nova Scotia Department of Justice, 2018; Statistics Canada, 2017). Looking at this statistic, a potential correlation may exist with low reading ability suggesting the far reaching potential long-term consequences of the educational opportunity gap locally.

Concluding Remarks

In conclusion, the literature review has demonstrated clear evidence of a racial educational opportunity gap related to Black learners. Black students in both the United States and Canada have poorer scores on measures of reading ability than their peers. However, the mechanisms underlying what is contributing to maintaining the educational opportunity gap are complex and largely unexamined in Canada. A proportion of the literature suggests some explanation of the educational opportunity gap being due to differences in SES, rather than ethnic differences. Additionally, school factors such as teacher bias, increased suspension rates, and academic streaming are also discussed in the literature as contributors to the educational opportunity gap. Long-term consequences include African Nova Scotians being less likely to go on to post-secondary education, being overrepresented in the prison system, and having the lowest child poverty rates compared to the general population. Furthermore, the literature also provides evidence that children that have higher dialect use have lower reading ability contributing to the educational opportunity gap. The literature also suggests that African Nova Scotians have lower average reading ability compared to their peers (Nova Scotia Department of Education and Early Childhood Development 2014, 2020). However, this is not captured in the way provincial assessment data is currently reported. Furthermore, local research is warranted related to how dialect influences the acquisition of overall reading ability and component literacy skills. By knowing how various mechanisms contribute to the maintenance of the educational opportunity gap, we can begin to develop effective processes to reduce it. Additionally, in the local context, the study findings will have implications for the current Nova Scotia Inclusive Education Policy.

CHAPTER 2: RESEARCH STUDY

There is extensive literature indicating that Black students consistently score lower than average on measures of academic achievement compared to White students, with the educational opportunity gap observed as early as kindergarten (Grey, 2019; Thomas-Tate et al., 2004; U.S. Department of Education, 2001). The majority of this research has been conducted in the United States. Dating back to 1992, the National Assessment of Education Progress (National Assessment of Education Progress, 2019) in the United States has reported that Black students have consistently scored lower on the national assessment of reading ability than White students. Similar national level data is not available in Canada; that said, provincial level data dating back to 2013 from Nova Scotia shows that students of African descent (or Black students) consistently have lower scores on measures of reading ability, writing, and mathematics compared to other students in Nova Scotia (Nova Scotia Department of Education and Early Childhood Development, 2014, 2020). This gap in performance between groups of students is referred to as the educational opportunity gap or the academic achievement gap, with explanations grounded in inequitable distribution of resources or systemic barriers in the former (Ansell, 2011; Brown, 2020; Mayor & Suarez, 2019) and in individual factors, such as socioeconomic status (SES), in the latter (Ansell, 2011; Teale, Paciga, & Hoffman, 2007). In the study that we report on here, we investigate the presence of the educational opportunity gap in Nova Scotia in grade 1 with particular attention to specific reading ability and component literacy skills between African Nova Scotians and other youth.

The reading ability and component literacy skills of African Nova Scotians are being investigated specifically because they are Canada's largest indigenous Black population (Sehatzadeh, 2008) and have resided in Nova Scotia since the 1700s (African Nova Scotian Affairs, 2021; Mensah, 2020). In relation, African Nova Scotians have a history of adverse experiences in schools (e.g., Black Learners Advisory Committee, 1994; Halifax Regional School Board, 2016; Hamilton-Hinch et al., 2017; Hamilton-Hinch et al., 2021; Sefa Dei, 2008; United Nations, 2014) that may be contributing to poorer reading ability, and also have lower levels of educational attainment compared to the larger Nova Scotian population (see Statistics Canada, 2013). Additionally, African Nova Scotians have higher rates of unemployment and child poverty levels, as

well as higher rates of low-income status (Black Learners Advisory Committee, 1994; Frank & Fisher, 2020; Statistics Canada, 2013). Knowing that there is a negative correlation between income levels and reading ability (e.g., Catts et al., 2008**;** Hagans & Good, 2013; National Institute of Child Health and Human Development Early Child Care Research Network, 2005; Ogbu, 1997), it is important to know the reading ability and component literacy skill levels of African Nova Scotian students. Additionally, based on data from provincial assessments (Nova Scotia Department of Education and Early Childhood Development, 2014, 2020) we know that all students of African descent are scoring lower on the assessment of reading ability compared to other Nova Scotian students, but we do not know specifically how African Nova Scotian students are doing. Notably, all students of African descent in the provincial assessment data would also include recent immigrant African populations. Based on data from Statistics Canada (2013), recent African immigrants are more likely to have a university degree than African Nova Scotians and have lower rates of unemployment. Additionally, many immigrant populations do not speak English as a first language, which may affect how recently immigrated children develop their reading ability and component literacy skills in English. These differences are not captured in the current reporting of the provincial assessment data because the provincial assessment data combines the scores for African Nova Scotian and African students when referring to students of African descent. Thus, it is unclear if differences in reading levels exist between African Nova Scotian and African students. Furthermore, by looking at both reading ability and component literacy skills we can identify which skills should be targeted for intervention or additional academic instruction to remediate any disparities (see Blachman, Tangel, Ball, Black, & McGraw, 1999; Hagans & Good, 2013).

The research literature stemming from the United States has documented that Black students have lower scores on average compared to White students on measures of reading ability and component literacy skills (e.g., U.S. Department of Education, 2009). Reading, in a general sense, is the ability to identify words, whereas reading comprehension is related to understanding what is read and depends on being able to read words (Perfetti, 2007). Reading ability or reading level are terms used to describe an individual's combined general word reading and reading comprehension skills. Component literacy skills refers to a collection of

skills that have been identified as required to become a proficient reader, and many of them predict future reading ability (see National Reading Panel, 2000). Fryer and Levitt (2015) assessed reading levels in Black and White students in grades 1 through 3 using standardized measures of reading ability, vocabulary and decoding from the Early Childhood Longitudinal Study Kindergarten Cohort. Decoding is a skill required to become a proficient reader (Gough & Tunmer, 1986; Snow et al., 1998). At its core, decoding is the ability to blend single sounds into words (Moats, 1998) which requires knowledge of rules related to letter-sound correspondence (Gough & Tunmer, 1986). The researchers found that Black student scored lower on assessments of reading ability, vocabulary, and decoding compared to White students in 1st grade, with a larger difference by 3rd grade. Results from other large studies using the Early Childhood Longitudinal Study Kindergarten Cohort or other databases (such as the National Institute of Child Health and Human Development and the National Longitudinal Survey of Youth databases) also showed lower scores for Black students compared to White students on measures of reading ability and vocabulary (see Bond & Lang, 2013; Murnane et al., 2006; Quinn, 2015; Rearson, 2006; Rowley & Wright, 2011).

The Canada literature on the Black-White educational opportunity gap paints a similar picture to that in the United States. Caldas et al. (2009) found evidence of the educational opportunity gap in Montreal, Quebec such that Black students had lower average scores on a latent variable of academic achievement compared to non-Black 10th and 11th grade students. Similar to the provincial assessment data (Nova Scotia Department of Education and Early Childhood Development, 2020), Black students in this sample consistent of all students of African descent including recent immigrant African populations. The measure of academic achievement was an overall score comprised of a number of variables that included students' scores on the Ministry of Education in Québec's standardized exam on the subject of history, the percentage of students who fail Québec's standardized exams, the educational opportunity gap in scores between males and females on the maternal language and physical science exams, and the proportion of students who grade and graduate on time.

Reports from Nova Scotia suggest evidence of a Black-White educational opportunity gap specific to reading ability, at least in the reports that are available from 2014 on. The province of Nova Scotia conducts

annual assessments of reading ability for students in grades 3, 6, 8, and 10, although these provincial assessments are not standardized or normed, so reliability and validity information is not available. Additionally, the provincial assessment reports do not separate the data for reading comprehension from overall reading levels. Thus, it is unclear whether different results are found when assessing reading comprehension only. Results from these provincial assessments reveal that, across all assessment grades, students of African descent have lower average reading levels compared to all other students in Nova Scotia (see Figure 3). For instance, in the most recent assessment year (2018-2019), 57% of students of African descent in grades 3 and 59% of students of African descent in grade 6 were at or above the expectation for reading levels; this is compared to 71% of all other Nova Scotian students in grade 3 and 75% of all other Nova Scotian students in grade 6. Thus, the local Nova Scotian context provides evidence of the educational opportunity gap between Black students and their peers specifically in terms of reading ability.

Dialect differences offer another reason to suspect that there might be an educational opportunity gap, at least for reading ability for African Nova Scotians in particular. Notably, African Nova Scotians speak a unique dialect compared to other Nova Scotian populations - African Nova Scotian English is documented as a distinct dialect derivative of African American English (Poplack & Tagliamonte, 1991; Walker, 1995). Although not empirically studied, it can be speculated that the presence of African Nova Scotian English may contribute to gaps in reading levels found in Nova Scotia. A portion of the research literature related to the educational opportunity gap has also demonstrated that dialect use negatively affects the acquisition of reading ability and component literacy skills which in turn influences academic achievement (e.g., Apel & Thomas-Tate, 2009; Craig et al., 2014; Edwards et al., 2014; Gatlin & Wanzek, 2015; Jarmulowicz et al., 2012; Kohler et al., 2007; Labov, 1972; McDonald Connor & Craig, 2006; Mitri & Patton Terry, 2014; Patton Terry, 2014; Patton Terry & McDonald Connor, 2012; Patton Terry & Scarborough, 2011; Snow et al., 1998; Washington et al., 2018). A meta-analysis, including studies consisting of native English-speaking students in kindergarten through grade 6, found that speaking patterns that differ from standard English, such as African American English, correlate negatively with reading ability even when controlling for SES (Gatlin & Wanzek, 2015). Dialect differences among the Black population in Nova Scotia are documented in the

literature (see Poplack & Tagliamonte, 1991; Walker, 1995). The presence of these dialect differences in African Nova Scotians is another reason to assess the acquisition of reading ability and component literacy skills in African Nova Scotians.

As we consider the educational opportunity gap for African Nova Scotians, SES is a key factor to consider in fully understanding this relation. As previously indicated, African Nova Scotians have higher rates of low-income status compared to the general Nova Scotian population (Black Learners Advisory Committee, 1994; Statistics Canada, 2013). The literature points to SES as a contributor to the educational opportunity gap (e.g., Catts et al., 2008; Hagans & Good, 2013; National Institute of Child Health and Human Development Early Child Care Research Network, 2005; Ogbu, 1997). Rowley and Wright (2011) investigated how student performance and school environment, as well as family, teacher, and peer relationships affect reading and math abilities between Black and White 10th graders in the United States. SES was the largest predictor of the discrepancy in test scores between Black and White students, with student performance and peer relationships also significantly contributing to the discrepancy in scores. No other factors had an effect on the difference in scores. This suggests that although SES is a contributor, it is not the only factor contributing to the educational opportunity gap. In relation, Fryer and Levitt (2015) found that differences in scores between Black and White students disappeared when controlling for SES (see also Quinn, 2015). However, other researchers have not corroborated that evidence (e.g., Murnane et al., 2006; Rowley & Wright, 2011; Strand, 2013) suggesting the relationship between the educational opportunity gap and SES is complex, and multiple factors may be contributing to the educational opportunity gap. For instance, a longitudinal study conducted in the United Kingdom found that Black Caribbean students had lower levels of academic achievement compared to White students, but SES did not completely account for the difference. However, SES did account for differences among other ethnic minority groups[1] (Strand, 2013) providing further support for the need to consider the relationship between SES and the educational

[1] Other ethnic minority groups included students of Black African, Pakistani, and Bangladeshi backgrounds.

opportunity gap although it may not fully explain why differences exist. In relation to the literature indicating SES contributes to the educational opportunity gap, it is noted that children from lower SES backgrounds have fewer opportunities to engage in reading-related activities before entering school which negatively impacts how they develop reading ability and component literacy skills. For instance, students from lower SES backgrounds by school entry are less likely to have participated in shared reading activities with a more experienced reader, know fewer vocabulary words, have less library access, have had fewer experiences engaging with print materials, and more often attend daycare centres that emphasize social-emotional skills over academic skills (see Baker et al., 1995; Goldenberg, 1996; Hagans & Good, 2013; Hart & Risley, 1995; Kowalski et al., 2001; McGill-Franzen et al., 2002; Roberts et al., 2005). Having less access to reading-related activities may be contributing to why the educational opportunity gap exists in the context of SES, and why students from lower SES backgrounds have been found to have lower overall reading ability.

In the Canadian context, Caldas et al. (2009) found that the relationship between Black and White students academic achievement scores was also influenced by school socio-economic status, peer family structure, and average age of students' parents (Caldas et al., 2009). Specifically, they found that Black students were more likely to have come from families with lower incomes, with a single parent, and with parents of a younger age, factors that all contributed to poorer academic outcomes. Although not looking specifically at reading or component literacy skills, this study demonstrates evidence of the educational opportunity gap, at least as measured by academic outcomes more generally, in the Canadian context with SES contributing to this gap. Furthermore, a scoping review examined factors contributing to the educational opportunity gap in Canada. Mayor (2019) evaluated how a range of demographic and contextual factors contributed to differences in academic achievement, measured by standardized test scores or GPA. The demographic factors included SES, gender, language, immigrant status, and family structure; they looked at a single ethnic group—that of Indigenous status. Although this study does not provide evidence of the educational opportunity gap between Black students compared to other groups, Mayor (2019) reported that more than half of the studies included in the scoping review indicated SES was "significant in determining the magnitude and direction of educational opportunity gaps" (p. 56). Notably however, neither Caldas et al.

(2009) or Mayor (2019) specifically investigated reading levels or component literacy skills. Thus, there is not a comprehensive examination of the evidence of the educational opportunity gap specifically for Black students in the empirical Canadian literature related to the acquisition of reading ability and component literacy skills.

In the present study, we build on the pre-existing evidence by examining the educational opportunity gap in reading levels with specific attention to African Nova Scotian learners, and we do so by considering the component literacy skills required to develop proficient reading ability. Knowledge of component literacy skill levels informs us of students reading development, as many component skills predict future reading ability. Understanding how young students develop these component skills and at what proficiency rates can inform curriculum development to ensure we are using the best instructional practices to promote strong reading skills. Additionally, knowing how students develop component literacy skills can inform schools and other educational environments in which areas students may need early intervention to improve their overall reading ability and prevent future disparities. For example, in the literature from the United States, Black students are identified as at-risk for poor reading ability (Snow et al., 1998; Thomas-Tate et al., 2004; U.S. Department of Education, 2001). Knowing the component literacy skill levels of Black students compared to other groups of students may point to specific deficits to inform which component skills need to be addressed to improve overall reading ability for this group. What is known about the identified component literacy skills related to the educational opportunity gap will be detailed in the following sections.

Component Literacy Skills

Vocabulary

Generally, vocabulary refers to "the words we must understand to communicate effectively" (p. 34; Armbruster et al., 2003). To become proficient readers, children need to learn 10,000 words by age 6 (Jalongo & Sobolak, 2011), when students are typically in 1st grade. In a study of 1st through 4th grade students, White et al. (1990) found that Black students from a low SES inner-city school scored lower than White students from a middle to high SES suburban school on a multiple-choice vocabulary test in all four grades assessed. However, the researchers did not compare White suburban schools to Black suburban

schools with similar SES distributions limiting what can be concluded from this study, knowing that SES has a negatively correlated relationship with reading ability (Fluss et al., 2008; Noble et al., 2006). Restrepo et al. (2006) investigated receptive and expressive vocabulary skills in a sample of high-risk 4- and 5-year-old preschool children using maternal education levels as a measure of SES. Restrepo et al. (2006) found that Black students whose mothers had a high school or less education scored lower than White students whose mothers also had a high school or less education on both measures of vocabulary. This suggests that vocabulary development may be affected by more than just SES as measured using family composition. More recently, McCabe and Champion (2010) found that 2nd and 4th grade Black students scored significantly lower than the norming sample on the Expressive Vocabulary Test and the Peabody Picture Vocabulary Test-III. However, the Black students participating in this study were all from low-income households. Without comparing Black students from differing SES backgrounds, it is unclear if these results are attributable to low SES or other factors. Although dated, the literature indicates that students from lower SES backgrounds know approximately 5,300 fewer words than students from higher SES backgrounds (Templin, 1957), with more recent literature suggesting the difference is closer to 15,000 words by 1st grade (Moats, 1999) further suggesting that SES is a strong contributor to vocabulary development. Notably, differences in vocabulary between Black and other students are observable as early as preschool (see Qi et al., 2006; Restrepo et al., 2006; Washington & Craig, 1992), stressing the importance of early identification and intervention for students at risk for poor reading ability.

Phonological Awareness

Phonological awareness is an umbrella term referring to a cluster of skills involving the ability to "recognize, discriminate, and manipulate the sounds in one's language" (Anthony & Francis, 2005, p. 256; see also Fisher, 2008; Hayward et al., 2017; Schuele & Boudreau, 2008). Yet, few studies have investigated specifically the effect of phonological awareness skills on reading ability among Black students. Thomas-Tate et al. (2004) investigated phonological awareness skills of a sample of African American 1st graders by administering the Test of Phonological Awareness and the Comprehensive Test of Phonological Processing. Three-quarters of participating Black students scored more than one standard deviation below the mean from

the manual on the Test of Phonological Awareness. In a normal distribution, it is expected that less than 16.5% of scores are more than one standard deviation below the mean. Conversely, Black students' scores on the Comprehensive Test of Phonological Processing fell on the low end of average compared to the normal distribution. The researchers suggest this discrepancy indicates that the Test of Phonological Awareness may not be suitable for assessing phonological awareness in Black students compared to the Comprehensive Test of Phonological Processing. To further support this notion, Black students' reading ability, assessed using the Woodcock Reading Mastery Test-Revised (WRMT-R) subtests in the sample of students, was average (expected based on their age and grade) to high average (Thomas-Tate et al., 2004). Similar results, using the Comprehensive Test of Phonological Processing, were found by Edwards and Taub (2016) in a sample of predominantly Black students in 1st through 4th grade where phonological awareness skills were positively correlated with reading comprehension. Thus, the literature indicates that overall reading ability is positively correlated with phonological awareness skills among Black students.

Related to the educational opportunity gap, Black children in early grades (preschool, kindergarten, and 1st grade) with poor phonological awareness skills have been found to have the most deficient reading ability in later grades (Thomas-Tate et al., 2004) demonstrating the importance of knowing how deficits in phonological awareness skills may contribute to the educational opportunity gap. Notably however, the empirical literature on the acquisition of phonological awareness skills related to the educational opportunity gap is mainly posed from the perspective of income (low SES groups compared to high SES groups) or only among Black students rather than Black students compared to White or other student groups. However, we know that Black students are more likely to come from low-income families than White students.

The empirical literature demonstrates there is a relationship between phonological awareness and SES. Foster and Miller (2007) investigated the relationship between phonological awareness skills and reading comprehension skills for children in kindergarten to grade 3. The authors found that there was a large discrepancy in phonological skills among students entering kindergarten between three reading readiness groups (low, average, and high), but the discrepancy had dissipated by 3rd grade (Foster & Miller, 2007). Although assuring, the average and high readiness groups had achieved the same level of proficiency in

phonological awareness skills by grade 1, whereas the low group did not achieve the same level of proficiency until grade 3. Notably, students from the low readiness group were more likely to be living in poverty and have a parent with a high school (or less) education level (Foster & Miller, 2007). The results from this study suggest that phonological awareness skills play an important role in the development of reading ability, and environmental factors may mediate this relationship; however, with proper academic instruction, disparities in phonological awareness skills can be remediated (see Blachman, Tangel, Ball, Black, & McGraw, 1999; Hagans & Good, 2013). Additionally, the literature suggests SES has less of an impact on the educational opportunity gap when phonological awareness skills are included as a covariate (see Bowey, 1995; Hagans & Good, 2013; Noble et al., 2006; Raz & Bryant, 1990).

Morphological Awareness

Morphological awareness is the "conscious awareness of the morphemic structure of words and their ability to reflect on and manipulate that structure" (Carlisle, 1995, p. 194). Morphemes are "the smallest units of meaning within words" (Deacon & Kirby, 2004, p. 224) which includes roots, prefixes, and suffixes (Apel & Thomas-Tate, 2009; Carlisle, 1995; Carlisle, 2010; McBride-Chang, Wagner, Muse, Shu, & Chow, 2005).

Research to date demonstrates positive correlations between morphological awareness, reading ability and spelling (e.g., Apel & Thomas-Tate, 2009; Carlisle, 2000; Carlisle & Stone, 2005; Deacon & Kirby, 2004; Kemp, 2006; Fowler & Liberman, 1995; Levesque et al., 2020; Robertson & Deacon, 2019; Siegel, 2008). The relationship between morphological awareness and reading ability has been demonstrated to survive multiple control variables, demonstrating its relevance to overall reading ability (see Deacon et al., 2013; Kirby et al., 2011; Levesque et al., 2017; Robertson & Deacon, 2019). However, it is unclear precisely how morphological skills influence the development of reading and spelling skills (Levesque et al., 2020). Manolitsis et al. (2019) investigated the relationship between morphological awareness and word reading, reading comprehension and vocabulary skills over time from grades 1 to 3. They observed that morphological awareness was related to word reading fluency and partially mediated the relationship between vocabulary, word reading and reading comprehension. However, morphological awareness was less predictive than phonological awareness on word reading fluency (Manolitsis et al., 2019). Although the study by Manolitsis

et al. (2019) does not provide evidence for the effects of morphological awareness on the educational opportunity gap, it indicates that it is a component literacy skill associated with reading ability. Other research has also found that morphological awareness is predictive of word reading (both actual words and pseudowords) in lower elementary-aged children, even after controlling for vocabulary and phonological awareness skills (Deacon, 2012; Robertson & Deacon, 2019). Thus, the literature indicates morphological awareness is a component literacy skill that contributes to reading ability.

Turning to levels of morphological awareness skills among Black students in particular, Apel and Thomas-Tate (2009) investigated morphological awareness skills in a sample of African American 4th graders. Black students' morphological awareness skills were comparable to that of White students reported in other studies (e.g., Siegel, 2008; Singson et al., 2000). Further, students' scores on morphological awareness tasks were related to their scores on word reading, spelling, and vocabulary tasks, but not to reading comprehension or phonemic awareness. Notably, in this sample with high levels of dialect use, levels of dialect use were not correlated with students' scores on the morphological awareness tasks. These results suggest that Black students have similar levels of morphological awareness skills compared to White students, and their proficiency with morphological awareness might not differ depending on the frequency of dialect use.

Related to the educational opportunity gap, interventions for students with low morphological awareness skills seem efficacious for students from low-income backgrounds. Apel and Diehm (2014) investigated whether an 8-week intervention improved morphological awareness and word reading skills of students in kindergarten through 2nd grade. All of the students participating in the intervention were from low-income backgrounds. The results of the study found that all students, regardless of grade, had statistically significant gains to their morphological awareness skills but not word reading ability (see also Apel, Brimo, Diehm, & Apel, 2013). The results from this study suggest that in order to increase word reading ability, morphological awareness may need to be targeted in addition to other component literacy skills. Notably, the researchers did not compare low-income students to high income students, limiting the conclusions of the

results. Taken together, the literature suggests that morphological awareness skills are related to word reading ability but may not contribute to the educational opportunity gap.

Syntactic Awareness

Syntax is a component of grammar that refers to the ways words are combined to create longer sentences (Dawson & Phelan, 2016); accordingly, syntactic awareness refers to "reflecting on or manipulating the order of words in a sentence" (Nagy, 2007, p. 53; see also Gombert & Gombert, 1992; MacKay et al., 2021). Of note, syntactic awareness is also an oral language skill (Curenton, 2010).

The literature on syntactic awareness related to the educational opportunity gap is limited. Curenton (2004) asssessed syntactic skills by asking low-income preschoolers aged 3 to 5 years to produce narratives, "the ability to create and understand stories" (Curenton, 2010; p. 288). The researchers found that there were no statisticlaly significant differences in narrative skills between Black and White preschoolers (Curenton, 2010). However, they found age-based differences such that 4- and 5-year old children had better developed narrative skills than 3 year olds. In a second study using the same sample of students, Curenton (2011) investigated if differences in narrative skills would be found when looking specifically at narrative comprehension and narrative production skills. Narrative comprehension involves "understanding not only what has happened in the story but also why it has happened" (p. 791). Narrative production on the other hand is the ability to "create stories that are rich in plot, themes and internal states" (p. 792). This time Black preschoolers had higher narrative skills compared to White preschoolers, but only on narrative comprehension tasks. Taken together, these results suggest that there is not a gap in syntactic awareness skills between Black and White students as measured using narratives in preschool children. Notably though, storytelling, or narratives, have long been documented as tradition amongst African and Black peoples (Gardner-Neblett et al., 2012; see also Peterson & McCabe, 1994; Rogoff & Chavajay, 1989; Smitherman, 1977, 2000) This history of storytelling may partially explain why Black preschoolers outperformed White preschoolers on a task of narrative comprehension. That said, past researchers (e.g., Craig & Washington, 1994; Whitehurst, 1997) have found that coming from a low-income background or having frequent dialect use is less likely to affect the development of narrative skills than other language skills (Curenton, 2004).

Thus, syntactic awareness as measured using narratives, may not be a component literacy skill associated with the educational opportunity gap. Importantly, narrative skills are only one way to assess syntactic awareness ability, thus assessments of other syntactic awareness skills may pose different results and results might also differ in older children. Furthermore, although there is not a gap in narrative skills, this does not mean differences for other component literacy skills do not exist.

Prosodic Sensitivity

Prosody is "the rhythmic patterning of spoken language" (Holliman et al., 2014, p. 256), including timing, phrasing, emphasis/stress, and intonation (Kim & Petscher, 2016). Prosodic sensitivity is the ability to detect these features (Holliman et al., 2010; Kim & Petscher, 2016). Prosody can help convey aspects of meaning in spoken language (Kim & Petscher, 2016). Prosodic sensitivity is also a characteristic of oral language, and thus this skill begins to develop before formal reading instruction (Critten et al., 2020; Rago et al., 2014).

Prosodic sensitivity skills are related to reading ability and component literacy skills. Kim and Petscher (2016) investigated how prosodic sensitivity is related to reading ability in 1st grade students. The researchers found that prosodic sensitivtiy in relation to word reading is influenced by students phonological awareness and morphological awareness skills. Thus, prosodic sensitivity may not be a standalone skill required for proficient reading ability and component literacy skills (see also Holliman et al., 2014). Other researchers have also found that prosodic sensitivity is not related to reading ability. The authors of these studies suggest that prosodic sensitivity may be more critical for older readers when they encounter longer, multisyllabic words (see Deacon et al., 2018; Holliman et al., 2017). Notably, however, there are no studies on how prosodic sensitivity relates to the educational opportunity gap between Black and White students or students from different SES backgrounds. Although differences may be more likely to be found for prosodic sensitivty skills between learners when differences are found for phonological awareness and morphological awareness skills. This result is speculated because the research suggests that prosodic sensitivity skills are influenced by other component literacy skills (see Kim & Petscher, 2016).

The Present Study

It is demonstrated in the literature mostly stemming from the United States that there is a gap in reading levels for Black students when compared to White students (National Assessment of Education Progress, 2019; Rowley & Wright, 2011; U.S. Department of Education, 2001), but the evidence is less evident in Canada. Furthermore, the data is even more limited in both contexts explicitly for gaps in component literacy skill levels. However, it is known that several component literacy skills are necessary for becoming a proficient reader (National Reading Panel, 2000). Although the existing literature on the educational opportunity gap focuses primarily on phonological awareness, the following study will also investigate measures of reading ability and component literacy skills, including vocabulary, phonological awareness, morphological awareness, syntactic awareness, and prosodic sensitivity.

The purpose of the present study is to investigate whether evidence of the educational opportunity gap in relation to reading ability and component literacy skills exists between all students of African descent, as well as separate comparisons of African Nova Scotian and African students, compared to all other Nova Scotian students in a sample of 1st grade children in Nova Scotia. Students of African descent in this sample combines all African students as well as African Nova Scotian students. Additionally, this study aims to investigate if current levels of reading ability and component literacy skills differs between African Nova Scotian students and African students.

Our first research question is do we observe a gap in reading ability and component literacy skills between students of African descent and their peers? It is hypothesized that students of African descent will have lower average scores on measures of reading ability, vocabulary, phonological awareness, and morphological awareness compared to a random sample of all other Nova Scotian students. This result is speculated based on the data from the provincial assessments that reports students of African descent have lower average reading levels (Nova Scotia Department of Education and Early Childhood Development, 2020). Additionally, the literature indicates that Black students have lower scores for component literacy skills compared to their peers including vocabulary (e.g., McCabe & Champion, 2010) and phonological awareness (Thomas-Tate et al., 2004). Although the literature does not indicate a Black-White educational

opportunity gap for morphological awareness, the literature suggests that a gap in morphological awareness skills exists for students from lower SES backgrounds (e.g., Apel & Diehm, 2014). However, the literature suggests syntactic awareness skills are not associated with the educational opportunity gap (e.g., Curenton, 2011), thus it is not hypothesized that differences will be found for this skill. Notably, there is no literature on prosodic sensitivity related to the educational opportunity gap or SES. However, considering it is speculated that prosodic sensitivity skills may be more critical for older readers (see Deacon et al., 2018; Holliman et al., 2017), it is hypothesized that there will be no differences for this skill.

Our second research question is do we observe a gap in reading ability and component literacy skill levels specifically for African Nova Scotian students when compared to a random sample of all other students in the sample? It is hypothesized that African Nova Scotian students will have lower average scores on measures of reading ability, vocabulary, phonological awareness, and morphological awareness but not the other component literacy skills, compared to a random sample of all other students. These results are speculated for the same reasons noted in the first research question. African Nova Scotian students were analyzed as a distinct group separate from all students of African descent to determine if African Nova Scotian students have distinct patterns concerning their levels of reading ability and component literacy skills when analyzed separately from all students of African descent. Differences in scores for students of African descent may be affected by additional factors such as past educational experiences or language considering this group includes students who have immigrated to Canada or may be first-generation Canadians. Furthermore, African Nova Scotian students had the lowest SES in the sample (see Table 4) and notably, the literature indicates that reading ability and component literacy skills are influenced by SES (e.g., Apel & Diehm, 2014; Foster & Miller, 2007; McCabe & Champion, 2010; White et al., 1990). Additionally, the provincial assessment data (Nova Scotia Department of Education and Early Childhood Development, 2020) does not analyze African Nova Scotian students as a distinct group from students of African descent despite reporting that African Nova Scotian students have lower reading ability scores compared to other students in Nova Scotia (Nova Scotia Department of Education and Early Childhood Development, 2014). Thus, we

would like to draw concrete conclusions whether African Nova Scotian students specifically have lower average reading ability and component literacy skill levels compared to other students.

Our third research question is do differences in levels of reading ability and component literacy skills remain when controlling for SES? To answer this question, students were matched on SES using Hollingshead scores (Hollingshead, 1975), age, first language, home country, and sex, in that order to rule out confounds. Again, students of African descent and African Nova Scotian students were analyzed as separate groups. It is hypothesized that students of African descent and African Nova Scotian students will not have different scores on measures of reading ability and component literacy skills when matched on SES to a sample of all other Nova Scotian students. This hypothesis is based on the literature that students from lower SES backgrounds are more likely to have lower reading ability (e.g., Snow et al., 1998), vocabulary (e.g., Restrepo et al., 2006), phonological awareness (e.g., Foster & Miller, 2007), and morphological awareness (e.g., Apel & Diehm, 2014). There is not enough literature for syntactic awareness and prosodic sensitivity in relation to SES to formulate strong a strong hypothesis, thus, it is also hypothesized that there will not be differences for these component literacy skills. If differences are observed, this would suggest they are not due to SES alone and may be due to language or other factors.

Our final research question is do we observe a gap in reading ability and component literacy skill levels between African Nova Scotian and African students? It is hypothesized that African Nova Scotian students will have lower average scores on all reading ability and component literacy skills compared to African students as African Nova Scotian students had the lowest SES in the sample (see Table 4). Additionally, African Nova Scotians have an adverse history of educational experiences in Nova Scotian (e.g., Black Learners Advisory Committee, 1994; Halifax Regional School Board, 2016; Hamilton-Hinch et al., 2021; Henry, 2019). We wanted to compare African Nova Scotian students to African students to determine whether we observe a gap in reading ability and component literacy skill levels between these groups. This information would tell us if African Nova Scotian students and African students should be analyzed as separate groups, and whether African Nova Scotian students have distinct differences in how they acquire reading ability and component literacy skills. The research literature to date treats all students of

African descent as a homogenous group, thus potentially missing specific patterns of reading ability and component literacy skill development that may be due to language or other factors.

Method

Participants

This study reports on data collected as a part of a larger study (N = 338). Participating students were recruited from 18 public schools in Nova Scotia, and all students were in the English stream (i.e., no students were in French Immersion). Participating students were in 1st grade at the time of assessment. All participating students had normal or corrected-to-normal vision. The primary exclusion criterion lies in the ability to understand the test instructions and cooperate with the testing. Notably, 51 (15.09%) students started, but did not complete, one or more measures. However, due to the small sample sizes for certain ethnic groups, their data was still included in the study.

Student demographics were based on parent report, obtained from the Parent Questionnaire (see Appendix C). Because the analysis is based on ancestry, having participants whose ancestry is not listed may limit accurate interpretation of the results. 50 (14.79%) participants had “no response” for ancestry and were excluded from the analysis. For SES,13 (3.85%) participants who had “no response” (i.e., missing data) or “not interpretable” were removed. Because the literature indicates that SES influences reading ability and component literacy skills, having participants whose SES is not supplied may limit accurate interpretation of the results. Thus, of the 338 students who participated in year one of the larger study 275 (81.36%) remained in this study after the dataset cleaning process (see Table 3 and Table 4 for the demographics for the sample as well as the sample split by ancestry group, respectively). Students in the study sample ranged in age from 74 to 92 months of age (M = 81.68 months, Med = 81.00 months, SD ± 3.76), and most students were born in Canada (N = 217, 78.90%), with 58 (21.1%) families indicating that Canada was not the child’s home

country[2]. The majority of students' first language was English[3] (N = 234, 85.1%) with 41 (14.90%) students speaking a first language other than English. The majority of families indicated English is always spoken at home (N = 226, 82.2%), followed by half of the time (N = 18, 6.5%), rarely (N = 16, 5.8%), usually (N = 11, 4.0%), and never (N = 1, 0.4%). Most students did not have any clinical diagnoses that may affect learning or the acquisition of academic skills (N = 249, 90.6%), the parents of 11 (4.0%) students reported that they had Attention-Deficit Hyperactivity Disorder (ADHD), 3 (1.1%) had Autism Spectrum Disorder (ASD), 4 (1.6%) had a language disorder, 4 (1.5%) had other diagnoses, and 4 (1.5%) had no response. SES was calculated using the Hollingshead Index (1975) – scores ranged from 8 to 66, with the mean being 46.82 (SD ± 11.43) and median 49.00. Student demographics are in Tables 3 and 4.

The data was analyzed using a random sample as well as with a matched sample approach. The matched sample analysis was completed to rule out confounds related to specific demographic variables. The variables used to match students were SES (based on Hollingshead scores; Hollingshead, 1975), age, first language, home country, and sex, in that order. The match for SES was within a four-point difference, and the match for age was within a seven-month difference (see Tables 5 through 7) based on means. The random sample analysis on the other hand compared students of African heritage and African Nova Scotian (ANS) students to random samples of all other Nova Scotian (NS) students. The random sample analysis is more reflective of what would be observed in a typical classroom or real-world setting. Thus, the data was analyzed in five comparisons:

1. To address the first research question, students of African descent (N = 24) were compared to a random sample of all other Nova Scotian students[4] (N = 24).

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[2] Other countries of birth were Abu Dhabi, Argentina, Australia, Bangladesh, Beijing, Belize, Bosnia, China, Croatia, Egypt, Ethiopia, India, Israel, Italy, Kenya, Korea, Kuwait, Libya, Mexico, Palestine, Philippines, Romania, Russia, South Africa, Syria, Taiwan, UAE, UK, and USA.

[3] Other first languages included Afrikaans, Albanian, Amharic, Arabic, Bengali, Bosnian, Gujarati, Hindi, Italian, Karay-a, Korean, Kurdish, Malayalam, Mandarin, Romanian, Russian, Spanish, (Ki)Swahili, Tamil, Telugu, and Urdu.

[4] The ancestry of all other NS students included Aboriginal, Acadian, Asian, East Asian, European, and Middle Eastern students.

2. To address the second research question, African Nova Scotian students (N = 12) were compared to a random sample of all other Nova Scotian students (N = 12).
3. To address the third research question, students of African descent (N = 24) were matched to all other Nova Scotian students (N = 24).
4. To address the third research question, African Nova Scotian students (N = 12) were matched to all other Nova Scotian students (N = 12).
5. To address the fourth research question, African Nova Scotian students (N = 12) were compared to African students (N = 12).

Materials

Demographics. Demographic information was collected using a parent questionnaire (see Appendix C). The Parent Questionnaire asked parents to answer a number of questions about their child including their name, the first language they learned, how often English or other languages are spoken in the home, the ancestry their child most identifies with (Acadian, European, Aboriginal, African/Black, African Nova Scotian, Middle Eastern, Asian, East Asian, or other), whether their child was born in Canada, and if their child has ever received a diagnosis that may affect their learning. Parents were also asked questions regarding their, marital status, education level, occupation, and relationship to their child (mother, father, stepparent, or other).

Socioeconomic Status (SES). SES was calculated using the Hollingshead Four-Factor Index of Social Status (Hollingshead, 1975) using information collected from the parent questionnaire. This measure was chosen because it is a widely cited measure of SES with over 11,000 citations. The Hollingshead Four Factor Index of Social Status is used to assess household socioeconomic status (Hollingshead, 1975) based on each parent/guardians' education (coded on a 1-7 scale) and occupation (coded on a 1-9 scale). To calculate the household SES score using the Index, the education code is multiplied by 3, and the occupation code is multiplied by 5. These two scores are then added together for each parent/guardian in the household. If both parents/guardians in the household were employed, each parent/guardian's scores were averaged to create a household socioeconomic status score. SES scores below 36 are considered low SES. However, Hollingshead

classifications have not been updated since their publication. Thus, the determination of parental occupation, and thus SES, may not be reflective of current society. As a result, several adjustments were made to the Hollingshead coding classifications for parent occupation to obtain a more accurate picture of SES. For example, some occupations were not listed in the original Hollingshead coding instructions (e.g., yoga teacher) and there were no specific instructions for how to code multiple occupations. It was decided that if a listed occupation(s) did not fit within the defined Hollingshead categories, the lowest score would be used if there were two or more similar options for an occupation code. For multiple occupations, the average of the scores for each occupation was calculated as the occupation code. If persons reported an occupation that did not have an income (e.g., student) the lowest code value would be applied unless there was another source of income in the household. In the event that someone indicated they were retired, but listed their previous occupation, their previous occupation was the code used assuming they are receiving a pension (see Appendix D).

Dependent Variables. The dependent variables used assessed reading ability, vocabulary, phonological awareness, morphological awareness, syntactic awareness, and prosodic sensitivity.

Tests of Reading Efficiency – Second Edition (TOWRE-2) Sight Word Efficiency. The TOWRE-2 Sight Word efficiency task (Form A; see Torgesen et al., 1999, 2012) is standardized for individuals between the ages of 6 to 24 years old (manual reliability is over .90; Torgesen et al., 1999). The task is designed to assess an individual's ability to pronounce printed words accurately and fluently, from a list of 108 words that gradually increases in length and difficulty. Individuals are asked to read as many items as they can within a 45 second time period.

Tests of Reading Efficiency – Second Edition (TOWRE-2) Phonemic Decoding Efficiency. The TOWRE-2 Phonemic Decoding Efficiency task (Form A; see Torgesen et al., 2012) is standardized for individuals between the ages of 6 to 24 years old (manual reliability is over .90; Torgesen et al., 2012). The is designed to assess an individual's ability to pronounce phonemically regular pseudowords accurately and fluently from a list of 66 pronounceable nonwords (e.g., *ba, fos, knap*). The nonwords gradually increases in length and

difficulty as they progress. Individuals are asked to read as many items as they can within a 45 second time period.

Woodcock Reading Mastery Tests, Third Edition (WRMT-III): Word Identification. The WRMT-III: Word Identification task (Form A; see Woodcock, 1998) is standardized for individuals between the ages of 4 to 79 years old (manual reliability = .95; Woodcock, 1998). Participants are asked to read as many words as they can based on their grade-specific start points. The task also has basal and ceiling rules to ensure participants only see items that are within their functional range. The words gradually increase in difficulty as participants progress.

Woodcock Reading Mastery Tests, Third Edition (WRMT-III): Passage Comprehension. The WRMT-III Passage Comprehension task (see Woodcock, 2011) is standardized for individuals between the ages of 4 to 79 years old (manual split half reliability = .93; Woodcock, 1998). Participants are asked to read a sentence or short passage silently and identify a single missing word, from a specified blank space, within the sentence or passage.

Peabody Picture Vocabulary Test 5th Edition (PPVT-5). The PPVT-5 (Form A; see Dunn, 2019) is a standardized assessment of receptive vocabulary for individuals aged 2 to 90 plus years old (manual reliability = .97; Dunn, 2019). Students are presented with sets of four colored photos and are asked to identify which picture represents a target word, answers a specific question, or provides a synonym for a word that fits the picture. All target words are administered verbally. The task has age-specific start points, and basal and ceiling rules to ensure participants only see items that are within their functional range. The words gradually increase in difficulty as participants progress.

Weschler Abbreviated Scale of Intelligence, Second Edition (WASI-II): Vocabulary (Expressive). The WASI-II; see Weschler, 2011) is a standardized assessment of expressive vocabulary for individuals aged 6 to 90 years old. Participants are asked to define or describe a target word that is presented orally. The number of items used from the standardized assessment was reduced to 14 items from a total of 31 items (sample reliability = .57).

Woodcock Reading Mastery Tests, Third Edition (WRMT-III) Phonological Awareness – Blending and Deletion. The WRMT-III Phonological Awareness tasks (see Woodcock, 1998) is a standardized assessment of phonological awareness for individuals aged 4 to 79 years old. The tasks are designed to assess five phonological components of language; only two components were assessed in this study (manual split half reliability = .81; Woodcock, 1998). One of the two specific phonological skills assessed was blending – the ability to combine phonemes or syllables and identify the formed words (sample split half reliability = .69). The other skill was deletion – the ability to say a formed word when one phoneme or syllable is removed from the beginning or end of the word (sample split half reliability = .77). For the blending task, words are said to a student one part at a time, and students are asked to say which word is made up of those sounds (e.g., Tell me what word this makes: "Pop" … "Corn", makes Popcorn). For the deletion task, students are asked to say words without certain sounds (e.g., Say Pancake without Pan, leaves Cake).

Morphological Analysis Picture Task. The Morphological Analysis Picture Task (see Champion, 1997) is an experimental task (sample reliability = .77) designed to assess a student's ability to infer the meaning of an unfamiliar morphologically complex word based on its smaller parts (prefix, base, and suffix word parts) and an accompanying photo. Participants are asked to choose which picture (one correct photo and three distractors) best illustrates a short phrase that includes a pseudoword (made up word). For example, participants are asked to point to the picture that shows "childreny chair". The correct picture would include the base word, suffix and/or prefix, and the anchor word.

Morphological Awareness Sentence Completion. The Morphological Awareness Sentence Completion task (see Kruk & Bergman, 2013) is an experimental task designed to assess a student's ability to manipulate the morphological structure of sentences for composing and decomposing sentences (sample split half reliability = .88). Participants are provided with a word, and then asked to finish sentences that have the target word missing at the end. The suffix of the word needs to be changed to fit the sentence grammatically. For example, if the sentence is "Car. Yesterday he sold two ___", the target word would be "cars" (compose; sample split half reliability = .76), or "Running. How fast can you ___", the target word would be "run" (decompose; sample split half reliability = .83).

Morphological Analysis – Define. The Morphological Awareness Define task (see Levesque et al., 2017; see also Larsen & Nippold, 2007; Nunes et al., 2006; Ram, Marinellie, Benigno, & McCarthy, 2013) is an experimental task (sample reliability = .60) designed to assess a student's ability to infer meaning from the morphological structure of infrequent morphologically derived words (e.g., questionable) based on its smaller parts (prefix, base, and suffix word parts). Students were presented with a morphologically complex word with four multiple-choice definitions (one correct definition and one distractor) and were asked to choose the definition that best represented the meaning of the complex word. The correct definition of each item was designed to reflect the meaning of both the base morpheme and the suffix.

Morphological Awareness: Word Analogy. The Morphological Awareness Word Analogy task (see Kirby et al., 2012; see also Levesque et al., 2017; Levesque et al., 2019) is an experimental task designed to assess a student's understanding of inflected and derived word suffixes (sample split half reliability = .81). Derived suffixes make new words by changing a word from one grammatical class to another whereas inflected suffixes add an inflection to the end of a word that changes the grammatical properties of a word within its syntactic category. Students are presented with a word and asked to change it so that it was a different word ending. Participants are asked what the next word should say after being presented with three words (e.g., if given longer, long, taller, the next word should be tall (inflected), or if given long, length, wide, the next word should be width (derived)).

Sentence Comprehension: Whatdunnit. Whatdunnit (see Montgomery et al., 2016) is an experimental task of syntactic awareness that assesses students' comprehension of and sensitivity to canonical (subject-verb-object) and noncanonical (passive, object relative) word order structures (sample reliability = .66). Students hear a sentence and are then presented with three pictures. Students are then instructed to choose the image that matches the object doing the action from the sentence.

Syntactic Awareness: Grammatical Correction. The Syntactic Awareness Grammatical Correction Task (see Deacon & Kieffer, 2018; see also Cain, 2007) is an experimental task (reliability = .69; Deacon & Kieffer, 2018) that assesses a student's ability to identify and correct grammatically incorrect sentences presented verbally. Students are instructed to change the order of the words, without adding, changing, or omitting

words, to make the sentence grammatically correct. For example, if presented with the sentence “The girl opened door the.”, the sentence should be changed to “The girl opened the door” to make it grammatically correct.

Prosody Sensitivity (Maddy’s Farmhouse). Maddy’s Farmhouse (see Clin et al., 2009; Holliman, 2016; Holliman et al., 2017; Whalley & Hansen, 2006; Wood, 2006) is an experimental task (sample reliability = .69) designed to assess the participants ability to detect components of prosodic sensitivity (stress and intonation) In this task, participants are instructed to look at pictures using slides on a computer and listen to various audio files. In the first task (word stress), the person speaking in the audio file is described as having a speech difficulty and says words a bit differently. The person in the audio file says an item present in the photo, and students are asked to point to the item that was said (e.g., chimney, closet, balloon). The second task (intonation) assesses if the student can distinguish between statements or questions based on the intonation used by the speaker in the audio file (e.g., “The farmer milks the cow?” or “The farmer milks the cow.”). Participants are asked to listen to what is said, and then point to a picture to indicate whether a statement or question fits what they heard. The third and final task (phrase stress) assesses if the student can recognize sound patterns based on stress patterns. Participants are instructed that they will hear the name of a story or movie then hear the name said in a robot language with “dee-dee” sounds (e.g., Humpty Dumpty: DEEdee DEEdee or Bob the Builder: DEE dee DEEdee) that has the same stress pattern as the story or movie.

Procedure

Recruitment and Consent. As part of the larger longitudinal study, schools were provided information packages with a short description of the study for review. Informational flyers, demographic questionnaires, and informed consent forms (see APPENDIX A: CONSENT FORM) were then provided to teachers to distribute to children in grade 1 to take home to their parents. Consent forms and questionnaires were returned to the school by children, collected by their teachers, and completed forms were returned to the researchers before testing.

Once consent was obtained and testing began with students in school, assent was obtained from each student prior to beginning the research tasks. During the assent process, children were informed that they can decide to end their participation at any time. The experimenter monitored each child closely throughout the testing session and if a child exhibited signs of frustration with the tasks the testing was discontinued. The testing was also stopped if a child lost interest or appeared to be uncomfortable. Testing may have been continued at a later time if the child indicated an interest in continuing with the tasks through verbal assent. The child's ability to assent (or not) to testing was fully respected on a continuous basis throughout all interactions.

Data Collection. All tasks were administered individually with a trained research assistant and were administered in the order presented in the Experimenter Protocol (see APPENDIX B: EXPERIMENTER PROTOCOL**)** as part of the larger testing battery for the larger research study that took approximately two hours to complete with each student. Testing was divided into multiple sessions based on what was preferred and most accommodating for participating students and their classroom teachers. For instance, the number and length of the sessions was determined by the school's bell schedules, the participant's interest and cues, and teachers class schedules. During each session, participants were asked to do the best they can with time allowed for assent, breaks, and questions. For each task, children were provided practice questions giving the child an opportunity to ask questions and the tester a chance to provide feedback. For all sessions, students worked with a trained experimenter/research assistant individually in a quieter room where they were asked to complete a series of tasks. Data collection took place between January and May of 2019.

Results

Descriptive statistics for available standard scores can be found in Table 1. The values reported are one-tailed significance for exact tests (exact tests are more precise when the sample size is small; Field, 2009) as it was predicted that all NS students would have better scores on reading ability, vocabulary, and phonological awareness tasks compared to ANS students or students of African descent as a whole.

Students of African descent Compared to a Random Sample of All Other NS Students

Students of African descent were compared to a random sample of all other NS students to answer the first research question, do we observe a gap in reading ability and component literacy skills between students of African descent and their peers?

Word Reading. Scores on the TOWRE-2 Sight Word Efficiency task for students of African descent (*Mdn* = 26.00) did not differ significantly from all other Nova Scotian students (*Mdn* = 28.50), $Z = 0.43$, $p > .05$, $r = 0.06$. Results were also not significant when comparing TOWRE-2 Phonemic Decoding Efficiency scores between students of African descent (*Mdn* = 6.50) and all other Nova Scotian students (*Mdn* = 6.00), $Z = 0.37$, $p > .05$, $r = 0.05$. The same pattern emerged for the WRMT-III: Word Identification task where scores were not statistically different for students of African descent (*Mdn* = 13.00) compared to all other Nova Scotian students (*Mdn* = 14.00), $Z = 0.30$, $p > .05$, $r = 0.04$.

Reading Comprehension. There was not a significant difference in scores on the WRMT-III: Passage Comprehension task between students of African descent (*Mdn* = 6.50) and all other NS students (*Mdn* = 9.00), $Z = 0.87$, $p > .05$, $r = 0.12$.

Vocabulary. There was not a significant difference in scores on the PPVT-5 between students of African descent (*Mdn* = 126.00) and all other NS students (*Mdn* = 129.00), $Z = 0.89$, $p > .05$, $r = 0.13$. Similarly, scores on the WASI-II: Vocabulary task were also not statistically significant between students of African descent (*Mdn* = 5.00) and all other NS students (*Mdn* = 5.00), $Z = 0.59$, $p > .05$, $r = 0.09$.

Phonological Awareness. On the WRMT-III: Blending and Deletion task, scores for students of African descent (*Mdn* = 10.00) and all other NS students (*Mdn* = 10.00) were not statistically significant, $Z = 0.43$, $p > .05$, $r = 0.06$.

Morphological Awareness. On the Morphological Awareness Picture Task students of African descent (*Mdn* = 10.00) scores did not differ significantly compared to all other NS students (*Mdn* = 10.00), $Z = 0.98$, $p > .05$, $r = 0.14$. Similarly, scores on the Sentence Completion task between students of African descent (*Mdn* = 9.00) and all other NS students (*Mdn* = 9.00) was not statistically significant, $Z = 0.44$, $p > .05$, $r = 0.07$. The same pattern emerged for the Word Analogy task where students of African descent (*Mdn* = 3.00) did not

have significantly different scores compared to all other NS students (*Mdn* = 3.00), $Z = 0.59$, $p > .05$, $r = 0.09$. However, scores on the Analysis Define task were significantly lower for students of African descent (*Mdn* = 6.00) compared to all other NS students (*Mdn* = 12.00), $Z = 1.33$, $p < .05$, $r = 0.20$.

Syntactic Awareness. There was not a significant difference in scores on the Sentence Comprehension: Whatdunnit task between students of African descent (*Mdn* = 11.00) and all other NS students (*Mdn* = 12.00), $Z = 0.89$, $p > .05$, $r = 0.13$. Similarly, there was also not a significant difference on the Grammatical Correction task between students of African descent (*Mdn* = 5.00) and all other NS students (*Mdn* = 5.00), $Z = 0.44$, $p > .05$, $r = 0.07$.

Prosodic Sensitivity. There was not a significant difference in scores on the Maddy's Farmhouse task between students of African descent (*Mdn* = 26.00) and all other NS students (*Mdn* = 28.00), $Z = 0.74$, $p > .05$, $r = 0.11$.

To summarise, there were no significant differences in scores for students of African descent and all other NS students on the TOWRE-2 Sight Word Efficiency, TOWRE-2 Phonemic Decoding Efficiency, WRMT-III: Word Identification, WRMT-III: Passage Comprehension, PPVT-5, WASI-II: Vocabulary, WRMT-III: Blending and Deletion task, Picture Task, Sentence Completion (MA), Word Analogy, Sentence Comprehension: Whatdunnit, Grammatical Correction, or Maddy's Farmhouse tasks (see Table 8). A single statistically significant difference did emerge: students of African descent had statistically lower scores compared to all other NS students on the Analysis Define task.

ANS students Compared to a Random Sample of All Other NS Students

African Nova Scotian students were compared to a random sample of all other NS students to answer the second research question, do we observe a gap in reading ability and component literacy skill levels specifically for African Nova Scotian students when compared to a random sample of all other students in the sample?

Word Reading. Scores on the TOWRE-2 Sight Word Efficiency task for ANS students (*Mdn* = 22.50) was significantly lower compared all other NS students (*Mdn* = 37.50), $Z = 1.43$, $p < .05$, $r = 0.29$. Similarly, scores on the TOWRE-2 Phonemic Decoding Efficiency task were significantly lower for ANS students

(*Mdn* = 2.00) compared to all other NS students (*Mdn* = 13.00), $Z = 1.28$, $p < .05$, $r = 0.29$. However, scores on the WRMT-III: Word Identification task did not differ significantly between ANS students (*Mdn* = 10.00) and all other Nova Scotian students (*Mdn* = 16.50), $Z = 0.98$, $p > .05$, $r = 0.20$.

Reading Comprehension. There was not a significant difference in scores on the WRMT-III: Passage Comprehension task between ANS students (*Mdn* = 5.50) and all other NS students (*Mdn* = 10.00), $Z = 1.02$, $p > .05$, $r = 0.21$.

Vocabulary. There was not a significant difference in scores between ANS students (*Mdn* = 125.00) and all other NS students (*Mdn* = 134.00) on the PPVT-5, $Z = 0.78$, $p > .05$, $r = 0.16$. Similarly, there was not a significant difference in scores on the WASI-II: Vocabulary task between ANS students (*Mdn* = 4.00) and all other NS students (*Mdn* = 6.00), $Z = 0.96$, $p > .05$, $r = 0.20$.

Phonological Awareness. On the WRMT-III: Blending and Deletion task, ANS students (*Mdn* = 10.00) had significantly lower scores compared to all other NS students (*Mdn* = 12.00), $Z = 1.23$, $p < .05$, $r = 0.25$.

Morphological Awareness. On the Morphological Awareness Picture Task, scores between ANS students (*Mdn* = 10.00) and all other NS students (*Mdn* = 12.50) did not differ significantly, $Z = 0.80$, $p > .05$, $r = 0.17$. On the Define task, scores between ANS students (*Mdn* = 6.00) were also not statistically significant when compared to all other NS students (*Mdn* = 10.00), $Z = 0.85$, $p > .05$, $r = 0.18$. However, on the Sentence Completion task ANS students (*Mdn* = 6.00) scored significantly lower than all other NS students (*Mdn* = 11.50), $Z = 1.18$, $p < .05$, $r = 0.28$. Similarly, on the Word Analogy task ANS students (*Mdn* = 1.00) had significantly lower scores compared to all other NS students (*Mdn* = 4.00), $Z = 1.16$, $p < .05$, $r = 0.24$.

Syntactic Awareness. There was a significant difference in scores on the Sentence Comprehension: Whatdunnit task between ANS students (*Mdn* = 11.00) and all other NS students (*Mdn* = 12.50), $Z = 1.40$, $p < .05$, $r = 0.29$. However, scores on the Grammatical Correction task did not differ significantly between ANS students (*Mdn* = 4.00) and all other NS students (*Mdn* = 8.50), $Z = 0.80$, $p > .05$, $r = 0.17$.

Prosodic Sensitivity. There was not a significant difference in scores on the Maddy's Farmhouse task between ANS students (*Mdn* = 22.00) and all other NS students (*Mdn* = 26.50), $Z = 0.53$, $p > .05$, $r = 0.11$.

To summarize, ANS students had statistically lower scores when compared to all other NS students on the TOWRE-2 Sight Word Efficiency, TOWRE-2 Phonemic Decoding Efficiency, WRMT-III: Blending and Deletion, Sentence Completion, Word Analogy, and Sentence Comprehension: Whatdunnit tasks. The difference in scores between ANS students and all other NS students was not statistically significant for the WRMT-III: Word Identification**,** WRMT-III: Passage Comprehension, PPVT-5, WASI-II: Vocabulary, Picture Task, Analysis Define, Grammatical Correction, and Maddy's Farmhouse tasks (see Table 9).

Matched Sample Analysis Comparing Students of African descent to All Other NS Students

Students of African descent were compared to a matched sample of all other NS students to answer the third research question, do differences in levels of reading ability and component literacy skills remain when controlling for SES?

Word Reading. TOWRE-2 Sight Word Efficiency for students of African descent (*Mdn* = 26.00) did not differ significantly compared to scores for all other Nova Scotian students (*Mdn* = 28.50), Z = 0.72, $p > .05$, $r = 0.10$. However, WRMT-III: Word Identification scores were significantly lower for students of African descent (*Mdn* = 13.00) compared to all other Nova Scotian students (*Mdn* = 16.00), Z = 1.13, $p < .05$, $r = 0.17$. Similarly, for TOWRE-2 Phonemic Decoding Efficiency students of African descent (*Mdn* = 6.50) scored significantly lower than all other Nova Scotian students (*Mdn* = 12.50), Z = 1.21, $p < .05$, $r = 0.19$.

Reading Comprehension. For WRMT-III: Passage Comprehension students of African descent (*Mdn* = 6.50) scored significantly lower to all other NS students (*Mdn* = 11.00), $Z = 1.55$, $p < .005$, $r = 0.23$.

Vocabulary. On the PPVT-5, scores for students of African descent (*Mdn* = 126.00) were significantly lower than scores for all other NS students (*Mdn* = 139.00), $Z = 1.17$, $p < .05$, $r = 0.18$. However, for the WASI-II: Vocabulary task students of African descent (*Mdn* = 5.00) scores did not differ significantly compared to all other NS students (*Mdn* = 6.00), $Z = 0.82$, $p > .05$, $r = 0.12$.

Phonological Awareness. On a task of phonological awareness (WRMT-III: Blending and Deletion) there was not a significant difference in scores between students of African descent (*Mdn* = 10.00) and all other NS students (*Mdn* = 12.00), $Z = 1.01$, $p > .05$, $r = 0.15$.

Morphological Awareness. There was not a significant difference in scores on the Morphological Awareness Picture Task between students of African descent (*Mdn* = 10.00) and all other NS students (*Mdn* = 11.00), $Z = 0.98$, $p > .05$, $r = 0.14$. Similarly, on the Word Analogy task scores between students of African descent (*Mdn* = 3.00) and all other NS students (*Mdn* = 4.00) did not differ significantly, $Z = 0.98$, $p > .05$, $r = 0.15$. However, on the Sentence Completion task, students of African descent (*Mdn* = 9.00) scored significantly lower than all other NS students (*Mdn* = 13.00), $Z = 1.11$, $p < .05$, $r = 0.17$. Similarly, on the Analysis Define task students of African descent (*Mdn* = 6.00) scored significantly lower than all other NS students (*Mdn* = 11.50), $Z = 1.17$, $p < .05$, $r = 0.18$.

Syntactic Awareness. On the Sentence Comprehension: Whatdunnit task students of African descent (*Mdn* = 11.00) had significantly lower scores compared to all other NS students (*Mdn* = 12.00), $Z = 1.11$, $p < .05$, $r = 0.17$. However, there was not a significant difference in scores on the Grammatical Correction task between students of African descent (*Mdn* = 5.00) and all other NS students (*Mdn* = 10.00), $Z = 0.94$, $p > .05$, $r = 0.14$.

Prosodic Sensitivity. There was not a significant difference in scores on the Maddy's Farmhouse task between students of African descent (*Mdn* = 26.00) and all other NS students (*Mdn* = 29.00), $Z = 0.83$, $p > .05$, $r = 0.12$.

To summarize, students of African descent had statistically lower scores on the TOWRE-2 Phonemic Decoding Efficiency, WRMT-III: Word Identification, WRMT-III: Passage Comprehension, PPVT-5, Sentence Completion, Analysis Define, and Sentence Comprehension tasks when matched to all other NS students. There were no significant differences in scores on the TOWRE-2 Sight Word Efficiency, WASI-II: Vocabulary, WRMT-III: Blending and Deletion, Picture Task, Word Analogy, Grammatical Correction task, or Maddy's Farmhouse tasks between students of African descent matched to all other NS students (see Table 10).

Matched Sample Analysis Comparing ANS students to All Other NS Students

African Nova Scotian students were compared to a matched sample of all other NS students to answer the third research question, do differences in levels of reading ability and component literacy skills remain when controlling for SES?

Word Reading. TOWRE-2 Sight Word Efficiency scores for ANS students (*Mdn* = 22.50) did not differ significantly compared to all other Nova Scotian students (*Mdn* = 25.50), $Z = 1.01$, $p > .05$, $r = 0.21$. The same pattern emerged on the WRMT-III: Word Identification task where ANS students (*Mdn* = 10.00) scores were not significantly different when compared to all other Nova Scotian students (*Mdn* = 16.00), $Z = 1.07$, $p > .05$, $r = 0.23$. However, on the TOWRE-2 Phonemic Decoding Efficiency task, ANS students (*Mdn* = 2.00) had significantly lower scores compared to all other NS students (*Mdn* = 9.00), $Z = 1.37$, $p < .05$, $r = 0.31$.

Reading Comprehension. ANS students (*Mdn* = 5.50) scored significantly lower than all other NS students (*Mdn* = 10.00) on the WRMT-III: Passage Comprehension task, $Z = 1.38$, $p < .05$, $r = 0.29$.

Vocabulary. For ANS students (*Mdn* = 125.00) scores were significantly lower on the PPVT-5 compared to all other NS students (*Mdn* = 144.00), $Z = 1.28$, $p < .05$, $r = 0.27$. However, on the WASI-II: Vocabulary task, scores for ANS students (*Mdn* = 4.00) did not differ significantly compared to all other NS students (*Mdn* = 6.00), $Z = 1.07$, $p > .05$, $r = 0.23$.

Phonological Awareness. Scores for ANS students (*Mdn* = 10.00) were significantly lower compared to all other NS students (*Mdn* = 12.00) on the WRMT-III: Blending and Deletion task, $Z = 1.43$, $p < .05$, $r = 0.29$.

Morphological Awareness. ANS students (*Mdn* = 10.00) scores on the Morphological Awareness Picture Task did not differ significantly compared all other NS students (*Mdn* = 13.50), $Z = 0.98$, $p > .05$, $r = 0.20$. Similarly, on the Define task ANS students (*Mdn* = 6.00) scores did not differ significantly compared to all other NS students (*Mdn* = 12.00), $Z = 1.07$, $p > .05$, $r = 0.23$. The same pattern emerged on the Word Analogy task where ANS students' scores (*Mdn* = 1.00) did not differ significantly compared to all other NS students (*Mdn* = 3.00), $Z = 0.85$, $p > .05$, $r = 0.18$. However, on the Sentence Completion task ANS students (*Mdn* = 6.00) had significantly lower scores compared to all other NS students (*Mdn* = 14.00), $Z = 1.49$, $p < .05$, $r = 0.32$.

Syntactic Awareness. There was not a significant difference in scores on the Sentence Comprehension: Whatdunnit task between ANS students (*Mdn* = 11.00) and all other NS students (*Mdn* = 11.00), $Z = 1.07$, $p > .05$, $r = 0.23$. Similarly, ANS students (*Mdn* = 4.00) scores on the Grammatical Correction task did not differ significantly compared to all other NS students (*Mdn* = 11.00), $Z = 1.07$, $p > .05$, $r = 0.23$.

Prosodic Sensitivity. There was not a significant difference in scores on the Maddy's Farmhouse task between ANS students (*Mdn* = 22.00) and all other NS students (*Mdn* = 28.00), $Z = 0.64$, $p > .05$, $r = 0.14$.

To summarize, ANS students had significantly lower scores on the TOWRE-2 Phonemic Decoding Efficiency, WRMT-III: Passage Comprehension, PPVT-5, WRMT-III: Blending and Deletion, and Sentence Completion tasks when matched to all other NS students. There were no significant differences in scores on the TOWRE-2 Sight Word Efficiency, WRMT-III: Word Identification, WASI-II: Vocabulary, Picture Task, Analysis Define, Word Analogy, Sentence Comprehension: Whatdunnit task, Grammatical Correction, or Maddy's Farmhouse tasks between ANS students matched to all other NS students (see Table 11).

ANS students Compared to African Students

African Nova Scotian students were compared to African students in the sample to answer the fourth and final research question, do we observe a gap in reading ability and component literacy skill levels between African Nova Scotian and African students?

Word Reading. Scores on the TOWRE-2 Sight Word Efficiency task for ANS students (*Mdn* = 22.50) were significantly lower than scores for African students (*Mdn* = 45.50), $Z = 1.43$, $p < .05$, $r = 0.29$. Similarly, ANS students (*Mdn* = 2.00) had significantly lower scores on the TOWRE-2 Phonemic Decoding Efficiency task compared to African students (*Mdn* = 13.00), $Z = 1.21$, $p < .05$, $r = 0.27$. The same pattern emerged for scores on the WRMT-III: Word Identification task between ANS students (*Mdn* = 10.00) who scores significantly lower than African students (*Mdn* = 17.00), $Z = 1.18$, $p < .05$, $r = 0.25$.

Reading Comprehension. Scores on the WRMT-III: Passage Comprehension task between ANS students (*Mdn* = 5.50) and African students (*Mdn* = 8.00) were not statistically significant, $Z = 0.82$, $p > .05$, $r = 0.17$.

Vocabulary. On the PPVT-5, scores between ANS students (*Mdn* = 125.00) and African students (*Mdn* = 127.50) were not statistically significant, $Z = 0.51$, $p > .05$, $r = 0.11$. Similarly, on the WASI-II: Vocabulary task, scores between ANS students (*Mdn* = 4.00) and African students (*Mdn* = 6.00) were not statistically significant, $Z = 0.96$, $p > .05$, $r = 0.20$.

Phonological Awareness. On the WRMT-III: Blending and Deletion task, ANS students (*Mdn* = 10.00) scores did not differ significantly compared to African students (*Mdn* = 12.00), $Z = 1.02$, $p > .05$, $r = 0.21$.

Morphological Awareness. On the Morphological Awareness Picture Task, scores between ANS students (*Mdn* = 10.00) and African students (*Mdn* = 10.50) were not statistically significant, $Z = 0.47$, $p > .05$, $r = 0.10$. Similarly, on the Sentence Completion task scores between ANS students (*Mdn* = 6.00) and African students (*Mdn* = 10.50) were not statistically significant, $Z = 0.98$, $p > .05$, $r = 0.20$. The same pattern emerged for the Analysis Define task where ANS students (*Mdn* = 6.00) scores were not statistically different compared to African students' scores (*Mdn* = 6.50), $Z = 0.49$, $p > .05$, $r = 0.10$. Scores on the Word Analogy task between ANS students (*Mdn* = 1.00) and African students (*Mdn* = 4.50) were also not statistically significant, $Z = 0.98$, $p > .05$, $r = 0.20$.

Syntactic Awareness. There was not a significant difference in scores on the Sentence Comprehension: Whatdunnit task between ANS students (*Mdn* = 11.00) and African students (*Mdn* = 12.00), $Z = 1.02$, $p > .05$, $r = 0.21$. The same pattern emerged for the Grammatical Correction task between ANS students (*Mdn* = 4.00) and African students (*Mdn* = 8.50), $Z = 0.78$, $p > .05$, $r = 0.16$.

Prosodic Sensitivity. There was not a significant difference in scores on the Maddy's Farmhouse task between ANS students (*Mdn* = 22.00) and African students (*Mdn* = 26.50), $Z = 0.91$, $p > .05$, $r = 0.19$.

To summarize, ANS students had significantly lower scores on the TOWRE-2 Sight Word Efficiency, TOWRE-2 Phonemic Decoding Efficiency, and WRMT-III: Word Identification tasks compared to African students. There were no significant differences in scores between ANS students and African students for the WRMT-III: Passage Comprehension, PPVT-5, WASI-II: Vocabulary, WRMT-III: Blending and Deletion, Picture Task, Sentence Completion, Analysis Define, Word Analogy, Sentence Comprehension: Whatdunnit task, Grammatical Correction, or Maddy's Farmhouse tasks (see Table 12).

Discussion

The purpose of the study was to investigate if evidence of the educational opportunity gap exists for reading ability and component literacy skills between students of African descent, African Nova Scotian students, and all other students in Nova Scotia in 1st grade. This research builds on findings from local provincial assessments report that students of African descent have lower average word reading levels compared to all other students in NS (Nova Scotia Department of Education and Early Childhood

Development, 2020). Here, we separated students of African Nova Scotian heritage from other students of African descent as an attempt to determine if differences in scores may be attributable to different socioeconomic, first language, home country, or sex differences between the groups.

The first research question was, do we observe a gap in reading ability and component literacy skills between students of African descent and their peers? To answer this question, students of African descent were compared to a random sample of all other NS students. This comparison was conducted to determine if differences would be found regardless of various socioeconomic, first language, sex differences between the groups that would be comparable to what is observed in a classroom environment. It was hypothesized that students of African descent would have lower average scores on measures of reading ability, vocabulary, phonological awareness, and morphological awareness but not the other component literacy skills. Students of African descent had significantly lower scores compared to a random sample of all other Nova Scotian students on a single measured variable: that of morphological awareness, and more specifically only for the Analysis Define task. This result supports the hypothesis. The Analysis Define task required that students choose the correct definitions for morphologically complex words. This suggests that students of African descent have more difficulty identifying the definitions of morphologically complex words, but it is unclear why.

In the comparison, there were more students in the group of all other Nova Scotian students that were not English first language compared to students in the African descent group (see Table 5). It could be that the language(s) spoken by students of African descent may have a different morphological structure, or less similarity to the morphological structure of the English language, compared to the language(s) spoken by all other Nova Scotian students. This difference in language may contribute to students of African descent having more difficulty defining morphologically complex words. Differences were not found between students of African descent and all other NS students for reading ability, phonological awareness, syntactic awareness, or prosodic sensitivity. These findings are interesting as it does not support the findings from the provincial assessment data (Nova Scotia Department of Education and Early Childhood Development, 2020). Additionally, based on the literature, it was speculated that differences would be observed for vocabulary and

phonological awareness. The literature on vocabulary indicates that Black students have lower scores on measures vocabulary when compared to their peers (e.g., McCabe & Champion, 2010; Restrepo et al., 2006; White et al., 1990), however this result was not found in the present study. Related to phonological awareness, considering reading ability has a reciprocal relationship with phonological awareness (Blaiklock, 2004; Cataldo & Ellis, 1988; Hogan et al., 2005) and no differences were observed for word reading levels, this may be why no differences were found for phonological awareness. The other hypotheses that were confirmed was that there would be no differences between students of African descent and all other Nova Scotian students for syntactic awareness and prosodic sensitivity. This result suggests that syntactic awareness and prosodic sensitivity are not component literacy skills that contribute to the educational opportunity gap.

The second research question was, do we observe a gap in reading ability and component literacy skill levels specifically for African Nova Scotian students when compared to a random sample of all other students in the sample? To answer this question African Nova Scotian students were compared to a random sample of all other NS students. This comparison was conducted to determine if differences would be found regardless of various socioeconomic, first language, home country, or sex differences between the groups that would be comparable to what is observed in a classroom environment. It was hypothesized that African Nova Scotian students would have lower average scores on measures of reading ability, vocabulary, phonological awareness, and morphological awareness, but not the other component literacy skills. Students of African Nova Scotian heritage had significantly lower scores when compared to a random sample of all other Nova Scotian students on word reading, phonological awareness, morphological awareness, and syntactic awareness. However, differences were not found for reading comprehension, vocabulary, or prosodic sensitivity. The results for word reading support the findings from the provincial assessment data (Nova Scotia Department of Education and Early Childhood Development, 2020), indicating that African Nova Scotian students have lower word reading levels compared to all other students in Nova Scotia. Notably though, the provincial assessment data does not separate the results for reading comprehension from overall reading ability. Thus, this result suggests that these two skills should be reported separately, as different

patterns are found in this study for word reading compared to reading comprehension. African Nova Scotian students did not have lower scores on measures of vocabulary compared to all other Nova Scotian students. These results are contrary to what was hypothesized and does not align with the literature on vocabulary indicating that Black students have lower scores on measures vocabulary when compared to their peers (e.g., McCabe & Champion, 2010; Restrepo et al., 2006; White et al., 1990). This may be because, in a typical classroom environment, all students are learning the same vocabulary through instruction, reducing any potentnial differences in scores on measures of vocabulary.

African Nova Scotians students also had lower scores for phonological awareness skills. As it relates to phonological awareness, African Nova Scotian students had lower scores compared to all other Nova Scotian students. As previously noted, African Nova Scotian students had the lowest SES in the entire sample. This result supports the literature indicating that Black students from lower SES backgrounds have poorer phonological awareness skills (e.g., Foster & Miller, 2007). Additionally, considering reading ability has a reciprocal relationship with phonological awareness (Blaiklock, 2004; Cataldo & Ellis, 1988; Hogan et al., 2005), it is expected that African Nova Scotian students had lower scores on phonological awareness considering they also had lower reading scores. Furthermore, phonological awareness is the strongest predictor of reading ability and comprehension (see Adams et al., 1998; Stanovich, 1986; see also Badian, 1994; Bradley & Bryant, 1983; Cardoso-Martins & Pennington, 2004; de Jong & van der Leij, 1999; Ehri et al., 2001; Muter & Snowling, 1998; Parrila et al., 2004). This result suggests phonological awareness is a fundamental skill that may be not as well developed in African Nova Scotian learners compared to other learners in the early elementary years that also affects reading ability.

Additionally, African Nova Scotians students had lower scores for morphological awareness skills. African Nova Scotian students had lower scores on the Sentence Completion and Word Analogy tasks. Considering the literature suggests that a gap in morphological awareness skills exists for students from lower SES backgrounds (e.g., Apel & Diehm, 2014), and African Nova Scotians had the lowest SES in the sample, this result supports literature that there is an educational opportunity gap for SES. However, African Nova Scotian students had a different pattern of which morphological awareness tasks they had lower scores for

compared to the results for students of African descent. Notably, although not considered in the present study, it is documented that African Nova Scotians speak a dialect similar to African American English (Poplack & Tagliamonte, 1991; Walker, 1995) which may contribute to why the pattern of significant score differences differed between African Nova Scotian students and students of African descent. Although past researchers did not find a correlation between dialect use and morphological awareness (Apel & Thomas-Tate, 2009), different tasks were used in the present study compared to prior research. Thus, the tasks used in the present study may pick up on the different morphological features of African Nova Scotian English that the task used by Apel & Thomas-Tate (2009) did not pick up for African American English.

Additionally, it was hypothesized that there would be no difference for syntactic awareness between African Nova Scotian students and all other Nova Scotian students, but significant results were found. Additionally, African Nova Scotian students scored lower on the Sentence Comprehension: Whatdunnit task compared to all other Nova Scotian students in the sample. This result may also be related to dialect use, considering no significant results were found for vocabulary, and students of African descent did not have lower scores for the syntactic awareness tasks compared to all other Nova Scotian students. The hypothesis that there would be no differences between African Nova Scotian students and all other Nova Scotian students for prosodic sensitivity was confirmed. This result suggests that prosodic sensitivity is not a component literacy skill that contribute to the educational opportunity gap.

The third research question was, do differences in levels of reading ability and component literacy skills remain when controlling for SES? To answer this question, students of African descent were compared to a sample of all other NS students where both groups had similar demographics related to socioeconomic, first language, home country, and sex differences. The same comparison was done for African Nova Scotian compared to a sample of all other NS students where both groups had similar demographics related to socioeconomic, first language, and sex differences. This comparison was conducted to determine if differences in reading ability and component literacy skills exist even when controlling for socioeconomic, first language, and sex differences between groups. It was hypothesized that there would be no differences in scores for students of African descent or African Nova Scotian students on measures of reading ability,

vocabulary, phonological awareness, morphological awareness, syntactic awareness, or prosodic sensitivity compared to all other Nova Scotian students. The results for students of African descent compared to all other Nova Scotian students will be discussed first. Students of African descent had lower scores on measures of reading ability, vocabulary, morphological awareness, and syntactic awareness compared to all other Nova Scotian students. These results suggests that there are differences between students of African descent and all other Nova Scotian students that are not due to socioeconomic, first language, home country, or sex differences between groups. This finding is unexpected considering the literature points to students from lower SES backgrounds being more likely to have lower reading skills (e.g., Snow et al., 1998), vocabulary (e.g., Restrepo et al., 2006), phonological awareness (e.g., Foster & Miller, 2007), and morphological awareness (e.g., Apel & Diehm, 2014). Thus, if all students in the sample are from low SES backgrounds, it is not expected that differences would be found.

Additional results from this comparison also indicate differences for students of African descent related to prosodic sensitivity and other component literacy skills. Similar to the other comparisons, no differences were found for prosodic sensitivity suggesting this skill does not contribute to the educational opportunity gap. Notably however, these studies do not compare students from the same SES backgrounds, but rather students from low SES backgrounds to those from high SES backgrounds. Restrepo et al. (2006) was the only study that compared students from the same SES background; however, they measured SES using maternal education level rather than a measure of income. Additionally, these findings are contrary to the results when students of African descent were compared a random sample to all other Nova Scotian students where lower scores were only found for morphological awareness. However, considering there was an overlap for morphological awareness, specifically the Analysis Define task, this result suggests that the difference in scores for students of African descent compared to other Nova Scotian students for this task may be due to additional factors beyond socioeconomic, first language, and sex differences. Notably though, the effect sizes were small suggesting the differences in scores found for students of African descent are not meaningful.

Noticeably, different results were found for African Nova Scotian students. African Nova Scotian students on the other hand had lower scores on measures of reading ability, vocabulary, phonological awareness, and morphological awareness compared to all other Nova Scotian students. These results suggests that there are differences between African Nova Scotian students and all other Nova Scotian students that are not due to socioeconomic, first language, sex, or other factors between groups. Similar to the results for students of African descent, this finding is unexpected considering if all students in the sample are from low SES backgrounds, it is not expected that differences would be found. However, there is overlap for the results that were found when African Nova Scotian students were compared to a random sample of all Nova Scotian students. For both comparisons, African Nova Scotian students had lower scores for word reading, specifically decoding, phonological awareness, and morphological awareness, specifically word analogy. This overlap suggests additional factors beyond socioeconomic, first language, and sex differences may contribute to the educational opportunity gap for African Nova Scotian students. Similar to the results found by Foster and Miller (2007), African Nova Scotian students had the lowest scores for phonological awareness skills as well as the lowest SES.

Additional factors should be considered related to the results for African Nova Scotian students. Notably, the word level reading scores for African Nova Scotian students were only different compared to all other Nova Scotian students when looking specifically at decoding. Decoding requires well-developed phonological awareness skills to help students learn new words (Archer, 2003; Ehri, 2020; Samuels, 1988). This suggests that phonological awareness, or more specifically decoding, is a fundamental skill that may be not as well developed in African Nova Scotian learners compared to other learners in the early elementary years. Notably, phonological awareness is the strongest predictor of reading ability and comprehension (see Adams et al., 1998; Stanovich, 1986; see also Badian, 1994; Bradley & Bryant, 1983; Cardoso-Martins & Pennington, 2004; de Jong & van der Leij, 1999; Ehri et al., 2001; Muter & Snowling, 1998; Parrila et al., 2004). Additionally, the literature on morphological awareness as it relates to the educational opportunity gap between Black and other student groups is limited. The literature on morphological awareness has not reported on differences in morphological awareness skills between Black students and other student groups

(Apel & Thomas-Tate, 2009) outside of the role of dialect use. Although Apel and Thomas-Tate (2009) did not find a correlation between dialect use and morphological awareness, this may be because different tasks were used in the present study compared to prior research. Thus, the tasks used in the present study may have picked up on the different morphological features of African Nova Scotian English that the task used by Apel & Thomas-Tate (2009) did not pick up for African American English. Alternatively, there may be nuanced features of African Nova Scotian English that differ from African American English. Similar to the other comparisons, no differences were found for prosodic sensitivity suggesting this skill does not contribute to the educational opportunity gap.

The fourth and final research question was, do we observe a gap in reading ability and component literacy skill levels between African Nova Scotian and African students? To answer this question, all African Nova Scotian students were compared to all African students in the sample. This comparison was done to determine if specific differences exist in reading ability and component literacy skills between students of African descent from different socioeconomic, first language, and home country backgrounds. It was hypothesized that African Nova Scotian students would have lower average scores on all reading ability and component literacy skills compared to African students as African Nova Scotian students had the lowest SES in the sample and a history of adverse experiences in Nova Scotian schools. African Nova Scotian students had lower scores on measures of word reading and morphological awareness compared to African students. No differences were observed for reading comprehension, vocabulary, phonological awareness, syntactic awareness, or prosodic sensitivity. Related to word reading, differences were found for this specific skill indicating African Nova Scotian students and African students should be compared as separate groups in the data from provincial assessments (Nova Scotia Department of Education and Early Childhood Development, 2020).

A number of factors should be taken into consideration when interpreting all of these comparisons. African Nova Scotians had lower scores on the Sentence Completion task when compared to all other Nova Scotian students whereas students of African descent had lower scores on the Sentence Completion and Analysis Define tasks. Considering African Nova Scotian students and all students of African descent had

lower scores on the Sentence Completion task compared to all other NS students, score differences for this task are likely not related to differences in SES, first language, home country, or sex. However, differences found for the Sentence Completion task could potentially be due to dialect differences. This is speculated because there was not a significant difference in scores for this task between African Nova Scotian and African students. Notably, some students of African descent spoke a first language other than English. Students of African descent also had lower scores the Analysis Define task. Thus, the Analysis Define task may have different language demands compared to other morphological awareness tasks contributing to the difference in scores. Furthermore, the Analysis Define task also had the lowest sample reliability compared to the other morphological awareness tasks. Notably however, having lower reliability makes differences harder to detect. This suggests that the Analysis Define task may pick up differences in first language ability, but not dialect since this task only had significant results for students of African descent and not African Nova Scotian students. However, further research is needed to confirm this suggestion. Additionally, African Nova Scotian students had lower scores on syntactic awareness. This result may be related to dialect use. The literature on dialect use and the acquisition of reading ability and component literacy skills suggests that students with high dialect use have more difficulty acquiring skills due to morphological, phonological, and syntactic differences in their spoken dialect compared to standard American English (see Edwards et al., 2004; Gatlin & Wanzek, 2015; Lablov, 1995; Washington & Seidenberg, 2021). However, more research is needed to confirm this result as dialect was not assessed in this study.

Notably, there were some component literacy skills where African Nova Scotian and African students did not differ. There were no significant differences for measures of reading comprehension, vocabulary, or phonological awareness suggesting that African Nova Scotian students and African students do not have differences in how they acquire these skills. Notably, these results also demonstrate that all students of African heritage should not be treated as a homogenous group. The literature stemming from the United States focuses specifically on Black Americans and not all Black populations. However, the Nova Scotia Department of Education and Early Childhood Development (2014, 2020) reports on all students of African descent as one uniform group. The results of this study demonstrate that there are differences between how

students of African Nova Scotian heritage and students of African descent score on various measures of reading ability and component literacy skills. Thus, these populations should be analyzed as separate groups to truly understand which specific student groups are having difficulty, as well as to demonstrate the extent of difficulty experienced by different groups.

Limitations

This study used secondary data from a larger, longitudinal study so a number of challenges exist. The larger study is not specifically looking at outcomes between groups of students, thus matches for analyses were not predetermined. In other words, the recruitment strategy took more of a mixed purposive-convenience sampling approach rather than recruiting equal amounts of students with specific demographic backgrounds in order to compare them. For example, it was not paramount to recruit equal amounts of students from various ethnic backgrounds with the same SES background. Thus, this limits the accuracy of the matched sample analysis and does not allow for an exact match between groups as African and African Nova Scotian students came from lower SES backgrounds than all other Nova Scotian students (see Tables 5 and 6). Additionally, the sample size for African and African Nova Scotian students in the study was small (n = 12, respectively). Although it is expected that students of African heritage would constitute a smaller sample in the study, considering they make up approximately only 4% of the overall Nova Scotia population (Statistics Canada, 2017), a larger sample would allow for a more robust analysis of the data.

Additionally, confounding factors such as dialect or teacher bias for example were not accounted for in the present study. Considering that the literature indicates dialect use affects the acquisition of overall reading ability and component literacy skills (e.g., Apel & Thomas-Tate, 2009; Craig & Washington, 1994; Curenton, 2004) and there are documented dialect differences among ANS populations (Poplack & Tagliamonte, 1991; Walker, 1995), it is speculated that dialect may be contributing to some of the differences in scores observed in this study for phonological awareness, morphological awareness, and syntactic awareness. To summarize, the literature on dialect use and the acquisition of reading ability and component literacy skills suggests that students with high dialect use have more difficulty acquiring skills due to morphological, phonological, and syntactic differences in their spoken dialect compared to standard

American English (see Edwards et al., 2004; Gatlin & Wanzek, 2015; Lablov, 1995; Washington & Seidenberg, 2021). Although not accounted for in this study, these results warrant investigating other factors that may be contributing to the educational opportunity gap such as dialect or teacher bias. In relation, the results from this study also indicate that African Nova Scotian students have distinct challenges from students of African descent specifically for word level reading (decoding), phonological awareness, and morphological awareness. The differences for these component skills in particular may be due to dialect, but dialect was not assessed. Similar to the relationship between morphological awareness and dialect, researchers have also found that dialect use is negatively correlated with word reading and phonological awareness skills (e.g., Caesar & Kerins, 2020; Moyle et al., 2014; Patton Terry, 2012). African Nova Scotian English has been documented in the literature as a distinct dialect derivative of African American English (Poplack & Tagliamonte, 1991; Walker, 1995). Thus, dialect should be considered as a potential covariate in future studies investigating the educational opportunity gap in NS.

In addition to dialect, teacher bias was also not assessed as a factor that may contribute to differences in scores. Recent qualitative reports on the experiences of African Nova Scotians in Nova Scotian schools indicate that African Nova Scotians feel as though they experience race-based discrimination at school (Hamilton-Hinch et al., 2021). This literature warrants further empirical study into how bias, whether implicit or explicit, affects how ANS students are engaged in the learning process at school. Ultimately, teacher bias may have an impact on how ANS students develop and attain proficiency with reading ability and component literacy skills.

As it relates to the measures used in this study, many of them are standardized, which is an improvement from the measure used by provincial assessments (Nova Scotia Department of Education and Early Childhood Development, 2020). However, some of the measures in this study have poor reliability. A general rule of thumb for reliability to be considered acceptable is to have a coefficient of .70 or higher (Sim & Wright, 2005). Thus, some of the measures used may not accurately measure the constructs they say they measure, which may have affected the results of this study. The WASI-II: Vocabulary task, a measure of expressive vocabulary, reports a sample reliability of .57 (Weschler, 2011). Although standardized, this test

may not be the best measure of expressive vocabulary as used in this study, as only a subset of the items for this task were administered. Thus, it was not administered in a standardized way. An alternate standardized assessment of expressive vocabulary with good reliability, such as the Expressive Vocabulary Test (manual reliability = .93; Williams, 2019) may have yielded different results. Furthermore, in young children "it is estimated that their receptive vocabulary often is four times greater than their expressive vocabulary" (Jalongo & Sobolak, 2011; p. 422) which may also account for why significant differences were found for receptive but not expressive vocabulary. It is warranted that additional assessments of receptive vocabulary are explored in future analyses and studies to get an accurate, well-rounded picture of Black students' receptive vocabulary skills. Additionally, the Morphological Analysis Define task has a reported sample reliability of .60 (Levesque et al., 2017) so it may also not be the most accurate measure of morphological awareness. However, the Morphological Analysis Picture Task measures the same construct – inferring the meaning of morphologically complex words – in a different way but has a higher sample reliability of .77. Maddy's Farmhouse, another experimental task, has a reported reliability approaching good (sample reliability = .69). This suggests that some component of this task may not be a reliable measure of prosodic sensitivity with this sample. However, considering this task is experimental there are limited alternatives available. Alternatively, the sample reliability may also be due to the age of the sample. It may be that the experimental tasks are too complex for the developmental age of the participants in this study, resulting in poor reliability. Further tweaking and piloting of these experimental tasks is warranted until a suitable reliability coefficient is achieved.

In addition to the poor reliability for the prosodic sensitivity task, there were also no significant differences observed for any comparison group for this component literacy skill. Notably, there was no literature on how prosodic sensitivity relates to the educational opportunity gap between Black students compared to other students. However, the results from this study may support the literature suggesting prosodic sensitivity may be more critical for older, more experienced readers (see Deacon et al., 2018; Holliman et al., 2017). It is warranted that future studies investigate the contribution of prosodic sensitivity related to the educational opportunity gap in a sample of older students.

Implications for School Psychology

The implications of our results are clearest for findings specific to phonological awareness. Results from this study found that African Nova Scotian students had the lowest scores for phonological awareness skills and decoding compared to other students in the samples. Notably, this suggests that phonological awareness and decoding skills, fundamental skills for future reading ability (Gough & Tunmer, 1986; Snow et al., 1998), are deficient in African Nova Scotian learners compared to other learners in the early elementary years. Notably, phonological awareness is the strongest predictor of reading ability and comprehension (see Adams et al., 1998; Stanovich, 1986; see also Badian, 1994; Bradley & Bryant, 1983; Cardoso-Martins & Pennington, 2004; de Jong & van der Leij, 1999; Ehri et al., 2001; Muter & Snowling, 1998; Parrila et al., 2004). This suggests, within the Multi-Tiered Systems of Supports framework as part of the Nova Scotia Inclusive Education Policy (Nova Scotia Department of Education and Early Childhood Development, n.d, 2019), that Tier 1 screening of African Nova Scotian students at school entry may identify students at risk for poor reading ability. Thus, results from Tier 1 screening of students can inform Tier 1 classroom interventions for phonological awareness and word reading and identify which students may need more intensive intervention at Tiers 2 and 3. At present, students are not routinely being screened at school entry across all schools to plan for potential areas of intervention. Without preventative measures at Tier 1, difficulties with phonological awareness and word skills may be more pronounced for African Nova Scotian students as they progress grades.

Additionally, the results from this study also found differences for morphological awareness between students of African descent, specifically African students, that differed compared to what was found for African Nova Scotian students. Notably, African students are also more likely to have a first language other than English. This finding may suggest that the differences found for morphological awareness may be associated with first language. However, direct effects of language were not assessed in this study, thus more research is warranted to affirm this speculation. Nonetheless, this suggests that when conducting and interpreting the results of a psychoeducational assessment with English language learners, care should be taken related to reporting on the acquisition of these specific skills. Notably, when assessing English language

learners, we should be using assessment measures that are appropriate for the current level of English language development. Additionally, informing classroom teachers with a high proportion of English language learners in their classroom, particularly African students as included in this study, taking additional instructional time for studying and practicing vocabulary and morphological awareness may be beneficial for improving overall reading ability with this population.

Furthermore, the findings of this study have implications for the educational curriculum in Nova Scotia. For instance, "begin to read with increasing stamina," "understands beginning concepts about print," and "read simple patterned texts and non-patterned texts" are identified as educational outcomes in the English Language Arts (primary/kindergarten) curriculum (Department of Education and Early Childhood Development, 2019, p. 1). However, phonological and morphological awareness are identified as Tier 2 and 3 interventions (Nova Scotia Department of Education and Early Childhood Development, n.d, 2019) for students who are not meeting curriculum outcomes although it is documented that well-developed component literacy skills are required to develop proficient reading ability (National Reading Panel, 2000). Similarly, rhyming, segmenting, isolating, deleting, blending, and substituting sounds are listed Nova Scotia educational curriculum, but they are not connected to reading. Considering that the results from this study, combined with the data reported by provincial assessments (Nova Scotia Department of Education and Early Childhood Development, 2014, 2020), indicate that students of African descent have lower scores on measures of word reading, phonological awareness, and morphological awareness, explicit instruction of these component literacy skills should be stated in the curriculum as part of reading instruction particularly because historically marginalized groups are more likely to be at-risk for future reading disparities.

Conclusion

The results from this study indicate that differences in skill, as well as SES, first language, and home country differences contribute to the educational opportunity gap. Furthermore, this result provides evidence that provincial assessments, by combining all students of African heritage together, are not observing more pronounced skill deficits for African Nova Scotian students. Considering that the analysis also involved matching the students on SES, age, first language, home country, or sex, more investigations are needed to

determine the mechanisms maintaining the educational opportunity gap. Furthermore, these results provide justification that students of ANS heritage should be investigated as a distinct group when it comes to analyzing provincial assessment data, considering the acquisition of their reading ability and component literacy skills was significantly different when compared to students of African heritage who would not be considered ANS. Further investigations are needed to explore how confounding factors may be contributing to the maintenance of the educational opportunity gap.

Table 1

Distribution of standard scores for standardized assessment measures.

	African descent		African Nova Scotian		African		All Other NS Students		All Students	
Task	M (± SD)	Median (range)	M (± SD)	Median (range)	M (± SD)	Median (range)	M (± SD)	Median (range)	M (± SD)	Median (Range)
SW[a]	98.21	95.5	90.75	90.5	105.67	109	104.49	103	103.94	102
	(18.3)	(74-135)	(10.84)	(75-108)	(21.62)	(74-135)	(16.46)	(68-145)	(16.7)	(68-145)
PD[b]	90.4	87	81.56	80	97.64	97	96.75	95	96.24	95
	(18.24)	(68-123)	(10.92)	(71-101)	(20.22)	(68-123)	(4.47)	(68-145)	(14.87)	(68-145)
WI[c]	100.83	100	97.73	100	103.67	104.5	105.74	105	105.3	105
	(17.99)	(70-131)	(15.16)	(70-123)	(20.51)	(72-131)	(13.81)	(64-145)	(14.25)	(64-145)
PC[d]	96.5	93	93.75	91	99.25	100	104.85	106	104.11	105
	(16.53)	(71-124)	(15.86)	(71-120)	(17.42)	(71-124)	(12.54)	(67-144)	(13.12)	(66-144)
VoR[e]	97.96	99	97.45	99	98.42	98	106.51	105	105.76	104
	(11.09)	(75-120)	(10.8)	(75-112)	(11.81)	(76-120)	(15.75)	(66-160)	(15.57)	(66-160)

a. TOWRE-2 Sight Word Efficiency

b. TOWRE-2 Phonemic Decoding Efficiency

c. WRMT-III: Word Identification

d. WRMT-III: Passage Comprehension

e. PPVT-5

Table 2

Table of Ns of standard scores for standardized assessment measures.

	African descent	African Nova Scotian	African	All Other NS Students	All Students
SW[a]	24	12	12	248	272
PD[b]	20	9	11	228	248
WI[c]	23	11	12	238	261
PC[d]	24	12	12	247	271
VoR[e]	23	11	12	239	262

a. TOWRE-2 Sight Word Efficiency

b. TOWRE-2 Phonemic Decoding Efficiency

c. WRMT-III: Word Identification

d. WRMT-III: Passage Comprehension

e. PPVT-5

Table 3

Complete sample demographics table (N = 275)

	N	Median (range)	M (± SD)
SES	275	49.00 (8-66)	46.82 (11.97)
Age (in months)	274	81.00 (74-92)	81.68 (3.76)
	N	%	
Gender			
Male	150	54.5	
Female	124	45.1	
Ancestry			
African	12	4.4	
African Nova Scotian	12	4.4	
All other NS students	242	88.0	
First Language Learned			
English	234	85.1	
Other	41	14.9	
Home Country			
Canada	217	78.9	
Other	58	21.1	

Table 4

Sample demographics sorted by ancestry group (N = 275).

Demographics	ANS			African			African descent			All Other NS Students		
	N	Median (range)	M (± SD)	N	Median (range)	M (± SD)	N	Median (range)	M (± SD)	N	Median (range)	M (± SD)
SES	12	35.00 (20-56)	35.08 (10.40)	12	47.00 (20-63)	42.42 (15.58)	24	36.00 (20-63)	38.75 (13.49)	251	50.00 (8-66)	47.59 (11.55)
Age (in months)	12	80.50 (77-88)	81.50 (77-88)	12	83.50 (76-88)	82.25 (4.03)	24	81.50 (76-88)	81.88 (3.95)	250	81.00 (74-92)	81.66 (3.75)
	N	%		N	%		N	%		N	%	
Gender												
Male	5	41.7		6	50.0		11	45.8		139	55.4	
Female	7	58.3		6	50.0		13	54.2		111	44.2	
Ancestry												
African	0	0.0		12	100.0		12	50.0		0	0.0	
African Nova Scotian	12	100.0		0	0.0		12	50.0		0	0.0	

All other NS students	0	0.0	0	0.0	0	0.0	242	88.0
First Language Learned								
English	12	100.0	9	75.0	21	87.5	213	84.9
Other	0	0.0	3	25.0	3	12.5	38	15.1
Home Country								
Canada	11	91.7	3	25.0	14	58.3	203	80.9
Other	8.3	1	9	75.0	10	41.7	48	19.1

Table 5

Demographics for students of African descent compared to all other NS students (N = 48), matched and random.

	Matched					Random	
Demographics	African descent		All Other NS Students[a]			All Other NS Students[b]	
	N	Mean (SD)	Med (range)	N	Mean (SD)	Med (range)	N Mean (SD)	Med (range)
SES	24	38.75 (13.49)	36.0 (20-63)	24	38.75 (13.23)	38.5 (17-61)	23 46.50 (12.31)	55.0 (25-65)
Age (in months)	24	81.11 (3.95)	81.5 (76-88)	24	81.79 (3.41)	81.0 (76-90)	24 80.25 (3.96)	82.5 (77-88)
	N		%	N		%	N	%
Gender								
Male	11		45.8	11		45.8	16	66.7
Female	13		54.2	13		54.2	8	33.3
First Language Learned								
English	21		87.5	21		87.5	19	79.0
Other	3		12.5	3		12.5	5	21.0
Home Country								
Canada	14		58.3	17		70.8	20	83.3

Other	10	41.7	7	29.2	4	16.7

a. Ancestry of all other NS students includes European (n = 17, 70.8%), Acadian (n = 3, 12.5%), Asian (n = 1, 4.2%), Middle Eastern (n = 1, 4.2%), and not listed (n = 2, 8.3%).

b. Ancestry of all other NS students includes European (n = 14, 58.3%), Acadian (n = 4, 16.7%), Asian (n = 1, 4.2%), East Asian (n = 1, 4.2%), and not listed (n = 4, 16.7%).

Table 6

Demographics for ANS students matched to all other NS students (N = 24), matched and random.

				Matched			Random		
Demographics	ANS			All Other NS Students[a]			All Other NS Students[b]		
	N	Mean (SD)	Med (range)	N	Mean (SD)	Med (range)	N	Mean (SD)	Med (range)
SES	12	35.08 (10.40)	35.0 (20-56)	12	35.25 (10.31)	36.5 (17-61)	12	48.50 (12.93)	52.0 (25-63)
Age (in months)	12	81.50 (4.01)	80.5 (77-88)	12	80.75 (2.90)	81.0 (76-87)	12	80.75 (3.11)	80.5 (76-88)
	N		%	N		%	N		%
Gender									
Male	5		41.7	5		41.7	8		66.7
Female	7		58.3	7		58.3	4		33.3
First Language Learned									
English	12		100.0	12		100.0	11		91.7
Other	0		0.0	0		0,0	1		8.3
Home Country									

Canada	11	91.7	12	100.0	10	83.3
Other	1	8.3	0	0.0	2	16.7

a. Ancestry of all other NS students includes European (n = 10, 83.3%), Acadian (n = 1, 8.3%), and not listed (n = 1, 8.3%).

b. Ancestry of all other NS students includes European (n = 10, 83.3%), Acadian (n = 1, 8.3%), and Asian (n = 1, 8.3%).

Table 7

Demographics for ANS students compared to African students (N = 24).

Demographics	ANS			African		
	N	Mean (SD)	Med (range)	N	Mean (SD)	Med (range)
SES	12	35.08 (10.40)	35.00 (20-56)	12	42.42 (15.58)	47.00 (20-63)
Age (in months)	12	81.50 (4.01)	80.50 (77-88)	12	82.25 (4.03)	83.50 (76-88)
	N		%	N		%
Gender						
Male	5		41.7	6		50.0
Female	7		58.3	6		50.0
First Language Learned						
English	12		100.0	9		75.0
Other	0		0.0	3		25.0
Home Country						
Canada	11		91.7	3		25.0
Other	1		8.3	9		75.0

Table 8

Values for students of African descent compared to a random sample of all other NS students.

Task		African descent			All Other NS Students		
		N	M (± SD)	Median (range)	N	M (± SD)	Median (range)
Word reading	SW[a]	24	29.83 (17.40)	26.00 (8-63)	24	30.46 (17.62)	29.00 (3-70)
	PD[b]	20	9.55 (10.09)	6.50 (0-31)	23	9.13 (10.77)	6.00 (0-43)
	WI[c]	23	13.52 (7.19)	13.00 (3-29)	23	13.61 (6.21)	14.00 (3-27)
Reading Comprehension	PC[d]	24	7.29 (4.43)	6.50 (1-17)	24	8.33 (4.22)	9.00 (1-16)
Vocabulary	VoR[e]	23	127.39 (14.36)	126.00 (93-154)	23	130.43 (20.65)	129.00 (94-164)
	VoE[f]	23	4.83 (2.53)	5.00 (0-10)	23	5.39 (1.85)	5.00 (0-8)
Phonological Awareness	PA[g]	24	9.38 (4.04)	10.00 (0-15)	24	9.58 (2.99)	10.00 (4-14)
Morphological Awareness	PT[h]	23	10.22 (3.53)	10.00 (4-17)	24	11.13 (5.07)	10.00 (4-21)
	SC[i]	23	9.35 (4.17)	9.00 (2-20)	23	10.00 (3.86)	9.00 (5-18)
	MD[j]	23	7.35 (5.97)	6.00 (0-21)	23	11.61 (5.74)	12.00 (0-20)
	WA[k]	23	3.30 (3.02)	3.00 (0-10)	23	3.83 (2.95)	3.00 (0-11)
Syntactic Awareness	WD[l]	23	10.78 (3.98)	11.00 (4-20)	23	10.87 (4.18)	12.00 (2-18)
	GC[m]	23	6.35 (4.85)	5.00 (0-17)	23	6.70 (5.21)	5.00 (0-18)
Prosodic Sensitivity	MF[n]	23	26.78 (6.65)	26.00 (17-38)	23	27.78 (5.89)	28.00 (16-39)

a. TOWRE-2 Sight Word Efficiency

b. TOWRE-2 Phonemic Decoding Efficiency

c. WRMT-III: Word Identification

d. WRMT-III: Passage Comprehension

e. PPVT-5

f. WASI-II: Vocabulary (Expressive)

g. WRMT-III Phonological Awareness – Blending and Deletion

h. Morphological Analysis Picture Task

i. MA Sentence Completion Total

j. Morphological Analysis – Define

k. Morphological Awareness: Word Analogy

l. Sentence Comprehension: Whatdunnit

m. Syntactic Awareness: Grammatical Correction

n. Prosody Sensitivity (Maddy's Farmhouse)

Table 9

Values for ANS students compared to a random sample of all other NS students.

Task		African Nova Scotian			All Other NS Students		
		N	M (± SD)	Median (range)	N	M (± SD)	Median (range)
Word reading	SW[a]	12	21.17 8.63	22.50 (8-34)	12	36.00 (13.55)	37.50 (11-61)
	PD[b]	9	3.89 (3.95)	2.00 (0-12)	11	11.73 (6.77)	13.00 (0-22)
	WI[c]	11	11.09 (5.11)	10.00 (3-20)	12	15.58 (5.44)	16.50 (6-22)
Reading Comprehension	PC[d]	12	6.00 (4.07)	5.50 (1-13)	12	10.08 (5.18)	10.00 (3-20)
Vocabulary	VoR[e]	11	125.91 (14.49)	125.00 (97-148)	12	137.58 (17.23)	134.00 (116-178)
	VoE[f]	11	4.27 (2.45)	4.00 (0-9)	12	5.50 (2.68)	6.00 (2-11)
Phonological Awareness	PA[g]	12	8.33 (4.14)	10.00 (0-12)	12	11.83 (3.35)	12.00 (4-16)
Morphological Awareness	PT[h]	11	9.73 (3.44)	10.00 (4-15)	12	12.17 (4.53)	12.50 (6-18)
	SC[i]	6	7.27 (3.20)	6.00 (2-13)	12	10.58 (4.76)	11.50 (1-16)
	MD[j]	11	6.18 (5.19)	6.00 (0-16)	11	10.36 (5.05)	10.00 (3-19)
	WA[k]	11	1.91 (2.02)	1.00 (0-6)	12	4.17 (4.00)	4.00 (0-8)
Syntactic Awareness	WD[l]	11	8.45 (3.05)	11.00 (4-11)	12	12.92 (4.93)	12.50 (6-22)
	GC[m]	11	4.73 (3.58)	4.00 (0-11)	12	8.33 (5.85)	8.50 (0-18)
Prosodic Sensitivity	MF[n]	11	24.09 (6.01)	22.00 (17-34)	12	26.33 (5.93)	26.50 (18-36)

a. TOWRE-2 Sight Word Efficiency

b. TOWRE-2 Phonemic Decoding Efficiency

c. WRMT-III: Word Identification

d. WRMT-III: Passage Comprehension

e. PPVT-5

f. WASI-II: Vocabulary (Expressive)

g. WRMT-III Phonological Awareness – Blending and Deletion

h. Morphological Analysis Picture Task

i. MA Sentence Completion Total

j. Morphological Analysis – Define

k. Morphological Awareness: Word Analogy

l. Sentence Comprehension: Whatdunnit

m. Syntactic Awareness: Grammatical Correction

n. Prosody Sensitivity (Maddy's Farmhouse)

Table 10

Matched sample values for students of African descent compared to all NS students.

Task		African descent			All Other NS Students		
		N	M (± SD)	Median (range)	N	M (± SD)	Median (range)
Word reading	SW[a]	24	29.83 (17.40)	26.00 (8-63)	24	33.67 (19.47)	28.50 (0-69)
	PD[b]	20	9.55 (10.09)	6.50 (0-31)	22	12.55 (7.14)	12.50 (0-27)
	WI[c]	23	13.52 (7.19)	13.00 (0-29)	21	16.67 (5.12)	16.00 (9-28)
Reading Comprehension	PC[d]	24	7.29 (4.43)	6.50 (1-17)	23	10.43 (4.09)	11.00 (1-18)
Vocabulary	VoR[e]	23	127.39 (14.36)	126.00 (93-154)	21	138.14 (17.27)	139.00 (106-166)
	VoE[f]	23	4.83 (2.53)	5.00 (0-10)	21	6.10 (2.66)	6.00 (1-11)
Phonological Awareness	PA[g]	24	9.38 (4.04)	10.00 (0-15)	24	11.58 (10.48)	12.00 (1-15)
Morphological Awareness	PT[h]	23	10.22 (3.53)	10.00 (4-17)	24	11.83 (5.58)	11.00 (2-21)
	SC[i]	23	9.35 (4.17)	9.00 (2-20)	22	12.00 (4.75)	13.00 (5-22)
	MD[j]	23	7.35 (5.97)	6.00 (0-21)	20	10.60 (5.61)	11.50 (0-21)
	WA[k]	23	3.30 (3.02)	3.00 (0-10)	21	4.71 (2.47)	4.00 (1-10)
Syntactic Awareness	WD[l]	23	10.78 (3.98)	11.00 (4-20)	22	12.14 (3.87)	12.00 (4-21)
	GC[m]	23	6.35 (4.85)	5.00 (0-17)	21	9.71 (5.25)	10.00 (2-21)
Prosodic Sensitivity	MF[n]	23	26.78 (6.65)	26.00 (17-38)	22	28.59 (7.31)	29.00 (17-43)

a. TOWRE-2 Sight Word Efficiency

b. TOWRE-2 Phonemic Decoding Efficiency

c. WRMT-III: Word Identification

d. WRMT-III: Passage Comprehension

e. PPVT-5

f. WASI-II: Vocabulary (Expressive)

g. WRMT-III Phonological Awareness – Blending and Deletion

h. Morphological Analysis Picture Task

i. MA Sentence Completion Total

j. Morphological Analysis – Define

k. Morphological Awareness: Word Analogy

l. Sentence Comprehension: Whatdunnit

m. Syntactic Awareness: Grammatical Correction

n. Prosody Sensitivity (Maddy's Farmhouse)

Table 11

Matched sample values for ANS students compared to all other NS students.

Task		African Nova Scotian			All Other NS Students		
		N	M (± SD)	Median (range)	N	M (± SD)	Median (range)
Word reading	SW[a]	12	21.17 (8.63)	22.5 (8-34)	12	35.42 (18.22)	25.50 (9-64)
	PD[b]	9	3.89 (3.95)	2.00 (0-12)	11	12.91 (7.54)	9.00 (3-27)
	WI[c]	11	11.09 (5.11)	10.00 (3-20)	11	17.27 (5.33)	16.00 (10-25)
Reading Comprehension	PC[d]	12	6.00 (4.07)	5.50 (1-13)	11	11.18 (4.00)	10.00 (4-18)
Vocabulary	VoR[e]	11	125.91 (14.49)	125.00 (97-148)	11	142.91 (10.89)	144.00 (126-166)
	VoE[f]	11	4.27 (2.45)	4.00 (0-9)	11	5.82 (2.71)	6.00 (1-10)
Phonological Awareness	PA[g]	12	8.33 (4.14)	10.00 (0-12)	12	11.92 (2.31)	12.00 (8-15)
Morphological Awareness	PT[h]	11	9.73 (3.44)	10.00 (4-15)	12	12.75 (5.38)	13.50 (6-20)
	SC[i]	11	7.27 (3.20)	6.00 (2-13)	11	13.09 (3.67)	14.00 (7-20)
	MD[j]	11	6.18 (5.19)	6.00 (0-16)	11	11.18 (5.74)	12.00 (0-21)
	WA[k]	11	1.91 (2.20)	1.00 (0-6)	11	4.18 (2.75)	3.00 (1-9)
Syntactic Awareness	WD[l]	11	8.45 (3.05)	11.00 (4-11)	11	12.55 (4.37)	11.00 (8-21)
	GC[m]	11	4.73 (3.58)	4.00 (0-11)	11	9.55 (5.82)	11.00 (2-17)
Prosodic Sensitivity	MF[n]	11	24.09 (6.01)	22.00 (17-34)	11	27.64 (7.55)	28.00 (17-41)

a. TOWRE-2 Sight Word Efficiency

b. TOWRE-2 Phonemic Decoding Efficiency

c. WRMT-III: Word Identification

d. WRMT-III: Passage Comprehension

e. PPVT-5

f. WASI-II: Vocabulary (Expressive)

g. WRMT-III Phonological Awareness – Blending and Deletion

h. Morphological Analysis Picture Task

i. MA Sentence Completion Total

j. Morphological Analysis – Define

k. Morphological Awareness: Word Analogy

l. Sentence Comprehension: Whatdunnit

m. Syntactic Awareness: Grammatical Correction

n. Prosody Sensitivity (Maddy's Farmhouse)

Table 12

Values for ANS students compared to African students.

Task		African Nova Scotian			African		
		N	M (± SD)	Median (range)	N	M (± SD)	Median (range)
Word reading	SW[a]	12	21.17 (8.63)	22.50 (8-34)	12	38.50 (19.87)	45.50 (9-63)
	PD[b]	9	3.89 (3.95)	2.00 (0-12)	11	14.18 (11.33)	13.00 (0-31)
	WI[c]	11	11.09 (5.11)	10.00 (3-20)	12	15.75 (8.26)	17.00 (4-29)
Reading Comprehension	PC[d]	12	6.00 (4.07)	5.50 (1-13)	12	8.58 (4.56)	8.00 (2-17)
Vocabulary	VoR[e]	11	125.91 (14.49)	125.00 (97-148)	12	128.75 (14.74)	127.50 (93-154)
	VoE[f]	11	4.27 (2.45)	4.00 (0-9)	12	5.33 (2.61)	6.00 (0-10)
Phonological Awareness	PA[g]	12	8.33 (4.14)	10.00 (0-12)	12	10.42 (3.83)	12.00 (5-15)
Morphological Awareness	PT[h]	11	9.73 (3.44)	10.00 (4-15)	12	10.67 (3.70)	10.50 (4-17)
	SC[i]	11	7.27 (3.20)	6.00 (2-13)	12	11.25 (4.16)	10.50 (6-20)
	MD[j]	11	6.18 (5.19)	6.00 (0-16)	12	8.42 (6.65)	6.50 (0-21)
	WA[k]	11	1.91 (2.02)	1.00 (0-6)	12	4.59 (3.29)	4.50 (0-10)
Syntactic Awareness	WD[l]	12	8.45 (2.86)	11.00 (4-11)	12	12.92 (3.58)	12.00 (9-20)
	GC[m]	11	4.73 (3.58)	4.00 (0-11)	12	7.83 (5.51)	8.50 (0-17)
Prosodic Sensitivity	MF[n]	11	24.09 (6.01)	22.00 (17-34)	12	29.25 (6.47)	26.50 (20-38)

a. TOWRE-2 Sight Word Efficiency

b. TOWRE-2 Phonemic Decoding Efficiency

c. WRMT-III: Word Identification

d. WRMT-III: Passage Comprehension

e. PPVT-5

f. WASI-II: Vocabulary (Expressive)

g. WRMT-III Phonological Awareness – Blending and Deletion

h. Morphological Analysis Picture Task

i. MA Sentence Completion Total

j. Morphological Analysis – Define

k. Morphological Awareness: Word Analogy

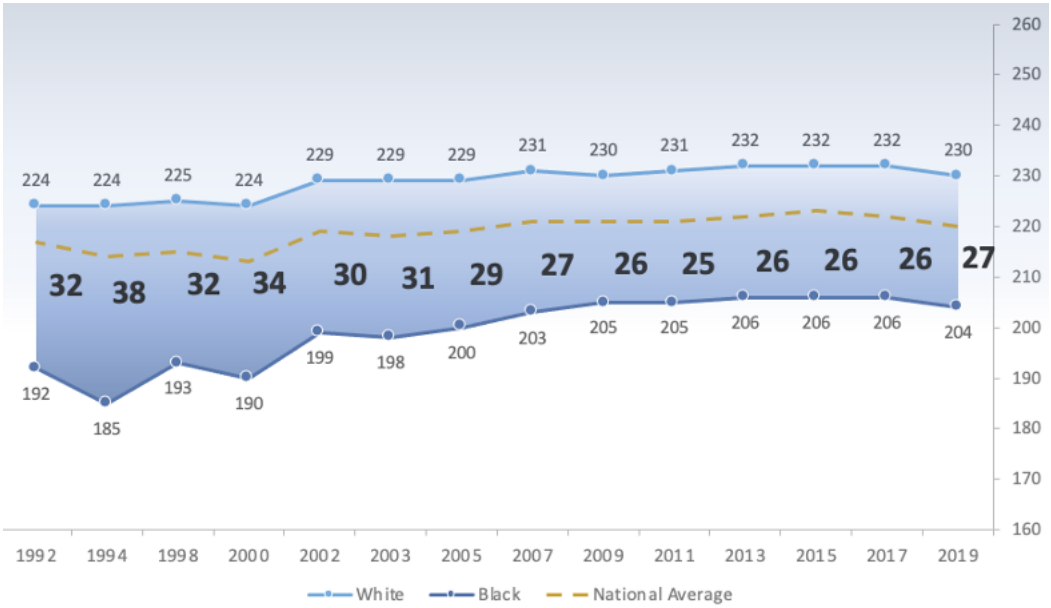
l. Sentence Comprehension: Whatdunnit

m. Syntactic Awareness: Grammatical Correction

n. Prosody Sensitivity (Maddy's Farmhouse)

Figure 1

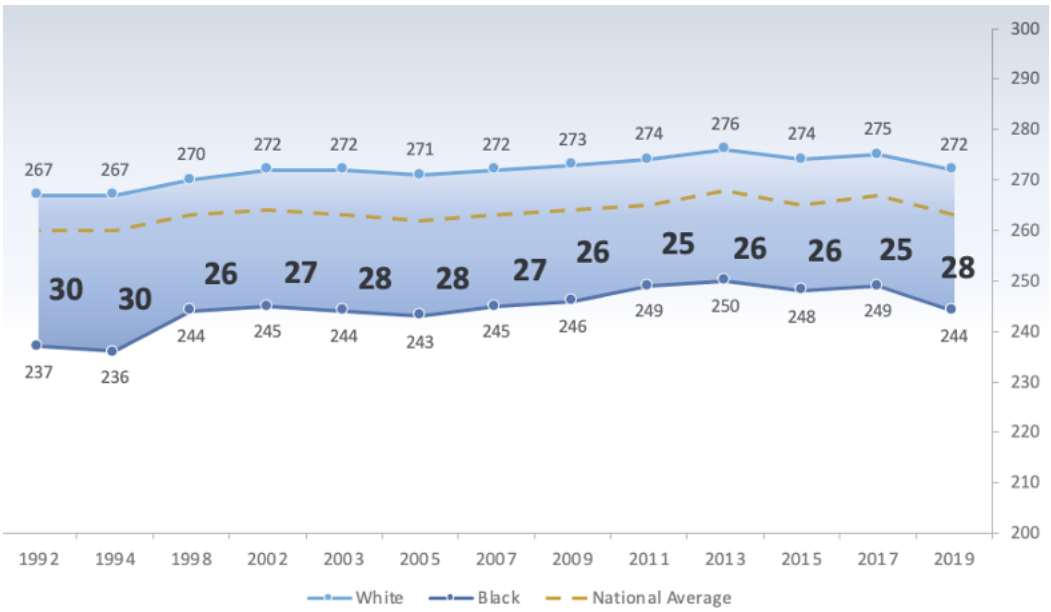
Reading Achievement Score Gaps Between Black and White Public-School Students in Grade 4: 1992-2019



Note. National Assessment of Education Progress (2019).

Figure 2

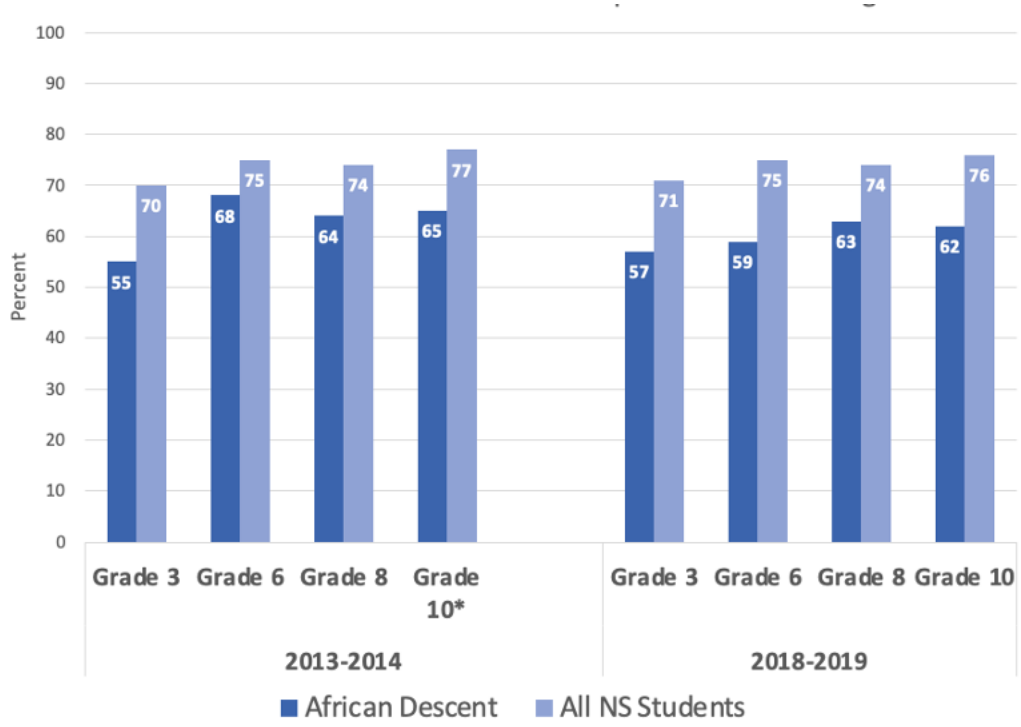
Reading Achievement Score Gaps Between Black and White Public-School Students in Grade 8: 1992 - 2019



Note. National Assessment of Education Progress (2019).

Figure 3

Percent of Students at or Above the Expectation for Reading



Note. Grade 10 data from 2014-2015; 2013-2014 data not available. Nova Scotia Department of Education and Early Childhood Development (2020).

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Leaps and Bounds:

From reading words to understanding texts.

Your child can take part in a study!

We are researching how children understand what they read.

To find out more, see the attached letter.

Please **complete and return** the signature page

and questionnaire to your child's teacher.

The class with the most forms returned **gets a $50 Chapters' gift card**!

Thanks very much!
Dr. Hélène Deacon

DALHOUSIE UNIVERSITY

DALHOUSIE UNIVERSITY

Study Title: *Leaps and bounds: From reading words to understanding texts*

Dear parent/guardian,

We invite your child in Grade 1 to take part in an exciting study! The study is being conducted by Dr. Hélène Deacon and her students in the Language & Literacy Lab at Dalhousie University. This research is funded by a grant from the Social Sciences and Humanities Research Council.

Purpose of the study

Reading is one of the most important skills that children learn. Our study examines how children harness their language skills to support their learning to read from Grades 1 to 6. We are working with a wide range of learners, to understand the skills that different children use. This knowledge will inform curriculum design, including how to support all children in reaching literacy success.

Who can participate in the study

All children in the English program in Grade 1 in your child's school are invited to participate.

Participation is completely voluntary. We will only work with your child if you agree by signing and sending in the attached consent form, and if your child agrees to take part when we visit. At this time, we ask your consent for your child's participation in each of the 6 years. Each year, you will receive a letter reminding you of your child's upcoming participation. We know circumstances may change over the years, so know that you can withdraw your child's participation at any time.

Who will conduct the research and when

Trained researchers from the Language and Literacy Lab will conduct the study at your child's school each winter or spring. All research assistants have cleared Criminal Record, Vulnerable Sector, and Child Abuse Registry checks and have years of experience working with children. We will arrange convenient times with your child's principal and teacher.

What your child will be asked to do

We would work with your child once per year from Grade 1 to Grade 6. Your child will be asked to complete a variety of language and reading activities designed to be fun and age-appropriate. For example, children will be asked to rearrange muddled sentences, choose meanings for words, and spell words on a tablet. In later grades, we will look at reading and writing in online environments, including asking children to choose some texts to share with us and to read on screens. Some activities are done individually and others in small groups. Some activities are audio-recorded. In total, these activities take about 2 hours, divided into shorter sessions based on children's interest and class activities.

We make it clear to the children that we are interested in *how* they do these these activities rather than whether they get things right. Based on our experience, children find these activities fun and engaging, and enjoy working one-on-one. Each year, we thank children for their participation with prizes, such as colourful pencils and erasers, as well as a certificate.

As part of our research, we would like to link provincial assessment results with the information collected for this study. Currently, Nova Scotia assessments are scheduled for Grades 3 and 6 and will cover reading, writing, and mathematics. If you consent, we will ask the school for your child's student ID so that the Department of Education can provide us with your child's assessment results.

To better understand the children we work with, we also ask you to answer some questions about your family's education, employment, and language. This is voluntary; answer as many questions as you are comfortable with. Your child can still participate if you return only the Signature Page.

What we will do with the information

The information gathered from this project is for research purposes. We expect to present our findings, based on results of all the participants together, in academic journals and education conferences; we will also share them with the Centre for Education and Department of Education. We may also contrast these group results to other groups, such as adults.

As a parent/guardian, you will receive a letter explaining our findings for the group as a whole. You also have the option to receive your child's reading levels based on standardized tests of word reading and reading comprehension. This feedback will indicate whether your child's performance is appropriate for their age-level. Please note that these results cannot be used for diagnostic purposes. You also have the option of letting us share this information with your child's teacher. Please indicate your preference on the attached Signature Page and return it to your child's teacher.

Possible Risks and Benefits

We hope our results will be useful for future teacher education and curriculum development. Individual children are unlikely to benefit greatly from the study, although they do tend to enjoy participating in our research. A possible risk lies in missing time from classroom instruction. We work hard to reduce any lost time by carefully arranging testing times with your child's teacher. We make every effort to accommodate the needs and preferences of individual children and teachers.

How we will protect your data

We take multiple steps to protect the privacy of children who participate in our studies. Data files are stored with only coded ID numbers, and not names. All audio files and de-identified data are stored securely (e.g., password-protect network, locked data storage room) and kept indefinitely. Consent forms and any identifying information are destroyed 5 years after publication of the research. Data use and storage is reviewed and approved by Dalhousie University's Research Ethics Board. Combined results for groups of children, never individuals, are reported in our publications and presentations. The only individual data shared with you and/or with your child's school will be your child's reading level and **only** with your permission.

To participate and for more information

We are happy to answer any questions about this study! You can contact the Research Coordinator at 902-494-3229, or langlab@dal.ca; she will be coordinating the testing at your child's school. You are also welcome to call the Lab Director, Dr. Hélène Deacon, at 902-494-2538.

If you have any difficulties with, or wish to voice concern about, any aspect of your child's participation in this study, you may contact Catherine Connors, the Director of Dalhousie University's Office of Human Research Ethics: Catherine.Connors@dal.ca or 902-494-1462.

In summary

We are very excited about our new research study and would love the opportunity to work with your child! With your consent, we will work with your child as they complete a series of enjoyable language and reading activities. We are motivated to understand how children understand what they read and look forward to sharing our findings with you!

Please complete and return the following Signature Page to your child's teacher.

We thank you for considering your child's participation in this study!

Dr. Hélène Deacon, Professor
Lab Director, Language & Literacy Lab
Dalhousie University
helene.deacon@dal.ca / 902-494-2538

Jill Taylor
Research Coordinator
Dalhousie University
readingresearch@dal.ca / 902-494-3229

Find out more about us! Visit our website: http://langlitlab.psychology.dal.ca/

Signature Page: *Leaps and bounds: From reading words to understanding texts*

Please complete this signature page and the attached questionnaire and return them to your child's teacher as soon as possible.

I have read the explanation about this study. I understand that participation is voluntary and that my child is free to withdraw from the study at any time.

Do you give permission for your child to participate in this study? Please check one of the boxes below.

☐ Yes, I **give permission** for my child to participate in this study

☐ No, I **do not** want my child to participate in this study

Signature of parent/guardian: _____ Date: _____

If you give permission for your child to participate, please provide the following information:

Child's first name: _____ Child's last name: _____

Parent/Guardian first name: _____ Parent/Guardian last name: _____

To receive follow-up information: Parents/guardians of all participating children will receive the general results of this study in each year. **You also have the option of receiving information about your child's invididual results by answering the questions below.** If you select 'yes', we will send this information in a sealed envelope to the school, which will be brought home to you by your child.

1. Would you like to receive information on your child's reading ability (based on standardized tests)? *This information will provide you with a snapshot of your child's reading ability, to be considered in relation to other sources of information. The results cannot be used for diagnostic purposes.* **YES** **NO**
2. Would you like us to pass on information about your child's reading ability to your child's teacher and school? **YES** **NO**
3. Do you give the Department of Education and Early Childhood Development permission to share your child's provincial assessment data with us? **YES** **NO**

YES

4. Would you like to be contacted with opportunities to participate in other studies? **NO**

If yes, please provide your email address: _____

Please also provide the following: Child's date of birth*:_____ / ____ / ____
YYYY MM DD

*We collect date of birth so that we can appreciate what is age-appropriate for your

What is the first language that your child learned to speak?

_____

Does your child speak any other languages? If yes, list:

_____

APPENDIX B: EXPERIMENTER PROTOCOL

EXPERIMENTER'S PROTOCOL for LEAPS AND

Order	ACTIVITY	Est. Time	Materials	Pg.
1	Matrix Reasoning	3-6 mins	Score sheet, Stimulus Binder, Pen/Pencil	3
2	WRMT-III Blending and Deletion	5 mins	Score sheet, Audio Recorder	4
3	Morph. Analysis Pictures	4-5 mins	Picture Binder, Scoring Sheet	5
4	TOWRE-2 Sight Word and Phonemic	4-6 mins	Stopwatch, score sheet, pen/pencil, audio recorder, word lists	6
5	WISC-IV Backwards Digits	5-7 mins	Score sheet	8
6	WRMT-III Passage Comprehension	5-10 mins	Stimulus binder, score sheet, paper/pencil	9
7	Prosodic Sensitivity	15-18 min	Laptop w E-Prime program (Wi-Fi off), Headphones x2 and splitter, USB # pad	10
8	Whatdunnit	8-10 mins	Laptop computer with ePrime program for the Whatdunnit task, Headphones x2 with splitter.	14
9	MA Sentence Completion	5-7 mins	Score Sheet	15
10	Morph Analysis Define	6-10 mins	Audio recorder, scoresheet	16
11	Grammatical Correction	5-10 mins	Audio Recorder, Pen/Pencil, Scoresheet	17
12	WRMT-III Word ID	2-3 mins	Score sheet, stimulus binder, audio recorder	18
13	PPVT-5 Vocab	6-10 mins	Score sheet, stimulus binder, pen/pencil	19
14	MA Word Analogy	5-7 mins	Score sheet, pen/pencil, finger puppets	20
15	WASI Vocab	5-8 mins	Score sheet, audio recorder	21
16	Print Convention - 1st set only	3-10 mins	Separate workbook, Marker – **TO STOP MARCH 18.**	22
17	Alphabet DASH	3-4 mins	Laptop with Eye/Pen 2 software, headphones (x2) with splitter, Eye/Pen dongle, tablet w/ clip to hold paper, inking pen, **Alphabet Response Sheet**	23
18	Spelling Easy Words	5-10 mins	↑ +**"3TrialPracticeRespSheet"**+ **"10ItemTaskRespSheet" – Continue until n = 100**	24

= Audio Recorder Used = Electronics Used = Stopwatch Used
☒ = "If incorrect" ☑ = "If correct" "NR" = No Response "DK" = Don't Know

Mar-04-2019-Rev.

LEAPS AND BOUNDS MATERIALS CHECKLIST

Basic Materials
Scoring Booklet
Pen/Pencil
Audio Recorder
Stopwatch
Markers
EPrime
Laptop
Laptop Charger
Headphones (x2)
Splitter
USB Keypad
Eye and Pen dongle
Tablet

Stimuli & Worksheets
Matrix/MA Picture/PSG Comp Binder
Word ID/PPVT-5 Binder
TOWRE Word Lists
OC Task Workbook
"Alphabet Response Sheet"
"3TrialPracticeResponseSheet"
"10ItemTaskResponseSheet

About the study, for staff:

We are interested in how children's oral language skills support their understanding of what they read. These are skills like if they know how to combine words or make sentences and their awareness of the rhythm of speech. These skills help children become better readers and move from learning to read to reading to learn – but how do these skills develop, and which of these skills matter when? We designed activities to tap into and explore how these skills help children in learning to read. We hope that, down the road, our findings will contribute to evidence-based curriculum design.

School Testing Musts:

-Sign-in at main office
-Grab a 'visitor' pass and wear all day
-Talk with Principal (or VP, or Admin) as to where you should set up each day
-Visit with respective teachers early (preferably before classes begin) each morning to find out about students' schedule for that day. Find out what times you should (and should not) be removing students from the classroom.
-**Always get children's assent** before removing them from the classroom. Simply ask, **"Would you like to come to do some reading activities with me?"**

Introduction to the Study

Hello, [child's name]*. I am* [your name]*, and I am a researcher from Dalhousie University. We are here today because we are interested in how children learn to read. We are curious about the way in which you think about words, not in whether you get things right or wrong. We have some activities that we hope you'll be interested in. These activities involve things like reading different kinds of words and fixing up messy sentences - I think you might find them kind of fun!*

You can take breaks as we go and you can stop doing the activities at any time. Would you be interested in participating in these activities?"

At end of each sitting with a child, you can offer them a choice of a sticker. When all activities are completed with child, they get the prize (e.g., notebook or pencil & eraser).

At end of day, Back up files : E-prime data and voice output files (onto jump drive daily, then to lab docs – at min. 1x/week) and Digital recorder files (in lab to lab docs – at min. 1x/week)

1. Matrix Reasoning (WASI-II)

Materials: Score sheet, stimulus binder, pen/pencil

Start Rule: Administer the two Sample Items A and B to all participants, then Item 1 as first test item. **Stop Rule:** Stop testing after 3 consecutive scores of 0

Discontinue Rule: Discontinue testing after reaching Item 24

Rules:

- Provide corrective feedback on the sample items only
- You must point to: the visual stimuli, the response options, and the question mark
- Use a 30-second guideline for test items: This guideline is to help with timely administration - it is not to be used rigidly. Do not abruptly stop the participant if there is an indication that he or she is about to give a response.
- If the examinee has not responded in approximately 30 seconds, prompt him or her by asking, **"Do you have an answer?"** Adjust the timing of this prompt and/or grant additional time if the participant has established a pattern of providing delayed but correct responses as the item difficulty increases.
- If the participant does not respond after prompting, move on to the next item by saying, **"Let's try another one."**
- A participant can answer a previously administered item after beginning a new item – give credit for that corrected response. If a response is changed, use final response, even if it is incorrect.

Scoring:

- Circle the examinee's response for each item on the score sheet
- Correct responses are bolded on the score sheet so keep it out of participant's view
- Correct responses are 1 point each; incorrect responses, don't knows, or no answers are 0 points

INSTRUCTIONS

Sample Item A (all ages): Say, **"Look at this picture. Which one here** [point across response options] **goes here** [point to question mark]?

☑ → Say, **"That's right."**

☒ → Say, **"These two are apples** [point across the top row]**. Here is one banana** [point to the banana]. **We need another banana here** [point to question mark] **to make these two** [point across bottom row] **the same as well. So this one** [point to Response 2] **goes here** [point to question mark]. [Proceed to Sample Item B.]

Sample Item B (all ages): say, **"Which one here** [point across response options] **goes here** [point to question mark]**?**

☑ → Say, **"That's right."**

☒ → Say**, "These two are the same** [point down the first column]**. Here is one triangle** [point to the triangle]**. We need another triangle here** [point to question mark] **to make these two** [point across bottom row] **the same as well. So this one** [point to Response 3] **goes here** [point to question mark]. [Proceed to Item 1].

Testing

- Turn to Item 1 in the Stimulus Binder and *say*, **"Which one here** [point across response options] **goes here** [point to question mark]**?**
- Proceed to the next item until stop criterion (3 consecutive incorrect response) or the discontinue criterion (completing Item 24) is met.
- The instructions may be shortened or eliminated when the examinee understands the process.

2. WRMT-III: Phonological Awareness - Blending and Deletion 

Materials: Score sheet, paper/pencil, recorder

Start point: Begin testing at Item 1 after doing Sample Items A and B.

Stop Rule: 4 consecutive scores of 0

Scoring:

- Correct responses are on the score sheet so keep it out of participant's view
- Correct responses are 1 point each; incorrect responses, don't knows, or no answers are 0 points

RULES

- The pause between each syllable of the test word should be about **one second long.** Ensure there is a clear space between each sound.
- Ensure you are familiar with all prompt words prior to testing to ensure proper delivery.
- If the examinee does not respond in about **5 seconds (approximate, not timed)**, say: **"Give it a try."** If there is still no response, move on to the next item.
- If necessary, instructions can be repeated; however the items themselves should not be.
- Correct responses should sound like a word and should not be broken into sections – give feedback on this in practice items but code as incorrect for test items.

Say, **"I will use the recorder so that I can listen to your answers again if I need to, OK?"**

Begin Audio Recording: **"Blending and Deletion, ID # __"**

BLENDING (Section D**):** Say, **"Let's play a game with words…"**

Sample Item Practice (Form A): administered to all participants.

Sample Item A: Say, "**I'm going to say a word one part at a time. Listen: POP…CORN.** (*Pause about one second between word parts*). **Tell me what word this makes: POP…CORN."**

☑ → Say, "**That's right: POP…CORN makes POPCORN. Let's try another one."**

☒ → Say: **"POP…CORN makes POPCORN. Let's try it again.** (*Emphasize each sound*). **POP…CORN. POP…CORN makes…** *If still no response, say* **"POPCORN. Let's try another one."**

Repeat procedure with Sample Item B before proceeding to Test Item 1.

Test items:

Say "**Say [test word/sound] … [test word/sound]."**

DELETION (Section E**):** Say, **"You worked so well! Now let's try a different game with words…"**

Sample Item Practice (Form A): administered to all participants.
Sample Item A: Say, "**Say PANCAKE without PAN."**
☑ → Say: "**That's right: PANCAKE without PAN leaves CAKE. Let's try another one."**
☒ → Say: **"PANCAKE without PAN leaves CAKE. Let's try it again."** *Emphasize each sound.* **"Listen: PANCAKE** (pause) **without PAN** (pause) **leaves…"** (*Wait for examinee to respond). If still no response, say* **"CAKE. Let's try another one."**
Repeat procedure with Sample Item B before proceeding to Test Item 1.

Test items:
Say: **"Say [test word] without [test sound]."**

3. Morphological Analysis Picture Task

Materials: Picture binder; Scoring Sheet

Rules:

- Administer ALL items (practice and test items).
- Familiarize yourself with the correct pronunciation of items (see scoring sheet).
- Read items in using natural speech (do not place any specific emphasis on any part)
- Test item can be repeated two additional times.
- Use positive reinforcement for all questions but only give feedback on correctness for practice items.
- Ensure you have flipped the page completely and given the child time to look at the images before asking questions.
- If participant hesitates for more than 5 seconds, prompt them by saying, ***"Just give it your best try!"***
- Begin testing with picture binder closed in front of the child.
- Child can flip the pages if it helps them stay focused.

Scoring:

- Circle the number corresponding to the picture that the child indicates. Do not use scoring column—this will be scored later in lab.
- Participants can 'self-correct' their response ("*it's Picture 1… oops, I meant Picture 4*") until you've turned the page and moved on to the next item. Circle all responses given, and indicate order, making sure the final answer is clearly indicated.

Sample Instructions:

Practice Item 1: **"Sometimes it is possible to make up words that seem to make sense, even though we have never heard them before. For instance, if I said to you that I saw the *"circliest table"*** (*circle-/ee/-est*)**, which table do you think it would be?** [open binder to the first page, Practice 1]. **Go ahead and look carefully at these four pictures and then point to the one that shows the circliest table.**

☑ → Say, **That's right!** [Turn to Practice 2].

☒ → Say, ***That's not quite right.*** [point to correct picture] Say, "**This one is the circliest table"**

Practice Item 2: "**Try this one, can you point to the picture of the "disorange shirt"** (*/diss/-orange)***?**

☑ → **That's right!** [Continue to testing].

☒ → Say, ***"That's not quite right"*** [point to correct picture] ***"This one is the disorange shirt***."

Testing:

After completing practice items, say: **"You did a great job! I am now going to tell you some more made-up words, and your job is to tell me which picture it is. Some of these made-up words may sound silly, so make sure to look at each picture carefully before answering. OK, let's start!"**

For each item, say: ***"Can you point to the picture of the… [target]?"***

4A: TOWRE-2 Sight Word Efficiency (Form A)

Materials: Stopwatch, score sheet, pen/pencil, digital recorder

Administration Guidelines:

- Know correct pronunciations before testing
- Tell participant to **"stop"** at 45 seconds – and **stop recorder**
- Use the score sheet to record errors and last word read. Put "X" beside words misread or skipped.
- If participant hesitates for 3+ seconds on a word, mark word as "X". Say **"go on"** or **"try the next one".**
- At 45sec, draw a line after the last word read. If all words read before 45s, note the time.
- If, before the time is up, the participant indicates that they cannot read any more words, ask them to look over the whole list to see if there are any more words they can read. If they then indicate they can read no more words, stop testing and make a note of why and at what time testing stopped.

PRACTICE INSTRUCTIONS:

Say: **"I want you to read some lists of words as fast as you can. Let's start with this practice list**. **Begin at the top, and read down the list as fast as you can. If you come to a word you cannot read, just skip it and go to the next word. Use your finger to help you keep your place if you want to."**

*-If they skip around, ask them to "***read the words from top to bottom, without jumping around***"* *-Testing is discontinued if participant is unable to correctly respond to at least one practice word.*

TEST INSTRUCTIONS:

Say: **"Ok, now you will read some longer lists of words. The words start out pretty easy, but they get harder as you go along. Read as many words as fast as you can until I tell you to stop. Begin here** *[turn over the sheet to point to the upper left corner of list]* **and read down the list** *[draw finger down the list]* **before you start on the next list** *[point to top of second column]*.

*Say: "***Read the words in order, but if you come to one you can't read, skip it and go to the next one. Use your finger to keep your place if you want to, and if you skip more than one word, point to the word you are reading next.** *[Turn the card back to the practice words.]* **Do you understand?"**

Say: **"I will record you while you are reading so that I can listen to your answers if I need to, OK?** *[Start the recorder* : **Participant number ___, TOWRE, Sight Word**].

Are you ready? Ok, you will begin as soon as I turn over the card." [*Quickly turn over the sheet so the test word list is exposed, and start timing as soon as the participant says the first word.]*

4B: TOWRE-2 Phonemic Decoding Efficiency 

Materials: Stopwatch, score sheet, pen/pencil, digital recorder

Administration Guidelines:

- Know correct pronunciations before testing
- Tell participant to **"stop"** at 45 seconds – and **stop recorder**
- Use the score sheet to record errors and last nonword read. Put "X" beside item misread or skipped.
- If participant hesitates for 3+ seconds on a word, mark word as "X". Say **"go on"** or **"try the next one".**
- At 45sec, draw a line after the last word read. If all words read before 45s, note the time.
- If, before the time is up, the participant indicates that they cannot read any more nonwords, ask them to look over the whole list to see if there are any more nonwords they can read. If they then indicate they can read no more words, stop testing and make a note of why and at what time testing stopped.

PRACTICE INSTRUCTIONS:

Say: **"I want you to read some made-up words that are not real words. Just tell me how they sound. Let's start with this practice list. Begin at the top, and read down the list as fast as you can. If you come to a made-up word you cannot read, just skip it and go to the next word. Use your finger to help you keep your place if you want to."**

*-If they skip around, ask them to "***read the words from top to bottom, without jumping around***"*

*-If they try to substitute real words for the nonwords, remind them that "***these are made-up words, not real words; just try to say how they sound."**

*-If they simply pronounce each letter sound separately, say, "***you are giving me the sounds each letter makes. Try to blend the sounds together to make a made-up word."** *-Testing is discontinued if participant is unable to correctly respond to at least one practice word.*

TEST INSTRUCTIONS:

Say: **"Now you will read some longer lists of made-up words. The made-up words start out pretty easy, but they get harder as you go along. Read as many of them as you can until I tell you to stop. Begin here** [*turn over the sheet to point to the upper left corner of the list]* **and read down this list** [*draw finger down the list]* **before you start on the next list** [*point to top of second column*].

Say: "**Read the made-up words in order, but if you come to one you can't read, skip it and go to the next one. Use your finger to keep your place if you want to, and if you skip more**

than one word, point to the word you are reading next. *[Turn the card back to the practice words.]* **Do you understand?**

[*Restart recorder*: **Participant number ___, TOWRE, Phonemic**].

"Ok, you will begin as soon as I turn over the card." *[Quickly turn over the sheet so the test nonword list is exposed and start timing as soon as the participant says the first nonword.]*

5. WISC-V: Backwards Digit Span

Materials: Score sheet

Start Point: Sample Item → Item 1 for all participants between the ages of 6 and 16

Discontinue Point: After scores of 0 are obtained for **both** trials of an item, not consecutive scores of zero across separate items.

Scoring:

-Score 1 point for a correct response and 0 points for an incorrect response (or no response).
-Digit Span Backward (DSB): Sum of item scores of the trials completed. Max = 16
-Longest DSB (LDSB): Number of digits recalled on the last DSB in which 1 point was scored.

Administration Guidelines

-Each item contains 2 trials. Administer both trials, regardless of the child's performance on Trial 1.
-Read each trial at a rate of one digit per second, ensuring a clear pause between each number, dropping your voice on the last digit.
-If a child says he/she cannot answer, encourage them by saying, "**Just try your best."**
-Do NOT repeat items; if a child requests repetition, say "**Just take your best guess."**
-Give praise ("**You're working hard"**, for example) but do not reinforce participant performance by saying "good" or "right" or otherwise hinting at the correctness of the response.
-Encourage a response by around 30 seconds unless child is performing well and is just taking longer as difficulty increases, then can give more time.
-If the child doesn't respond, note "**NR"** on the score sheet and move on to the next item, say: "**Let's try another one."** (If they say they don't know, note "**DK"** and proceed the same way).

Testing Instructions

Sample Trial Item 1: Say, "**I am going to say some numbers. Listen carefully, and when I stop, I want you to say them backward. If I say 8 – 2, what would you say?"**

☑ (2-8) → Say, "**That's right."** *Proceed to Sample Trial Item 2.*

☒ → Say, **"That's not quite right. I said 8 – 2, so to say it backward, you should say 2 – 8. Let's try again: 8 – 2."**

☑ → *Proceed to Sample Trial Item 2.*

☒ → Say: **"That's not quite right. I said 8 – 2, so to say it backwards, you should say 2 – 8."** *Proceed to Sample Trial Item 2.*

Sample Trial Item 2: Say, "**Let's try these numbers. Remember, you are to say them backward: 5 – 6.**

☑ (6 – 5) → Say, "**That's right."** *Proceed to Item 1 Trial 1.*

☒ → Say, "**That's not quite right. I said 5 – 6, so to say it backward, you should say 6 – 5. Let's try again: 5 – 6."**

☑ → *Proceed to Item 1 Trial 1.*

☒ → Say: **"That's not quite right. I said 5-6, so to say it backwards, you should say 6-5."** *Proceed to Item 1 Trial 1.*

"Okay, let's try some more – remember you are to say them backwards."

6. WRMT-III: Passage Comprehension

Materials: Stimulus binder, score sheet, paper/pencil
Start Point: Start point for Grade 1 and 2 is Item 1.
Stop Rule: 4 consecutive scores of 0.
Query: "Tell me another word."
Scoring:

- Correct responses are on the score sheet so keep it out of participant's view
- Correct responses are 1 point each; incorrect responses/DK/NR are 0 points

Administration Guidelines

- One-word response required to be correct. If answers with more than one, say: **"What <u>one</u> word belongs in the space?"**
- Try to record all responses, but <u>especially ambiguous responses</u>.
- Do not read any items (other than Sample) aloud or tell the participant any other words.
- Passages are intended to be read **silently** by participants. Some may start to read out loud. If this happens, say **"please read silently."** If they persist in reading aloud, do not insist on silence.
- Do not stop testing part way through a page. Continue until full page is done even if discontinue rule is met (but do not award points for any correct responses after discontinue rule is met).
- Some responses on the score sheet are listed as <u>*query*</u>. If the participant gives one of these responses, say *"***Tell me another word."** Indicate Q for a queried item in Error Response column and write answer provided to the query. If it is part of the acceptable responses, score the item as 1, if not, score as a 0.
- If a response isn't provided **within about 5 seconds** after the child finishes reading, encourage a response with **"What word belongs in the blank space?"** . If there's still no response, move on (you can usually tell if they are done reading by watching where their eyes/where they are looking)

Practice: <u>Sample Item</u> (administered to all participants)

-Point to the passage and *say*: "**This says, 'The cat is playing with a … [pause]."** [Point to the blank space in the sentence] and *say*: **"What word belongs in the blank space?"**

☑ (BALL) → Say: **"Correct. Let's try the next one."** [Turn to appropriate start point.]
☒ (YARN, etc.)/NR → Say, *"***The cat is playing with a <u>ball</u>. Let's try again."**
<u>Repeat the sample item for a correct answer before moving on to the test items.</u>

Test items:

Beginning at Item 1, point to each item and say: **"Read this to yourself and tell me what word belongs in the blank space."**

7. Prosody Sensitivity (Maddy's Farmhouse)

Subtest 1.1: Word stress Subtest 2: Intonation
Subtest 3.1: Phrase stress Subtest 1.2: Word stress vocab check

GENERAL INSTRUCTIONS AND TIPS FOR E-PRIME

MATERIALS

Laptop w E-Prime program (wifi off), Headphones x2 and splitter, USB # pad, Familiarity Check Duotang

TO START

-Plug the headphones into the laptop using the splitter.

-Plug the number pad into the laptop using the USB, **make sure "num lock" is on** or the number pad will not work.

-Ensure both the child and experimenter are facing the screen.

-Ask the child to put on headphones, saying **"*Can you put this headset on? I'll wear one too so we can hear the same thing*".**

E-PRIME

-Open each subtest individually in E-Prime. They are in the "Prosody E-Prime" folder; there you will find four computer tasks, each in their own subfolder: 1 Word Stress, 2 Intonation, 3 Phrase Stress, and 4 Vocab Check.

- In each folder, you will find their E-Run Script File (.ebs3 file).
- Simply click on file, and the trial will begin.
- Enter Participant ID number
- Enter Session # (usually it will be "1", unless you are returning a second time).

Administer tasks **in order**. Follow along in E-Prime with the scripts on the following pages. Use [ENTER] on the number pad to move from one slide to next. Audio will play automatically. To repeat audio, press "9" on the number pad.

- To exit a task before completing the task, press [*Ctrl*]+[*Alt*]+[*Backspace*].
- If the above option fails to exit program, press [*Ctrl*]+[*Alt*]+[Shift] to force-abort the program.

RESPONSES

- After the child responds, press the number on the number pad corresponding to their choice. This will advance the slide.
- Use the booklet to correct any incorrect key presses or note if the child self-corrects after a key has been pressed. If possible, record all responses in case there are any problems with the E-Prime files.
- For all items, allow the child sufficient time to give a response, but encourage them to make a choice if they are taking as long as 10 seconds. All items should be administered to each child. Encourage them to guess if they do not know before moving onto the next item. If they make a self-correction to their answer, accept their final answer.
- Maximum 1 repeat if the child does not hear an item or asks for it to be played again. To repeat a word stress or intonation item, press "9" on the number pad.
- Say prompts (e.g. "What is Susan looking for") each time until it is clear that the child understands.

FEEDBACK

- Feedback on the accuracy of responses is only permitted for practice items; no corrective feedback should be provided for test items.
- Please praise the child for their effort and hard work throughout, regardless of how well they are actually performing. E.g. "*Nice work*" and "*I like how you're working hard*".

SUBTEST 1: WORD STRESS

[Open "Word Stress" in E-Prime.]

"This is Maddy. Today we're going to help Maddy out by doing some activities!"

*[*Press ENTER to advance the slide.]

"**Do you see this farmhouse here? There's a lot of stuff here isn't there*?"*** *[*Pause; child looks around at the slide*]* **"Well, this farmhouse belongs to Maddy. And as you can see, Maddy is messy- her stuff is everywhere. Maddy's friend Susan is looking for some things in Maddy's farmhouse but she needs your help since Maddy's farmhouse is just so messy. Susan is going to tell you what she is looking for so that you can point to it and show her where it is. The only problem is that Susan has a speech difficulty so she doesn't say words exactly the way I say them. She says them a little bit differently. You need to listen very carefully so you can hear what the words sound like and figure out what Susan is really trying to say. Do you understand what to do?"** [Child usually responds in agreement; if the child does not respond or appears to not understand the instructions, repeat the instructions*]* "**Let's try a couple for practice."**

[Advance the slide.] Practice item A, "chimney", will play: **"What is Susan looking for?"** [Give feedback after the child responds]

☑ → **"That's right! This is what Susan is looking for***." [Point at the chimney*]

☒ → **"That's not quite right. This is what Susan is looking for."** *[Point at the chimney]*

"Let's try another one." [Press the key corresponding to the child's response for A. This will advance the slide.]

Practice item B, "pillow", will play: **"What is Susan looking for?"** [Give feedback after the child responds]

☑ → **"That's right! This is what Susan is looking for."** [Point at the pillow*]*

☒ → "**That's not quite right. This is what Susan is looking for."** [Point at the pillow]

*"***Let's try another one."** [Press the key corresponding to the child's response for B. This will advance the slide.]

Practice item C, "shampoo", will play: *"***What is Susan looking for*?"*** *[Give feedback after the child responds]*

☑ → **"That's right! This is what Susan is looking for."** [*Point at the shampoo*]

☒ → "**That's not quite right. This is what Susan is looking for***." [Point at the shampoo]*

"OK, Maddy thinks you are ready to work on your own. What is Susan looking for?"

[Press the key corresponding to the child's response for C. This will advance the slide.]

[Continue through the remaining items, 1-20. Press the key corresponding to the child's choice each time. Also write the name of the object the child points to on the accompanying

scoring sheet. Do not give corrective feedback after the practice item. There is no stop rule. Administer all items. Each item is played once, maximum 1 replay (press "9") if child does not hear the item or requests to hear it again.]

SUBTEST 2: INTONATION

[Open "Intonation" in E-Prime.]

"Maddy and Susan think you did a great job finding what Susan was looking for! Maddy would now like to introduce you to her husband, Farmer Jack and his lovely dog, Jessie." [Point to Farmer Jack and Jessie on the screen]. **"Maddy is going to say some things about Farmer Jack and Jessie. Now, sometimes, Maddy will be 'telling you' about them, but sometimes she will be 'asking you a question' about them. So, if she was telling you something she might say "the Farmer has a beard."** [Say this one like a statement and point to the picture of Maddy pointing her finger with no question mark included] **but if she was asking you a question she might say "the Farmer has a beard?"** [Say this one like a question and point to the picture of Maddy with a confused expression with a question mark].

"Maddy will be telling you something or asking you a question. I want you to listen to what she says and to point to the picture that best fits what you have heard. Let's try some."

Practice Item A: **"Listen to Maddy. Does it sound like she is telling you something or asking you a question?"** [Press ENTER to advance the slide, practice item **A** will play. Give feedback after the child responds. This item is **asking**.]

☑ → **"That's right, it sounded like she was asking you a question didn't it"** [Point to the picture with the question mark]

☒ → **"That's not quite right. If you listen carefully, it sounded like she was asking you a question"** [Point to the picture with the question mark]

Practice Item B: **"How about this time – does it sound like Maddy is telling you something or asking you a question?"** [Press the key corresponding to the child's response for A. This will advance the slide. Practice item **B** will play. Give feedback after the child responds. This item is **telling**.]

☑ → **"That's right, it sounded like she was telling you didn't it"** [Point to the normal picture]

☒ → **"That's not quite right. If you listen carefully, it sounded like she was telling you"** [Point to the normal picture]

Practice Item C: **"Let's try some more. Does it sound like Maddy is telling you something or asking you a question?"** [Press the key corresponding to the child's response for B. This will advance the slide. Practice item **C** will play. Give feedback after the child responds. This item is **telling**.]

☑ → **"That's right, it sounded like she was telling you didn't it"** [Point to the normal picture]

☒ → **"That's not quite right. If you listen carefully, it sounded like she was telling you"** [Point to the normal picture]

Practice Item D: **"How about this time – does it sound like Maddy is telling you something or asking you a question?"** [Press the key corresponding to the child's response for C. This will advance the slide. Practice item **D** will play. Give feedback after the child responds. This item is **asking**.]

☑ → **"That's right, it sounded like she was asking you a question didn't it"** [Point to

"OK, Maddy thinks you are ready to work on your own. Does it sound like Maddy is telling you something or asking you a question?" [Press the key corresponding to the child response for D to advance the slide.

Test items 1-14 press corresponding key for each. Do not give corrective feedback after the practice item. There is no stop rule. Administer all items. Each item is played once, maximum 1 replay (press "9") if child does not hear the item or requests to hear it again.]

SUBTEST 3: PHRASE STRESS

[*Open "Phrase Stress" in E-Prime.]*

"Maddy thinks you did a great job figuring out if she was telling you something or asking you a question! Maddy also likes using technology on her farm. She has a robot named Data. Maddy likes to tell the robot Data about her favourite stories and movies. Data tries to say the names of these stories and movies, but since Data is a robot he can only speak using "dee-dee" sounds. Let's see if you can understand what Data is trying to say. First you will hear the name of a story or movie said clearly, in English. Then you will hear two names said in a sort of robot language, with only "dee-dee" sounds. I'd like you to listen carefully and tell me which of the two "dee-dee" sounds is referring to the same story or movie you heard clearly in English. All of the sounds will repeat twice. Do you understand what to do?" [Child usually responds in agreement; if the child does not respond or appears to not understand the instruction, repeat the instructions] **"Let's try a couple for practice."** [Press ENTER to advance the slide.]

*[*Practice item A will play. As you hear "Humpty Dumpty", point to the picture of Humpty Dumpty. As the two DEEdee items are said, point to "1" and "2" in turn. Give feedback when the child responds. The correct response is **1**]

☑ → Say: *"***That's right! DEEdee DEEdee is the same as Humpty Dumpty".**

[Emphasize the similarity between stress patterns]

☒ → Say: **"That's not quite right. DEEdee DEEdee matches Humpty Dumpty".**

[Emphasize the similarity between stress patterns]

"Let's try another one". [Press the key corresponding to the child's response for item A. This will advance the slide.]

[Practice item B will play. As you hear "Bob the Builder", point to the picture of Bob the Builder. As the two DEEdee items are said, point to "1" and "2" in turn. Give feedback when the child responds. The correct response is **2**]

☑ → **"That's right! DEE dee DEEdee is the same as Bob the Builder".** [Emphasize the similarity between stress patterns]

☒ → **"That's not quite right. DEE dee DEEdee matches Bob the Builder".**

[Emphasize the similarity between stress patterns]

"OK, Maddy thinks you are ready to work on your own." [Press the key corresponding to the child's response for item B. Continue through the remaining of the 18 items. Press the key corresponding to the child's choice each time. Do not give feedback after the first two items, as they are considered practice items. There is no stop rule. Administer all 18 items. Each item will repeat automatically if needed.]

8. Sentence Comprehension: Whatdunnit

Description: Children hear a sentence and see three pictures. They should select the picture that represents the action "doer".

Materials: Laptop with ePrime, Headphones x2 with splitter, score sheet for notes.

Start: Situate the laptop so it is facing both the research assistant and child. Open the ePrime/Whatdunnit folder on the desktop. Click the eRun program of ePrime.

Plug the headphones into the splitter and the splitter into the laptop.

Enter participant ID when prompted. Click Begin. While the first slide is up (the headphones slide), read the instructions written below to the child.

TIP: The laptops do not have an indicator light that shows if CAPSlock is on. EPrime's input is case sensitive - when EPrime starts it should turn the capslock off, but if the child pushes a response and the slide does not advance try pushing the capslocks key and their response again.

INSTRUCTIONS before PRACTICE:

"For this activity, you will hear a sentence about one animal doing an action to another animal. Then, the pictures of three animals will appear on the screen. Your job is to press the button that matches the animal that did the action." [As you read next part, point to each button and imaginary animal placement:] **The blue button on the left matches the animal on the left, the yellow button in the middle matches the animal in the middle, and the green button on the right matches the animal on the right."**

"Use your favorite hand to push the buttons. If your favorite hand is your left hand, put your finger on this button [Point to the red sticker to the left of the trackpad]. **If your favorite hand is your right hand, put your finger on this button** [point to the red sticker to the right of the trackpad]. "

"Keep your finger on the red sticker when you are not pressing a button and use that finger to push the buttons. Do you understand?" [Press any button to advance to the "Let's Practice!" slide] **"Let's practice - are you ready?"** [Once child is ready, press any button to advance to the first practice item, audio starts immediately.]

Rules:

- On first practice item, if child seems unclear of what to do, you can repeat the instructions and demonstrate by pointing to show how the colored buttons line up with the pictures on the screen: "**Press the button matching the object doing the action."**
- No feedback is given on the correctness of practice items
- Audio cannot be repeated after the initial play, so ensure that child is focused before continuing.
- Ensure that participant keeps their finger on the red sticker between trials.

Test Items:

[pause screen] **"Good job! Now, you will hear some funny sounding sentences about one object doing an action to another object. Then, I'll show you the pictures of three objects. Your job is to press the button that matches the object that did the action."** Encourage the

child as necessary, with comments that don't remark on accuracy. **"These are silly sentences," "It's okay to guess."**

9. MA Sentence Completion

Materials: Scoring sheet
Stop Rule: Each set considered separately, the **REVISED* Stop Rule is **three (3) incorrect answers in a row**.
Scoring: "1" correct. "0" incorrect, transcribe incorrect answers in space provided.
Administration Guidelines:

- Verbal; no text/visuals.
- Speak slowly and clearly. Short pause between target word and sentence
  - E.g., "**Teach** [pause]. **He was a very good** …" [pause for response. 5-sec max]
- You can repeat target word and sentence once. After repeating, you can ask "**What do you think it could be? Do you have a guess?"** before moving on.
- **[?]** → indicates item should be presented as a question.

Administration Order:

1) Compose practice items (with corrective feedback).
2) Compose set (with Stop Rule).
3) Decompose practice items (with corrective feedback)
4) Decompose set (with Stop Rule)

Sample/Testing Instructions

1. [*Say*]. "**In this activity, I'd like your help to finish sentences that have a word missing at the end. First, I'm going to say a word out loud, and then a sentence with a missing word at the end.**
I would like you to change the word so that it finishes the sentence in a way that makes sense. OK?

2. Administer Compose practice items (provide corrective feedback, as seen below).

[*Say*]. **Let's try some practice sentences. Here, you'll need to change a small word into a bigger word so that the sentence makes sense. Let's practice:**

(a) **Tree** […]**. Yesterday, I planted five …** [*trees*]
(b) **Teach** […]**. He was a very good …** [*teacher*]
(c)

3. Administer Compose Set, with Stop Rule.

4. Administer Decompose practice items (provide corrective feedback, as seen below).

[*Say*]. **Good job! Let's try some more! Now you'll have to change a big word into a smaller word so that the sentence makes sense. Let's practice:**

(c) **Driver** […]**. Children are too young to ...** [*drive*]
(d) **Helpful** […]**. My friend came over to ...** [*help*]
(e)

5. Administer Decompose Set, with Stop Rule.

Corrective Feedback:
Example of positive/encouraging feedback (e.g., for task items; for correct practice items):
☑ → **Great job! Let's keep going.**
☑ → **I like how you're figuring out the missing words!**
Corrective feedback for incorrect responses to practice items only:
☒ → **That's a really good guess! Can you think of another way to change the word** [repeat word] **to finish the sentence** [repeat sentence]**?** [pause for answer]

☒ → [if still incorrect/no response] **In this sentence, you have the make the word bigger** (*compose practice item*) / **smaller** [*decompose practice item*]
to finish the sentence in a way that makes sense. Like this… [provide full answer]

10. Morphological Analysis – Define

Materials: Digital audio recorder; Scoring sheets

Administration Guidelines:

- The entire task is audio recorded.
- Task is administered orally (no print). Participant responses are oral. Allow 5 seconds for response.
- Use the Prompt Score Sheets (checkmarks in boxes, transcribe) to keep track of participant responses.

Defining Target Words:

In this activity, participants are asked to define six (6) morphologically complex words and identify their smaller word parts—base and suffix. **IMPORTANT**: **To fully define a target word, ppt's response must include reference to the meaning of the base word and the meaning provided by the suffix.**

- Use the table of Acceptable Definitions to help judge the accuracy of defining the base and suffix.
- Other responses may be deemed acceptable if they capture the general meaning of base and suffix parts.
- Circle responses (if already in table) and transcribe responses (if not included in table).
- Use checkmarks in appropriate boxes to indicate success in defining/identifying word parts.

Instructions:

[*Say*]: **For this activity, I'd like your help in figuring out what some words mean. I'm going to tell you a word, and I'd like you to tell me what it means.**

For example, if I said the word "*builder*", one way that you could tell me what it means is by saying: "*a builder is someone who uses tools and makes things like houses*".

I'm also going to ask you if the words have smaller parts in them. For example, the word "*builder*" has two smaller parts in it: "*build*" and "*-er*". Do you understand? [clarify questions]

Let's try some more words. Some of the words can be tricky, so you might not know all of them. But it is OK to guess. Just try your best. Are you ready to start?

Say, **"I will use the recorder so that I can listen to your answers again if I need to, OK?"**

Begin Audio Recording: **"M. Analysis Define, ID # __"**

Prompt 1 is administered for each target word to all participants.

- Prompt 1 includes the initial question "*What does ___ mean?*" [allow response] and a second question "*Does the word ___ have any smaller parts… what are they*? [allow response].
  - **Base Prompt**: If the base word is used in defining the target word (e.g., a child says "*guardian*" is "*a person who is a guard*"), follow-up with a base prompt: "*Can you tell me what guard means?*" This is administered because a target's base word is not enough to count as a full definition of the item.
  - **Complete Prompt 1B regardless of performance on the first part of prompt 1. Their performance on Prompt 1B does not affect whether you continue to Prompt 2 or the next word; that is solely determined by Prompt 1A.** If response to Prompt 1 successfully defines **BOTH base & suffix** word parts [checkmarks in both boxes], then proceed to next word.

Prompt 2 is administered only if response to Prompt 1 does NOT define both word parts.

- Prompt 2 explicitly identifies the smaller word parts and gives participants a second chance to define the word, "*Now that you know the smaller parts, can you tell me more about what the word means?*"
  - This means that Prompt 2 is given following partial responses (e.g., defines base only, or defines suffix only) or incorrect responses (e.g., "*I don't know*"/no response, inaccurate meaning, etc.) to first prompt.
  - If unsure about whether their Prompt 1 response defines both parts, the default is to proceed to **Prompt 2**.

Allowable feedback throughout. Do not provide hints of word meaning.

- [if response is rushed/too brief/vague/approaching a correct answer] "*Do you know anything else about the word __?*"
- [if they ask you what the word means] "*What do you think it means?*"; "*Do you have a guess?*"
- [positive, encouraging] "*Great work!"; "You're working really hard."*
- [acknowledging difficulty] "*Yeah, this is a tricky one, just keep doing your best/let's try another one*"

11. Syntactic Awareness: Grammatical Correction

Materials: Audio Recorder, Pen/Pencil, Scoresheet

Start Point: Begin with Practice Items a) and b). Give corrective feedback on practice items only.

Stop Rule: Three consecutive scores of 0.

Scoring: 1 = correct; 0 = incorrect (transcribe incorrect answers in space provided).

INSTRUCTIONS:

"I will use the recorder so that I can listen to your answers again if I need to, OK?"

Start audio recorder and say participant number

Instructions: **"I am going to read you some sentences. In each sentence you will hear a mistake that makes the sentence sound wrong. I want you to fix the sentence up so that it sounds right. I don't want you to change, add, or leave out any words; just change the order of the words so that it makes a sentence that sounds right. If you don't hear me well, you can ask me to say the sentence one more time. Okay?"**

"Let's practice. Please fix up this sentence." Read sentence A.

☑→ *"***Good! Let's try another one."** Read next practice sentence.

If the child *paraphrases* the sentence (e.g., gives some version of it but has changed, added, or omitted words) say: "That's a good try, but there is another way of fixing the sentence so that it sounds right. Remember, I want you to fix it without changing, adding, or leaving out any words. Can you think of another way?"**

☒ → Read them the question again and give them the correct response, and say **"Did you hear how I changed the sentence? I just changed the order of the words and the sentence sounds right now. Let's try another one."**

Administration Guidelines

- Everything is heard from the experimenter. The child does not see any text at any time.
- The sentences should be read naturally, as though you are reading a syntactically correct sentence. Do not over exaggerate any words (e.g., the word the child has to move). Speak slowly and clearly. For the items that are questions, read the item as a question (inflection at end of sentence).
- You can repeat the target word and sentence a total of 1 time. After the child hears the sentence two times, you can ask one final time **"*What do you think it could be?*"** before scoring.
- When two consecutive errors are made, remind the child of the task requirements by saying: **"Remember, the sentence sounds wrong and I want you to fix it up and say it the right way. I don't want you to change, add, or leave out any words; just put the words you hear in order so that the sentence sounds right."**

12. WRMT-III: Word Identification 

Materials: Stimulus book, score sheet, recorder
Stop Rule: 4 consecutive scores of 0

Scoring:

- Ensure the score sheet is not visible to participants as it contains the correct responses.
- A correct answer is scored as 1; incorrect answer/"I don't know"/NR is scored as 0.
- Examiner should not penalize for mispronunciations due to speech defects, dialects or regional speech patterns.

RULES

- Point to each word if necessary – emphasize that they are reading words by row.
- Ensure you are familiar with the accepted pronunciations for all terms involved in testing.
- If the subject fails to respond to a word after about 5 seconds, say "**Try saying this word."** If there is still no response, move on to the next item.
- If you do not clearly hear the subject's response to a specific word, do not ask the subject to repeat that word. Wait until the page has been completed, and then ask the subject to repeat all the words in that row.
- Should the discontinue rule be met in the middle of a page, continue with the rest of the terms on the page. However, do not award any points for items tested past the discontinue point.

Testing:

Say, ***"*I'm going to show you some words and I want you to read them out loud. I will point to the first word and then you can tell me what it is. Do you understand? I will use the recorder so that I can listen to your answers if I need to, OK?"**

Start the recorder: **"Participant number ___, Word ID."** Stop the recorder at the end of the test.

➔ **"Try saying this word."**

13. Peabody Picture Vocabulary Test (PPVT-5)

Materials: Score sheet, stimulus binder, pen/pencil

Start Rule: Administer the two Training Plates and obtain two correct responses (or a demonstrated understanding of the task) then start at the age-appropriate item (or use own judgement to increase/lower start point).

Age 6:0-6:11* → Item 53
Age 7:0-7:11* → Item 66
*Round age by months, not years.

NEW
PPVT start point to be determined by TOWRE Sight Word Efficiency (SWE) raw score (RS; total # correct):

+ If ppt got a raw score of > 22**, start with item 95 (age 11+)**
- Otherwise, start at item 77 (age 8)

Basal Rule: If participant does not give 3 consecutive correct responses at predetermined start point, work back in item list until 3 consecutive correct responses are obtained. Then, return to the first incorrect response and resume testing with the next sequential item.

Stop Rule: End testing when participant has 6 consecutive error.

Scoring: Correct = 1, incorrect/DK/NR = 0. Correct responses are on the score sheet; keep out of view.

PRACTICE ITEMS: Start with **Training Items Group B** (Age 4+)

For Training Item B1: Point to each picture, then say: **"Look at the pictures on this page. Put your finger on the picture that shows laughing.**

☑ → Say **"Good!"** and continue to item B2.

NR → Say "**You may not be sure, but put your finger on the one you think is right**".

☒ → Point to the picture of the girl laughing and saying, "**This is laughing. Now try again; put your finger on laughing."** Assist in this way as necessary until the participant indicates the correct image and then continue to training item B2.

For Training Item B2, say: "Put your finger on **sleeping."**

☑ → Say, "**Good! Now we will do some more. You can point to the picture or say the number"** and proceed to the age-appropriate start point.

☒ → ~~Teach in the same way as for Training Item B1.~~

TEST ITEMS:

Refer to **Basal Rule**.

If participant identifies answer by number → "**What number is** (stimulus word)?"

If participant identifies answer by pointing → "**Put your finger on/Show me/Point to/Find** (stimulus word)."

Administration Guidelines:

- Use a 10-second guideline for test items to help with timely administration – this is not a rigid rule.

  After 10 sec., prompt by saying, **"Try one. Point to the one you think it might be"/"It's all right to guess."**
- If there is no response, record NR and say, **"That was a difficult one. Let's try another."**
- If you miss a response, ask for a repetition by saying, **"I missed your answer – show me** (or **say it**) **again".**
- The participant cannot go back to past items; if he/she responds too quickly, say**: "Be sure to look carefully at all the pictures before choosing one."** If the participant continues to answer in this way, point to each picture while saying, "**Look at this one, and this one, and this one and this one".**

- To refocus a participant, say **“Listen carefully.”** You can allow the participant to turn Picture Plates.
- If participant changes their response, use the final choice given, even if it changes from correct to incorrect.
- If asked about correctness of a response, say **“That is a good answer”.**
- **One repetition** can be given if it is requested or the tester feels it is needed.
- Ensure that you do not precede the word with an article (the/a/an).

14. Morphological Awareness: Word Analogy

Materials: Scoring sheet; Finger puppets (2)
Administration Guidelines:

- Verbal task; no text/visuals.
- Speak slowly and clearly. Short pause between word pairs.
  - E.g., **"bake, baker** [*short pause*]:: **strong**, …. " [*pause for response. 5-sec max*]
- Read the words in a way that slightly emphasizes the sound changes between word pairs (*bake–bakER*) so that participants can pick up on the difference. Don't go overboard, it still has to sound natural.
- You can repeat items once (2 deliveries total). After two times, you can ask "**What do you think it could be? It's OK to guess."** before moving on.

Task Order: Administer all practice items. Corrective feedback on practice items only (see below).
Then administer Test Set (with Stop Rule).
Stop Rule: For the Test Set, the **REVISED* Stop Rule is **three (3) incorrect answers in a row**.
Scoring: "1" correct. "0" incorrect, transcribe incorrect answers in space provided.

Instructions: *Change the names of the finger puppets based on the [animals] you have in your hand*

[*Say*] **Let's get out some puppets. This one is [Elephant] and this one is [Fox]. [Elephant and Fox] like to play word games. In this game, [Elephant] says a word, and [Fox] copies him but changes it a bit.**

For example, if this one says "*roll*", this one changes it to "*rolled*". This one then says "*jump*", and this one changes it to "*jumped*".

[as you go through this example, go back-and-forth between your two puppets].

For this activity, [Fox] will make a change to one word, and then I'd like you to help him make the same kind of change to another one. Let's try a few for practice.

[for Practice Items ~A-C, *Say*] **This one says __, this one changes it to ___. This one then says ___; what would this one say?** [for remaining practice items, and test items, you can simply read the words]

[Administer practice items, with feedback; Read the word pairs going back-and-forth between the two puppets]

☑→ [*Say*] **That's right!** [repeat the two pairs with answer]
Let's try another one. [Go to next practice item]

☒ [*Say*] **Not quite. Listen again.** [repeat two pairs including the correct answer] **if [Elephant] says __, [Fox] changes it to __. [Elephant] then says __, [Fox] changes it to ___** [give answer]
[for corrective feedback, slightly further emphasize the change between the word pairs].

Complete the Test Set, using Stop Rule.

[*Say*] **Good job, let's do some more words! Listen carefully to how [Fox] changes the words so that you can help him. Please let me know if you'd like to hear any of the words again. Some of them can be tricky, so just do your best.**

Continue to use the puppets throughout the task going, back and forth between them as you say the words. If child pauses too long to answer (~5 seconds), you can always prompt with, in this order:

- "Would you like me to repeat it?" [one repetition allowed]
- "What would Fox say? [lifting up Fox puppet] Do you have a guess?"

15. WASI-II: Vocabulary (Expressive)

MATERIALS: Scoring sheet; Audio recorder

GENERAL DIRECTIONS:

- The participant gives definitions for words that the experimenter reads aloud.
- Audio record the entire task. Complete all 7 items.
- Read each word aloud by saying "**What does** (word) **mean?**"
  - Each word may be repeated as often as necessary (but do not alter the word in any way).
  - If the Ppt mistakenly hears a different word, [*Say*] "***Listen carefully, what does*** (word) ***mean?***"
  - Provide up to 30 seconds for response

VERBAL INSTRUCTIONS:

[*Say].* **"I will use the recorder so that I can listen to your answers if I need to, OK?"** Turn on recorder. **"ID# ____, WASI Vocab."**

[*Say*]. **Now I am going to say some words. Tell me what each word means. Are you ready?**

For each item, [*Say*]. **What does** (*word*) **mean?**

Responses/Scoring:

- Use the table of sample response to help guide you. The sample responses and query responses are not an exhaustive list. It is important to evaluate all responses carefully. Any recognized meaning of the word is acceptable, but lack of content is penalized.
- Query (**[Q]**) any responses in the "Query" category of table. [*Say*] "***What do you mean*?**" or "***Tell me more about it***" (you may query responses not listed).
- If Ppt response is 1) unclear or too vague to be scored, query their response. [Say] "**What do you mean?**" or "**Tell me more about it**".
- Unless the child's response is fully correct, one query should always be applied; a second query can be applied on the rare occasions that the answer continues to be unclear. Two is maximum number of accepted queries.
- If the Ppt does not respond orally or merely points to an object in the room, [*Say*] "**Tell me in words what that is.**"
- Transcribe the child responses on scoring sheet, and/or circle responses listed in table.
- Record a "**Q**" if a response is queried; "**DK**" if Ppt says they do not know answer; "**NR**" if Ppt does not respond within approximately 30 sec.

**Administer Tasks 16-18 (separate workbooks) to all English 1st language children*

16. Print Convention Knowledge

Word Discrimination

MATERIALS: Marker for participant
Participant booklet (separate booklet)

INSTRUCTIONS:

Say: **"I am going to show you a list of made up words. In each row there will be two made up words, but one of them looks more like a real word that we can read in English. I want you to put a dot next to the word that looks more like a real word that we can read in English. If you aren't sure, take your best guess. Let's start with some practice words."**

[Point to Practice A] **"Look carefully at the two made up words here.** [For each practice example, clearly indicate the two made up words] "**Here is a marker so you can put a dot beside the one that looks more like a word that we can read in English".** Do not explain why the answer is correct.

Practice Examples (correct in **bold**):

Practice A	fnst	**fost**
Practice B	**launt**	iauei

Work through each example one at a time with feedback. Participant selects and circles their answer directly on the sheet. For each example:

☑ → Say, **"Yes, that's right. This looks more like a word that we can read in English** [*point to correct answer*]. **Please put a dot next to that one on your sheet. Let's try the next one."**

☒ → Say, **"Good try, but this one looks more like a word that we can read in English** [*point to correct answer*]. **Please put a dot next to that one on your sheet. Let's try the next one."**

Say: **"Great, now let's do some more on your own. Do you have any questions?"** [clarify any questions].

[Turn the page] Say: **"Look at each made up word carefully and use the marker to put a dot next to the one you think looks more like a word that we can read in English. Go as quickly as you can while still being careful."**

During the task, do not give feedback on accuracy. Use the responses below for questions.

General response to any questions: **"Try your best. Look at each made up word carefully and put a dot next to the one you think looks more like a word that we can read in English."**

If the child is really hesitating or not wanting to answer: **"If you aren't sure, take your best guess about which one looks more like a word that we can read in English."**

ENSURE ALL ITEMS HAVE BEEN ANSWERED PRIOR TO TASK COMPLETION.

17. Alphabet DASH

SETTING UP:

Materials: Laptop, Eye and Pen 2 software + dongle, Wacom tablet with clip to hold paper, Wacom inking pen, nib (non-inking) pen, and 3 response sheets (1 for alphabet, 2 for following spelling activity).

Equipment set-up:

- Plug in tablet and dongle to laptop. Work with laptop plugged in to power source.
- Open Eye and Pen 2 and run a frequency test with the nib pen (non-inking) → go to Device tests → Tablet → Performance and draw a line to test – result should be 200 to 220Hz – if not, try to re-plug tablet and relaunch Eye and Pen 2, or turn off laptop and turn it back on.

Pen & Paper set-up:

- Align the 3 tablet response sheets under the clip (lined page on top for alphabet printing).
- Line up the top of sheets perfectly with the tops of the placement markers on the tablet.
- Put left edge of the paper as far as is possible against the paperclip.
- If the participant is left handed you can move the paper clip to the other side, but paper placement must remain the same.

INTRODUCTION TO TABLET & PEN:

Say: **"I am really excited about our next two activities because we get to use this tablet to do some writing! This is a special tablet because we can write on it, and anything we write will show up on the computer. We also have special pen – you can use this pen on any piece of paper, but when you use it with the tablet, we can record your handwriting to read later! Let's start!**

INSTRUCTIONS FOR ALPHABET WRITING:

- In Eye & Pen, go to "File" → "Acquisition" → "Script". A pop-up box will appear.
- Click the small yellow folder icon to the right of the script box. Go to Indiv Diff Task 2019 > task scripts. Select the script called "dict_Alphabet_Dal3.txt"
- Enter Participant number preceded by '**A'**: [A####]
- Children can write in upper or lower case
- No practice for this part.

Say: **"When you hear 'start', write out the letters of the alphabet in their correct order and continue writing until you hear 'stop'. You will have one minute to write. If you finish writing the entire alphabet, just begin again and keep writing until you hear stop. Write the letters in order and write as quickly as possible but make sure I can read every letter. Are you ready?"**

- Answer any questions, then press any key to proceed. The program will run automatically.
- When you hear 'stop' and the stop screen appears, ask participant to put the pen down, press enter, end the program, then open the next script for spelling, aka 'individual differences'.

18. Spelling Easy Words

Materials: Laptop, Eye and Pen 2 software + dongle, Wacom tablet with clip to hold paper, Wacom inking pen, nib pen, and 2 response sheets (3 item practice and 10 item full activity), & headphones (x2) with splitter

Say: **"First I want to check the volume is okay for you. Could you put these headphones on? I will wear a set too so that I can hear what you hear."**

- Play the audio file "Is this volume okay.wav" (in the task's desktop folder)
- Adjust the volume to a comfortable level for the child.

Pen & Paper set-up:

- Remove alphabet sheet. Sheet with three lines for practice items should now be on top – make sure top of the paper lines up perfectly with the tops of the placement markers on the tablet
- Launch the spelling items:
    - In Eye & Pen, go to "File" → "Acquisition" → "Script". Press the yellow folder icon to the right of the script box. Go to 'Indiv Diff Task 2019' > 'task scripts'. Select the script called "IndivDiffs_p3_dict10Item_Dal7.txt"and enter Participant number preceded by 'S': [S####]

INSTRUCTIONS FOR PRACTICE ITEMS:

Say: **"Now you are going to be writing some words on here [point to practice sheet], and this special tablet will record your writing. You will hear a word, and then the word in a sentence; your job is to write the word as best as you can. I'll show you how to do the first one and then you can have some practice."**

There is no audio for the first practice - the tester does not write a word - this first line is used only to demonstrate. Say**: "You will see this cross, then you will hear a word, and then the word in a sentence; once the sentence ends, you will write the word on the line. When you are done writing, tap the box at the end of the line, like this [demo.]. That sound* tells you that recording is complete."**

*If you do not hear the sound, the paper may not be aligned properly. Adjust as necessary. If this does not work, relaunch the program or restart laptop and re-plug tablet. Check tablet orientation setting.

Say: **"You only get to hear each word once, so listen carefully. After the sentence with the word in it ends, write the word on the line. Now you can try! Write the word you hear once the sentence ends."** [Press any key on the keyboard. You will now hear the first word and sentence.]

- Have them follow this procedure with the two practice trials.
- Children can write in upper or lower case

*Say***: "Super! You did a great job. Do you have any questions?"** [Answer any questions].
"Let's try some more just like that!" [Remove the practice response sheet so that page with ten lines is ready. Again, make sure the top of the paper lines up perfectly with the tops of the placement markers on the tablet. **"Listen carefully"** [begin].

Provide positive feedback when the screen says "Are you ready for the next one?"

APPENDIX C: PARENT QUESTIONNAIRE

Dear Parents/Guardians,

If your child will be participating in our study, please complete

1) the Signature Page of the consent form and

2) the questionnaire below.

Once completed, **please return both parts to your child's classroom teacher**. We handle this information confidentially.

Demographic and Language History Questionnaire for Parents/Guardians

Completing this questionnaire will help us better understand the background of the children we work with. All responses are voluntary. You do not need to answer any questions that you are not comfortable answering.

Your child's name: _____

About your child:

1. What was the first language your child learned? _____
2. Has your child learned another language? Please circle: **Yes / No**
   a. If yes, what language? _____ from what age? _____
   b. Any other languages? _____ from what age? _____
3. Was your child born in Canada? Please circle one: **Yes / No**
   a. If not, where was your child born? _____
   b. At what age did your child come to Canada? _____
4. At what age did your child first start attending a daycare, preschool or school where English was the primary language? _____
5. Has your child ever received a diagnosis that might affect their language, reading, or learning? For example, Autism Spectrum Disorder or ADHD. Please circle: **Yes / No**
   a. If yes, please explain: _____
6. Please mark the boxes below to tell us about the language(s) that <u>are spoken with</u> your child in your home.

	Never	Rarely	50%	Usually	Always
English					
Other language: _____					

Other language: _____					

7. Please mark the boxes below to tell us about the languages in which your child reads, or is read to, in your home.

	Never	Less than once a week	Once a week	2-3 times a week	Every day
English:					
Other language: _____					
Other language: _____					

8. Please circle the ancestry with which your child most identifies:

• Acadian descent • European descent • Aboriginal descent • African descent (Black) -African Nova Scotian? Yes / No	• Middle Eastern descent • Asian descent • East Asian descent • Not listed, please specify: _____

About you, Parent/Guardian 1:

9. Please specify your relationship to the child (circle one):

a. Mother b. Father c. Stepmother d. Stepfather e. Other: _____

10. Were you born in Canada? Please circle: **Yes** / **No**

a. If not, what is your home country? _____

b. How long have you lived in Canada? _____

11. What is your current marital status? Please circle one:

a. Married b. Divorced/ Separated c. Remarried	d. Widowed e. Never married f. Other _____

12. What is your education? Please circle one:

a. Graduate School/ Professional training b. University graduate (4-year college) c. Partial university (at least 1 year) d. Trade School/Community College	e. High School graduate f. Some high school g. Junior high school graduate h. Less than 7th grade

13. What is your occupation? Please describe:

_____

About Parent/Guardian 2:

14. Is there a second parent/guardian living in your household?
Please circle: **Yes / No**

If no, skip to the end.

If yes, please complete questions 15 to 18.

15. Please specify Parent/Guardian 2's relationship to the child (circle one):

a. Mother b. Father c. Stepmother d. Stepfather e. Other: _____

16. Was Parent/Guardian 2 born in Canada? Please circle one: **Yes / No**

a. If not, what is his/her home country? _____

b. How long has he/she lived in Canada? _____

17. What is Parent/Guardian 2's education? Please circle one:

a. Graduate School/ Professional training b. University graduate (4-year college) c. Partial university (at least 1 year) d. Trade School/Community College	e. High School graduate f. Some high school g. Junior high school graduate h. Less than 7th grade

18. What is Parent/Guardian 2's occupation? Please describe:

_____

Thank you for taking the time to fill out this questionnaire. We greatly appreciate your responses!

Please return this questionnaire

and the signature page of the consent form

to your child's teacher at your earliest convenience.

APPENDIX D: HOLLINGSHEAD SCORING DECISIONS

There are a few challenges that arose during the coding of parent/guardian occupations. The responses to the question of what the guardians' current occupation was an open-ended response and some parental responses were difficult to determine how to code based on the Hollingshead occupations categories. For example, business owners are categorized based on their yearly income and not on the occupation of the business. The questionnaire provided did not ask parents/guardians to indicate an annual income. Therefore, if a parent reported that they were a "business owner" or that they were a self-employed hairdresser there was no pre-established rule to follow based on the Hollingshead coding instructions. Another challenge was that some occupations reported were not listed in the Hollingshead and thus we needed to make a series of decisions on how to categorize these occupations. For example, yoga teacher is not listed in the Hollingshead most likely because this was not a frequently occurring occupation in 1975. Other difficult occupations to code were those that indicated they had multiple occupations such as "part-time teacher, part-time artist". The Hollingshead did not provide instruction on how to deal with such occurrences.

A rule of thumb we adopted when scoring occupations that did not fit easily with a defined Hollingshead category was to choose the lowest score if two or more were plausible for a specific occupation. This was a suggestion from a former lab member, Tessa Craig, who had previously worked with the Hollingshead Two Factor Index of Social Position (1957), an earlier similar index for determining socioeconomic status. The Two Factor Index of Social Position (Hollingshead, 1957) is different from the Four Factor in that it only took into account one person's occupation and education level instead of both partners. We agreed that it was better overall to underestimate socioeconomic status than to overestimate it. Below is a list of

occupation categories that required the research team to make decisions as they were not explicitly listed in the Hollingshead (1975) as well as the final decision and rationale.

Business Owners, Entrepreneurs, and Self-Employed

Hollingshead (1975) scores business owners based on the annual business value. Participants were asked to report their occupation and not their annual income which made categorizing business owners challenging. Another challenge was that the Hollingshead (1975) does not explicitly include occupations like self-employed or entrepreneur. Below is a list of coding decisions that were made in relation to business owners, the self-employed, and entrepreneurs.

- Participants that reported their occupation as "business owner" were scored as a 4, which indicates a business value of less than $25,000. This is the lowest possible score for a business owner on the Hollingshead (1975) and is in line with the rule of choosing the lowest available score.
- Similar occupations such as those who reported being self-employed, entrepreneurs, home daycare owners, owners of home businesses, owners of contracting companies followed the were scored as 4s
- This rule was followed even if the individual gave some information on what their business was and this occupation was in the Hollingshead. For example a home daycare owner would be categorized as a business owner and receive a score of 4 instead of being categorized as a child caretaker and receiving a score of 3.
- If the business or self-employment could be scored based on an occupation that is lower than a 4, like the example above, they were still scored as a 4 to avoid inconsistencies in scoring.

Retired Individuals

Retired individuals were coded based on their occupation before they were retired, as stated in the Hollingshead (1975). In one case, an individual reported that they were retired from an occupation and currently a student. They were coded based on the occupation they had before they retired because they would be receiving pension from previous employment.

Stay At Home Moms, Students and Maternity Leave

As a rule, for occupations that did not have an income, if there was another source of income in the household this would be the only score used. If there was no other source of income, the household would be coded as a 1 which according to the Hollingshead indicates that the individual(s) is financially dependent on a form of government income assistance. Some examples are below.

- If one parent/guardian in a two parent/guardian home reported their occupation as a homemaker or stay at home mom while the second parent/guardian reported being employed; only the employed parent/guardian's occupation and education were included in the household's Hollingshead score. This is in line with the recommendations made by Hollingshead (1975).
- If there was a stay-at-home mom without a second guardian, the decision was made that they were coded as a 1, classified with no regular occupation and dependent on welfare
- If there was a stay-at-home mom married to someone on disability, we decided that they would be coded as a 1, classified with no regular occupation and dependent on welfare
- If the individual was a student, they were coded as a 1, we decided to classify them with no regular occupation and dependent on welfare

- If the individual was on maternity leave, we decided to code them based on their previous occupation.

Multiple Occupations Listed

If an individual listed more than one occupation, the average of the scores for each occupation was calculated. This is because we cannot make the assumption of which occupation is their full-time occupation and which is part-time or a side income. By determining the score this way we avoided making any major assumptions. If the average score was not a whole number, the score would be rounded down, in line with our rule of choosing the lower score.

Military and Department of National Defence

The Hollingshead Four Factor Index has clear categories for military occupations. Nevertheless, there were a few military occupations that were difficult to score and were determined on a case-by-case basis. Decisions are below.

- Individuals who indicated that they were working for the Department of National Defence were scored as a 6, classified with semi-professionals, including army and navy
- Unspecified military occupations, for instance, those who listed “military” as their occupation were scored as a 6, classified with semi-professionals, including army and navy
- For specific occupations in the military that would require special training (e.g., physician assistant, Canadian forces pilot), they were scored as an 8, with commissioned officers.

Healthcare Workers and Therapists

Some individuals gave their occupation as ‘healthcare worker’. This could mean a range of employment, so the decision was made to score with the lowest healthcare occupation in the Hollingshead, which is healthcare aides, score 3. Occupations such as physiotherapists, respiratory therapists, occupational therapists, etc. were not common when the Four Factor Index was written. They were scored as a 7, with health practitioners, because this does define the role of health therapists. Additionally, the average salary of health therapists is similar to that of health practitioners.

Chefs and Restaurant Owners

Restaurant owners were classified as small business owners, and given a score of 4. Chefs were scored as a 4, along with the other red seal trade professions (carpenters, plumbers, etc.), as the Culinary Arts fall under the same category. Cooks are classified in the Hollingshead as a score of 2, so they were scored accordingly.

Various Unspecified Occupations

Some occupations in the Four Factor Index are listed in different categories based on specifics. For example, private household housekeepers are classified as a 3, whereas housekeepers excluding private household are classified as a 2. If the individual did not specify their occupation enough for us to be able to score them effectively, decisions were made on a case-by-case basis, listed below.

- Unspecified administrators were scored as a 6, as this is the lowest category where administrators are listed. This follows our rule of thumb of choosing the lower score.
- Unspecified housekeepers were scored as a 3, classified with semiskilled workers. A score of 2 would classify them as unskilled, and housekeeping requires a certain level of training

- Nurses that did not specify their position were scored as an 8, with registered nurses, as most nurses are now registered nurses

Trade Technicians

Unspecified technicians are classified under a score of 6. However, there are some trade technician occupations that should not necessarily be scored as such (e.g., automotive technicians, fiber optic technicians). For these occupations, the trade of the technician determined the score.

- Automotive technicians were scored as a 4, with mechanics
- Fiber optic technicians were scored as a 4, with telephone linemen/splicers

Non-Profit Organization Occupations

Because non-profit occupations were uncommon in at the time the Hollingshead was written, there is no clear score to classify them with. With following the rule of choosing the lowest score, these occupations were scored as a 3, with welfare service aides, due to generally similar salaries.