The Abecedarian Approach in a Low-Resource Urban Neighborhood in Canada: An Impact Evaluation in a Child Care Setting

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Abstract

Despite the best efforts, persistent educational gaps remain between Indigenous and non-Indigenous children when they begin school. This evaluation explores the impact of the Abecedarian Approach for early education on the language development of First Nations and non-First Nations children, living in a low-resource, urban neighborhood in Canada. A treatment group received the Abecedarian Approach in a child care center, supplemented by home visiting, and comprised 20 families with 41 children of whom 51% were First Nations. The control group comprised 27 families with 39 children of whom 46% were First Nations. The analyses presented explore child language outcomes at the end of the second year of participation and take account of child and family characteristics, as well as the baseline language scores. Results indicate that children in the treatment group had stronger language outcomes than the control group. While First Nations children in the treatment group had lower levels of language development than non-First Nations children, at baseline, both groups progressed at about the same rate. While the findings do not guarantee that achievement gaps would close during the school years, improved language development in the years before school is likely to be associated with better achievement during school.

Keywords Abecedarian · Early childhood education · Language outcomes · Indigenous population · First Nations · Canada

Résumé

Malgré les efforts déployés, des écarts relatifs à l'éducation persistent entre enfants indigènes et non indigènes en début de scolarité. Cette évaluation explore l'impact de l'Abecedarian Approach pour l'éducation des jeunes enfants sur le développement du

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langage chez des enfants des Premières Nations et ceux n'appartenant pas aux Premières Nations, d'un quartier urbain à faibles ressources, au Canada. Un groupe a été soumis à l'treatment de l'Abecedarian Approach dans une garderie, avec des visites à domicile en complément. Il était comprenait 20 familles avec 41 enfants dont 51% des Premières Nations. Le groupe témoin comprenait 27 familles avec 39 enfants, dont 46% des Premières Nations. Les analyses présentées explorent les résultats de l'enfant en langage à la fin de la seconde année de participation et tiennent compte des caractéristiques de l'enfant et de la famille, de même que des scores de départ en langage. Les résultats indiquent que les enfants du groupe de l'treatment sont plus forts en langage que ceux du groupe témoin. Alors que les enfants des Premières Nations du groupe de l'treatment présentent au départ des niveaux plus faibles de développement du langage que ceux qui ne viennent pas des Premières Nations, les deux groupes progressent à peu près au même rythme. Si les constatations ne garantissent pas que les écarts rétrécissent au fil des années de scolarité, un meilleur développement du langage dans les années préscolaires sera vraisemblablement associé à une meilleure réussite scolaire.

Resumen

A pesar de grandes esfuerzos, aún existe una constante diferencia educativa entre niñas y niños indígenas y no indígenas al inicio de la etapa escolar. La presente evaluación explora el impacto del Método Alfabético para educación temprana en el desarrollo de lenguaje de niños Aborígenes y No Aborígenes que viven en un barrio urbano de bajos recursos en Canadá. Un grupo de intervención recibió el Método Alfabético en una guardería infantil, complementado con visitas domiciliarias, e incluyó 20 familias con 41 niños de los cuales 51% eran de descendencia aborígen. El grupo de control incluyó 27 familias con 39 niños de los cuales 46% era de descendencia aborígen. Los análisis presentados exploraron los resultados de lenguaje infantil al final del segundo año de participación, y tomaron en cuenta las características del niño y su familia, así como la calificación inicial de lenguaje. Los resultados indican que los niños en el grupo de intervención tuvieron mejores resultados de lenguaje que el grupo de control. Aunque los niños aborígenes en el grupo de intervención tenían niveles más bajos de desarrollo de lenguaje que los niños no aborígenes en la etapa inicial, ambos grupos progresaron aproximadamente al mismo ritmo. Aunque los resultados no garantizan que la diferencia en el logro escolar podría desaparecer durante los años escolares, es probable que el mejoramiento en el desarrollo de lenguaje en los años anteriores al ingreso escolar esté asociado con mayores logros académicos durante los años de escolaridad.

Introduction

The Province of Manitoba has long recognized that the early years are a critical time for brain development and an important period in determining success later in life. There is considerable evidence that young children can benefit from participation in high-quality, early learning programs (e.g., Ramey and Ramey 2004). In Canada,

there has also been considerable interest in how early childhood education can help address inequalities in educational outcomes between Indigenous¹ and non-Indigenous Canadians. For example, the final report of the *Truth and Reconciliation Commission* (2015) in Canada included a call to action for governments to support culturally appropriate early childhood education programs to enhance young children's development. It also noted the importance of parenting support to address parenting skill deficits that were a legacy of residential schooling, which generations of Indigenous parents had experienced as children. This research investigates the effects of the Abecedarian Approach for early education on language development, including a focus on First Nations and non-First Nations children, living in a low-resource, urban neighborhood.

Despite efforts to date, a persistent educational gap remains between Indigenous and non-Indigenous Manitobans. In an audit, assessing the provincial education system's response to this issue, the Office of the Auditor General (2016) in Manitoba, Canada expressed concern that high school graduation rates for Indigenous students were only about half that of non-Indigenous students (54.5% vs. 96.2%), and that over time the gap has widened. This achievement gap is evident throughout the elementary and secondary school years and indicated by various population-level measures in Manitoba. Data collected biennially for all children entering Kindergarten reveal a consistent disparity in the educational progress of Indigenous children, as compared to non-Indigenous children. In the 2016/2017 school year, Indigenous Kindergarten students scored significantly lower on all five developmental domains: physical health and well-being, social competence, emotional maturity, language and thinking skills, and communication skills and general knowledge (Healthy Child Manitoba Office 2018). This gap persisted beyond school entry, with data from students attending Grade 3, English language programs in 2017, showing that only 20% of Indigenous children met numeracy expectations, compared to 39% of non-Indigenous children, and that only 28% of Indigenous children met literacy expectations, compared to 52% of non-Indigenous children (Manitoba Education and Training [MET] n.d.).

The Current Research

Healthy Child Manitoba Office (HCM), a division of the Manitoba provincial government that is led by the Healthy Child Committee of Cabinet, oversaw this Abecedarian impact evaluation. HCM works across departments and sectors to facilitate a community development approach toward achieving the best possible outcomes for all of Manitoba's children and youth (Brownell et al. 2012). Based on a review of research outcomes and consultation with stakeholders, HCM in partnership with Manitoba Early Learning and Child Care selected the Abecedarian Approach for a pilot project aimed at 'leveling the playing field' for

¹ 'Indigenous peoples' is a collective name for the original peoples of Canada and their descendants, including First Nations, Metis, and Inuit peoples. In recent years, the term 'Indigenous' has become preferred over 'Aboriginal.'

vulnerable children and families. A partnership was formed with *Manidoo Gi-Miini Gonaan*, a nonprofit community organization, operating in a low-resource and public housing neighborhood, to implement the Abecedarian Approach in a new child care center.

The Abecedarian Approach provides a comprehensive early education program for young children at risk (Ramey and Ramey 2004). In the original studies in the 1970s, children were randomly assigned either to attend a research-focused, child care program from infancy up to kindergarten entry or to a control condition. The enhanced early childhood program significantly enhanced cognitive development with positive impacts on cognitive and academic skills continuing through the primary grades. The program offered an enriched stimulating environment, with a particular emphasis on language development, along with support services for families. Children's progress was monitored over time with follow-up studies into adulthood that demonstrated long-lasting benefits from this early childhood program (Campbell et al. 2012).

These analyses report an evaluation of the impact of the Abecedarian Approach in a research study that was conducted with young Canadian children and their families, in Manitoba. Children in the treatment group received an enriched early education program delivered in a child care center, the Lord Selkirk Park Child Care Centre. Across a 2-year period, children's language development was tracked. Their language outcomes were compared with those in a control group whose language development was also monitored across the same period. Of particular interest, also is the impact of the intervention program on language outcomes for First Nations and non-First Nations children.

Methodology

This study sought to replicate many features of the original Abecedarian Projects. It used the same curriculum and similar implementation processes, including similar child care adult/child ratios in delivering the intervention in a center-based program, as well as the processes used for staff training and coaching. Core elements of the Abecedarian Approach included were a focus on language development, as well as emphases on enriching caregiving practices, conversational reading with children, and incorporation of a range of interactional learning games. The research differed from the original Abecedarian project in a number of ways, including the research design and randomization method; the age of children's entry into the intervention; and the length of time in which children and families participated in the program.

Data in this study were collected under the legislative mandate of the Healthy Child Manitoba Act (HCM Act), which specifies that the HCM Office will gather data to inform future policy development and practice. The operation of the child care center in which the program was delivered to children was initiated and supported as a part of the ongoing work of the government of Manitoba. Thus, the study did not require an independent ethics board review, but informed consent for participation in this evaluation was received from all families.

Research Design and Project Implementation

Lord Selkirk Park Child Care Centre staff led recruitment efforts. They went door-to-door to all family units within the public housing development and spoke with parents/guardians of children up to age 12,² including expectant parents. If no one appeared to be home, staff left a flyer about the program asking the family to contact the center. If contact was not made, staff would return to the home on at least two additional occasions.

Parents/guardians were informed that a new child care center would be opening, that it would use an early learning approach new to Manitoba, and that a research project would be conducted to examine its effectiveness (including program and control groups). Families who expressed a desire for their children to participate completed an application for the family (not individual children), which were numbered sequentially. This process resulted in a pool of 119 children. A random sequence generator Web site was used to randomly sequence the application numbers, and the first set of families was assigned to the program group and the second set to the control group. Remaining families were placed on a wait list. As children exited or aged out of the study (both control and program groups), new children were selected from the wait list. Siblings of children already participating in the study (i.e., their family had been randomly selected to the program or control group) were prioritized for participation. Should no siblings be available, new families were randomly assigned from the wait list to the program and control groups, respectively. In 2013, the pool of children under 2 years of age remaining from the original pool was augmented by additional recruitment.

The child care center staff and the parent support staff implemented the strategies of the Abecedarian Approach, after receiving relevant training. The parent support staff was a skilled, local home visitor who also helped to engage the families through home visits and group meetings on Saturdays during the implementation of the treatment program. The control group continued their usual practices in the care and early education of their children. They were not strictly an ‘untreated’ group because 41% of children attended other child care centers. The rest of the children were cared for at home by parents or relatives. The overall impact study lasted from January 2012 until December 2016. The research followed families from the time of child enrollment in the child care program in which the treatment was provided until the children reached 72 months of age, although the full-day involvement in the treatment group officially ended when each child reached 60 months in age and entered Kindergarten.

In early 2012, Dr. Joseph Sparling and Kimberly Meunier provided the initial training for all Lord Selkirk Park Child Care Centre staff on the Abecedarian Approach. This training consisted of 1 week of full-time instruction, including instruction and interactive elements. In 2014, Dr. Sparling and Ms. Meunier

² Children, aged from 2 months to 5 years, participated in the research and were assigned to the treatment or control group. The new center also offered a school-age program for children aged 5 to 12 years that was not a part of the present study.

returned to the center to observe implementation and provide additional professional development for staff.

As well, HCM retained personnel from Red River College, which provides post-secondary training in community services and early childhood education, to provide support through mentoring and coaching for the staff at the child care center in which the evaluation was conducted. This ongoing support for staff in implementing the Abecedarian Approach kept the focus on relationships and trust, as well as attentiveness by staff to the fidelity of the intervention strategies and program content.

Mentoring by Red River College personnel was initially full time and was reduced to weekly from April 2012 through September 2015. After that time, mentoring was further reduced to a half-day per week, given staffs' competency and expertise in integrating the Abecedarian Approach within their practice. The mentor spent time with center staff both 'on the floor,' as well as 'off the floor' in individual meetings. The former focused on observation and provision of feedback, as well as the mentor modeling adult-child interactions. Individual meetings included time spent reviewing staffs' documentation of work with individual children, providing assistance with planning and skill development, and offering suggestions on how to handle any challenges they were experiencing.

Demographic Profile of Participants

The analyses reported in this article focus on children who were continuously enrolled in the research study, across a period of nearly 3 years from January 2012 to November 2014. Children were assessed at three time points, at baseline entry (enrollment), end of year 1 of participation, and end of year 2 of participation. The number of annual assessments that had been completed at March 2017 varied from 92 assessments at baseline enrollment; 92 assessments after one year of participation; and 80 assessments after 2 years of participation, across treatment and control groups. Of the 12 children who did not receive an assessment at the end of the second year, 8 had 'aged out' of the assessment instrument, being older than 71 months, the highest age at which children could be tested on the assessment instrument, while the remaining 4 children had moved out of the city. The focus in these analyses is the 80 children who were assessed at all three time points. This includes 41 children in the treatment group and 39 children in the control group.

The demographic profiles of the treatment and control groups are presented in Table 1. The treatment and control groups were different at baseline on three characteristics. In the treatment group, there were more lone parents, younger parents, and larger number of children per family. These demographic differences were taken into account in the analyses. The oldest child at baseline was 43 months of age, which allowed for only 18 months of full-day exposure to the Abecedarian program, prior to entering kindergarten at 5 years of age. From the age of 5 years, children in the treatment group continued the Abecedarian program on a half-day basis in the afternoon after half-day Kindergarten. This is a shorter period of time than for full exposure to the Abecedarian program, from 3 to 5 years. Therefore, the net impacts

Table 1 Demographic profile of the 80 children assigned to the treatment and control groups with three language assessments

Demographic characteristic	Total (<i>N</i> =80)	Treatment group (<i>N</i> =41)	Control group (<i>N</i> =39)	Chi-square or <i>t</i> test (<i>p</i> value)
Female child	48.7%	48.8%	48.7%	0.00 (1.00)
First Nations	48.7%	51.2%	46.1%	0.20 (0.65)
Other Indigenous ^a	30.0%	34.1%	25.6%	0.69 (0.41)
Non-Indigenous ^b	21.2%	14.6%	28.2%	2.20 (0.14)
Lone parent families	68.7%	85.4%	51.3%	10.81 (0.01)
Parents have post-secondary education	17.5%	14.6%	20.5%	0.48 (0.49)
Child age in months: mean	17.2	17.3	17.0	0.11 (0.91)
Standard deviation	12.3	13.4	11.1	
(Range—low/high)	(3–43)	(3–43)	(3–43)	
Parent's age in years: mean	28.0	26.8	29.4	1.66 (0.10)
Standard deviation	6.9	6.8	6.8	
(Range—low/high)	(16–46)	(17–45)	(16–46)	
Average no. of children in family	1.70	2.05	1.44	2.33 (0.02)
Standard deviation	0.61	0.79	0.41	
(Range—low/high)	(1–4)	(1–4)	(1–3)	

^aIncluded Metis and other Indigenous^bThe majority (88%) of non-Indigenous were immigrant (newcomer) children

reported in this study may understate the impact of the program on the language development of children.

Additionally, families were assigned to the treatment or control group at the level of the family not by every individual child. Thus, if one child from a family was identified for inclusion in either the treatment or control group, then other children in the family who were age-eligible to participate were also included in the same group. This approach was necessary because the study was conducted in natural settings where admission of all eligible children in a family to the same child care program is the expected and desired norm for families. However, as indicated in Table 1, families in the treatment group, on average, had more children, than families in the control group. This nested nature of the data (different numbers of children embedded within families) is taken into account for the analyses.

Outcome Measurement: Language Development

The original developers of the Abecedarian Approach noted that the treatment effects were effectively captured by measures of child cognitive development and that language development was a significant part of the measurement of cognitive development. In this research, language development was the focus of assessment and measured by the Brigance Screen Early Head Start II (Glascoc 2010) and was chosen as the main outcome variable in the current study.

The outcome score on the Brigance Screen derived for these analyses was the percentage of items marked as correct for age-appropriate items on the communication domain (for younger children) or the language development domain (for older children). These two domains were considered equivalent for the purposes of this study and are, hereafter, simply called language development. While the Brigance Screen also provides calculation of age-standardized scores based on items from the language domain and selected items from two additional domains, it was not possible to calculate age-standardized scores in this study for two reasons. First, at year 2 assessment, only items from the language domain were administered. Second, the Brigance protocol does not assign an age-standardized score to very low raw scores, increasing the likelihood of missing data in the analyses.

The data collectors were Child Development Counselors (CDCs) with Manitoba Family Services. As a part of their ongoing work, they regularly use the Brigance Screen as a clinical tool to detect potential developmental delays for young children. Manitoba Family Services made these CDCs available to participate in this impact study. The training of new CDC staff was carried out by experienced CDCs (e.g., observing assessments done by an experienced CDC, and later performing assessments with the experienced colleague present to provide feedback). In the current study, the CDCs were not aware of the treatment status of the children they tested.

Approach to the Data Analysis

Several issues were important in the planning for these analyses. First, on the baseline scores for language development there were a significance difference between the treatment group (mean = 35.8% of items correct) and control group (mean = 49.5% of items correct), $t = 2.68$, $p = 0.01$. Therefore, baseline language scores were included as control variables in the analyses, as well as the selected baseline demographic characteristics of the family.

Second, in order to account for the hierarchical nature of the data that children were nested within families, a mixed-model regression analyses, using STATA statistical software, were employed to analyze treatment effects over time. This analytic approach enables assessment of whether the intercept for each individual for the outcome variable varies significantly from the overall average intercept for each group (treatment and control) and also if the slope of the regression line that describes the rate of change in the outcome variable also varies significantly from the average slope for each group.

A third analytical consideration was to choose whether to test group average outcomes or the average outcome change for each individual child. The second strategy was chosen as a more accurate and conservative analytic approach. The impact of the treatment on change in outcomes was tested using the following regression equation in which the coefficient (β_1) for Program Status (treatment or control) describes the strength of the effect of the treatment on the outcome and the corresponding standardized z-score of the coefficient indicates the statistical significance of the coefficient (i.e., effect of the treatment).

Table 2 Mixed-model regression analysis of annual change in language development percent scores

Variable	Baseline to year 1	Year 1 to year 2	Baseline to year 2
Constant (intercept)	− 5.689	+ 41.913***	+ 36.345**
Treatment group	+ 19.298***	− 4.992	+ 13.648**
Female child	+ 14.718***	− 10.037**	+ 3.625
Age of child in months	+ 0.759***	− 0.401**	+ 0.324
Baseline language development score	− 0.608***	− 0.270**	− 0.860***
Parent's age	+ 0.771*	− 0.247	+ 0.513
Parent's First Nation Status	− 13.778**	+ 0.514	− 13.697***
Parent has post-secondary education	+ 18.714***	− 11.157*	+ 7.763
Parent is a lone parent	− 7.442	− 0.953	− 7.499

Statistical significance of the coefficients: *** ≤ 0.01 ; ** ≤ 0.05 ; * ≤ 0.10

- Change in outcome = Intercept + β_1 Program Status + β_2 Baseline Demographic Characteristics + ε

Results

In the first section of the results, mixed-model regression analyses are reported to explore the impact of the Abecedarian Approach on the language development of children in the treatment group in comparison with the language development of children in the control group across the three time points of assessment. Other analyses presented explore the differential effects of the Abecedarian Approach delivered to the intervention group on First Nations children and female children. Weighted average group scores for language development were also calculated and are presented to illustrate changes in language scores over time, from baseline, to year 1, to year 2.

Abecedarian Approach: Impact on Language Development

The mixed-model regression analysis exploring the impact of the Abecedarian Approach on change in language development, from baseline to year 1, year 1 to year 2, and baseline to year 2, is presented in Table 2. The regression coefficients indicate the percentage point change in language scores for any unit change in the independent variables (e.g., treatment group membership, child gender, First Nations parents). In Table 2, the coefficient of +19.3 for the treatment group from baseline to year 1 indicates that the change score for the treatment group was 19.3 percentage points higher than the control group's change score. The largest impact of treatment occurred in the first year of exposure to the program (baseline to year 1). From year 1 to year 2, the treatment had a small negative and statistically nonsignificant effect (− 4.99). From baseline to end of year 2, the significant positive effect (for the treatment group) for language development was maintained (+ 13.6). It was also assessed in this analysis if there were significant

differences in the regression intercept across the families in the evaluation, since there were multiple observations (i.e., children) for the same family. The results of a 'Likelihood Ratio versus Linear Regression' test indicated that there were no significant differences in the intercept across the families in the evaluation.

Table 2 also reveals that, across the first year of participation (baseline to year 1), female children showed a larger significant gain (+14.72) than male children, as well as children whose parents had a post-secondary level of education (+18.71). By comparison, First Nations children show smaller gains as do those whose baseline language development score was higher. Over the 2-year period, only the baseline language development score and the child's First Nations status are significantly associated with average change in the language development score between baseline and year two.

Modeling Baseline to Year 2 Scores and Change Scores

To examine the repeated-measures nature of this study and to visualize the data over time, it is also helpful to show the average language development scores at the three measurement points for both the treatment and control groups as well as the amount of change in those scores for both groups when the baseline differences between the two groups are controlled. A weighted average was calculated in which the sum of the product of the regression coefficient for each variable multiplied by the average value of that variable for the entire sample was calculated. The result is a 'regression adjusted' average score for each of the outcome variables of interest. In calculating the average score for the treatment group, the coefficient for the treatment group was used. For the control group, the calculation sets the value of the treatment coefficient to '0.' For all other nominal-level control variables, the average proportion of that group within the entire sample was used.

The average net treatment impact across years was calculated in two ways. The 13.6 percentage point net impact (24.7–11.1) based on the average of individual change scores with an effect size of 0.22 was smaller and more conservative than the 25.8 percentage point net impact (29.8–4.0) based on average group changes. The average of the individual change scores is considered the impact of treatment. The effect size calculated here and later is the standardized regression coefficient for the treatment group variable.

Figure 1 provides a visualization of the data points based on group averages, a more traditional way of presenting results, while statistically controlling for baseline differences. As indicated in Fig. 1, the treatment group made larger gains in the first year of the program (37.4 to 63.6 = 26.2) and much smaller gains in the second year. The children in the control group children, at the end of the first year, had lower language scores than the treatment group but showed larger gains in language scores (44.3 to 53.6 = +9.3) from year 1 to year 2 than the treatment group. The figure illustrates that, over time, the treatment group, although starting with lower scores than the control group, maintained that language advantage across 2 years of participation in the intervention program.

Fig. 1 Regression-adjusted mean language development % scores by program year and program group

Table 3 Sub-group effects for the average annual change in language development percent score—between baseline and year 2

Variable	First Nations children	Female children
Constant (intercept)	+ 36.140**	+ 41.264
Treatment group	—	—
Regular child care	—	—
First Nations control group	— 13.239*	—
First Nations treatment group	+ 0.001	—
Non-First Nations treatment	+ 14.073*	—
Female control group	—	— 0.932
Female treatment group	—	+ 16.579**
Male treatment group	—	+ 9.291
Female child	+ 3.601	—
Age of child in months	+ 0.329	+ 0.301
Baseline language development score	— 0.861***	— 0.871***
Parent's age	+ 0.511	+ 0.452
Parent's First Nation Status	—	— 13.416***
Parent has post-secondary education	+ 7.983	+ 7.300
Parent is a lone parent	— 7.561	— 7.477

Statistical significance of the coefficients: *** ≤ 0.01 ; ** ≤ 0.05 ; * ≤ 0.10

Language Development for First Nations Children and Female Children

Regression analyses were also used to test for the impact of treatment for First Nations children and female children from baseline to year two. The results for the

Fig. 2 Regression-adjusted mean language development % scores by year, program group, and First Nations (FN) status

change score analysis are presented in Table 3. In Table 3, the ‘constant’ term represents the average change in language development scores for the omitted category of the analyses, while the coefficients for the listed subgroups represent the average change in scores from the value of the constant term.

First Nations children in the control group show an average change in their language development score which is 13.2 percentage points lower than non-First Nations children in the control group (omitted category). Children in the First Nations treatment group show the same level of change as children in the non-First Nations control group (0.001), while children in the non-First Nations treatment group show an increase of 14.1 percentage point increase over the non-First Nations control group.

For female children, the results of the regression analysis revealed that, compared to male control group children (omitted category), female children in the treatment group showed a statistically significant increase in their language development scores of +16.6 percentage points. By comparison, male children in the treatment group showed a nonsignificant +9.3 percentage point increase compared to male control group children.

Differential Results for First Nations Children

The regression-adjusted average values for the group language development scores across the three measurement points for First Nations in the treatment group and non-First Nations children in treatment and control groups are presented in Fig. 2. This figure importantly reveals that the gap (21.9%) between the First Nations treatment group and the non-First Nations control group at baseline was completely closed by year two of the study, as they have identical scores, while the First Nations control group children lag far behind. Non-FN children in the treatment group also

Fig. 3 Regression-adjusted mean language development % scores by year, program group, and gender

benefitted from the Abecedarian Approach with high scores compared to the other groups. Even though the scores were generally lower for First Nations children, the 13.2 numerical value of the net impact of the treatment was about the same as the 14.1 value for non-First-Nations children in the treatment group. However, the effect size (0.29) for First Nations children was larger than the effect size (0.15) for non-First Nations children in the treatment groups.

Differential Language Development Results by Gender

Child's gender was a final independent variable of interest identified in the mixed regression analysis. The regression-adjusted group average values for the language development scores at the three measurement points for both the treatment and control groups by gender are presented in Fig. 3. The figure reveals that both male and female control group children showed small gains in their language development scores across 2 years of the program with their growth trajectories remaining almost flat. In contrast, male and female children in the treatment group exhibited stronger gains. The figure illustrates that the girls in the treatment group made most of their language gains in the first year of the program. For males, the net impact of the treatment was a 9.3 percentage point gain with an effect size of 0.20, while for females, there was a 17.5 percentage point treatment gain with an effect size of 0.25.

Discussion

From birth to 5 years is an important developmental period in which children rapidly develop significant language, cognitive, and social-emotional skills that predict later functioning at school and into adulthood (McCoy et al. 2017). It is, therefore, important to provide relevant learning supports for young children who

may be at risk for poorer developmental outcomes and provide stimulating environments and support services to families.

The treatment program evaluated in this research had a statistically significant impact on growth in language development scores over the first 2 years of the program. By the end of year two, the average language scores for the treatment group were significantly higher than for average scores in the control group. The gap between First Nations children in the treatment group and the non-First Nations children in the control group at the outset of the study was closed by year two of the study. While First Nations children in the control group show a negative change in language development compared to non-First Nations children in the control group, non-First Nations children in the treatment group showed positive gains, compared to non-First Nations children in the control group. The results also revealed that female children in the treatment group showed the largest gains in their language development.

In the most rigorous Abecedarian research studies, many independent variables (such as child age and length of time in study) were manipulated so that they were literally equal and did not need to be equalized through statistical procedures, as in this research. Even though the effect sizes in this study are smaller than some other studies, we interpret the results of this study to be in line with other studies using the Abecedarian Approach (e.g., Ramey and Haskins 1981; Sparling et al. 2005; Bann et al. 2016). While the implementation processes in this study were thorough, the less intense results may be due to compromises on randomization and measurement because of the naturalistic implementation of this project. However, strengths in the implementation of this study included strong local leadership and supports for ongoing coaching that kept a strong focus on maintaining positive relationships and sensitivity to the cultural context, which are critical processes for successful implementation and delivery of quality programs (Burchinal 2017; Wasik and Sparling 2012).

We conclude that this intervention approach applied through a child care setting as well as family engagement is effective means that can close the language and learning gaps between First Nations children and non-First Nations children in the years before school. We also acknowledge that the Abecedarian Approach needs to start at a consistently early age. Continued efforts are needed to enhance the delivery of this approach to produce stronger effects for First Nations children and for boys.

The current impact evaluation adds to the evidence from other research studies, showing that the Abecedarian Approach can be an effective tool to reduce or close the developmental and achievement gaps associated with family inequalities and lack of educational opportunities through the early years of education and through the school years into adulthood. This study provides another example of the generalizability of the effects of the Abecedarian Approach effects, including for First Nations children in Canada.

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Compliance with Ethical Standards

Conflict of interest Rob Santos and Shelley Jonasson are employed by the Government of Manitoba, the funder of this research. They were not involved in the operation or implementation of the program at the Lord Selkirk Park Child Care Center. Kimberly Meunier is the author of Abecedarian training programs, and Joseph Sparling is the author of the Abecedarian Approach curriculum used in this study. They receive no royalties or other benefits from the published Abecedarian resources.

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