Center for Advanced Studies in Child Welfare

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REPORT BRIEF

Academic Achievement of Youth in the 4-H Program

Purpose of the Study

The purpose of this study was to examine academic outcomes of youth who participated in 4-H compared to outcomes of youth who did not participate in Minnesota's 4-H program, and to understand how parent engagement and duration of 4-H participation affects youth achievement and attendance trajectories over five years.

Background & Purpose

The Minnesota 4-H youth development program has over 100 years of history in Minnesota and around the country. The Minnesota 4-H youth development program offers age-appropriate, hands-on learning via short- and long-term projects and activities including 4-H clubs, special-interest groups, after-school programs, volunteering, civic engagement, community service, camping, and school enrichment. The program is primarily volunteer-delivered throughout Minnesota in urban, suburban, and rural communities, allowing youth to design and participate in their own programs and activities. Youth who participate in the program do so via the 4-H learn-by-doing model, which teaches youth essential, transferrable skills that they'll use throughout their lives.

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Previous studies have investigated the relationship between 4-H participation and academic achievement outcomes (Goodwin et al., 2007; Seevers et al., 2011). A recent and ongoing study by researchers at Tufts University (Lerner & Lerner, 2009) found that youth who participate in 4-H had significantly better grades than other youth, were less likely to have risky or problem behaviors, and were more likely to see themselves going to college. Although this research has demonstrated the impact of 4-H youth programs on short-term academic outcomes, examining the longitudinal impact of long-term participation in the 4-H youth development program is needed.

This study sought to understand the influence of 4-H participation on youths' academic outcomes (namely school attendance, math and reading achievement, and high school graduation) by answering the following questions:

1. *Do youth who participate in Minnesota's 4-H program outperform matched non-4-H peers in school attendance, math and reading achievement, and graduation?*
2. *Does parent engagement in 4-H influence the academic outcomes of youth?*
3. *Does duration of 4-H participation influence the academic outcomes of youth?*

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Methods

To estimate the effect of 4-H on youth academic outcomes, 4-H records from youth in grades 3-8 who participated in the program in 2006 were linked to their corresponding educational and child protection records. A matched comparison group of youth who had not participated in Minnesota's 4-H program was created. Academic outcomes were examined for five years until the sample was in 8th through 12th grade.

Through Minn-LInK, 4-H data from youth in grades 3-8 who participated in the program in 2006 (n=25,707) were linked to data from the Minnesota Departments of Education (MDE) and Human Services (DHS). A total of 21,023 youth records were linked (81% match rate). A propensity score optimal matching method was used to produce a comparison group of youth who did not participate in 4-H activities but whose characteristics were similar to those of the 4-H group. The comparison group was matched on district/school number, gender, grade, race/ethnicity, free/reduced lunch eligibility, special education receipt, attendance rate and school mobility in 2006, prior child protection involvement, and prior out-of-home placement. Attendance, Graduation, and MCA II test scores were used as key outcome measures. Linear Mixed Models (LMM) were primarily used to answer questions about the association between 4-H participation, attendance, and math and reading achievement (after excluding youth with special needs). Chi-square analysis was used to compare differences in graduation rates based on 4-H participation.

Table 1. Characteristics of 4-H and Non-4-H Youth

	4-H (N=11,264)	**Non-4-H** (N=11264)
Race/Ethnicity		
American Indian	96 (0.9%)	56 (0.5%)
Asian	80 (0.7%)	92 (0.8%)
Hispanic	95 (0.8%)	326 (2.9%)
Black	69 (0.6%)	443 (3.9%)
White	10,924 (97.0%)	10,347 (91.9%)
Gender		
Male	4,775 (42.4%)	5,179 (46.0%)
Female	6,489 (57.6%)	6,085 (54.0%)
School Moves (Mean)	0.062	0.13
Attendance (Mean)	96%	94%
Special Education*	1,433 (12.7%)	2,561 (22.7%)
Free/Reduced Lunch	2,610 (23.2%)	4,305 (38.3%)
Grade		
3	1,654 (14.7%)	1,654 (14.7%)
4	1,817 (16.1%)	1,817 (16.1%)
5	1,937 (17.2%)	1,937 (17.2%)
6	2,043 (18.1%)	2,043 (18.1%)
7	1,963 (17.4%)	1,963 (17.4%)
8	1,850 (16.4%)	1,850 (16.4%)

**Students receiving special education were excluded from achievement analysis due to testing differences.*

Findings

Youth who participated in 4-H had consistently higher attendance and better math and reading scores than their non-4-H peers. Parent involvement in 4-H was associated with increased math scores, but not with increased reading scores or school attendance. 4-H youth with more extensive involvement over time had higher attendance and better reading and math scores than other 4-H youth.

Characteristics of 4-H and Non-4-H Youth

The composition of the group of youth who were members of 4-H in 2006 was largely (97%) white, with slightly more girls than boys (see Table 1). Youth who participated in 4-H had high levels of school attendance and few school moves (mobility) in 2006; over 20% of youth who participated in 4-H were eligible for free or reduced lunch and over 10% of 4-H youth were involved in special education. The group of youth who did not participate in 4-H resembled 4-H youth but were more racially diverse and had slightly higher rates of free/reduced lunch eligibility and special education involvement than youth who participated in 4-H.

Attendance: Youth who participated in 4-H demonstrated higher attendance rates during the observed 5-year period than youth who did not participate in 4-H (see Figure 1). In particular, statistically significant differences between the 4-H group and the non-4-H group were confirmed based on LMM fixed-effect parameter estimates (-0.01, $t(16{,}227.33)=-9.21$, $p<.01$). Although youth who participated in 4-H attended school at higher rates than their non-4-H peers it is important to note that both the 4-H and non-4-H groups maintained satisfactory average attendance rates (>90% attendance) over time.

Math and Reading Proficiency: Youth who participated in 4-H demonstrated higher math and reading scores during the observed 5-year period than youth who did not participate in 4-H (see Figure 2). In

particular, statistically significant differences between the 4-H group and non-4-H group for all students, grade 3 to 8, were confirmed based on LMM fixed-effect parameter estimates for math (-4.05, $t(16,186.54)=-19.98$, $p<.01$) and reading (-3.23, $t(16,579.08)=-13.68$, $p<.01$). Youth who participated in 4-H outperformed their non-4-H peers by approximately five points in math and four points in reading, on average. Significant differences were replicated separately in every one of the five grade cohorts. These differences were visible in 3rd grade math and reading performance, suggesting that differences were not entirely caused by 4-H participation but rather by a combination of factors.

Graduation: Significant differences in graduation rates of 4-H and non-4-H youth were also evident (see Figure 3). For this analysis, graduation rates of 4-H and non-4-H youth who were 8th graders in 2006 (and who were in 12th grade in 2011) were compared. Only 86% of non-4-H youth graduated on time compared to 97% of 4-H youth ($\chi^2(1, 2,853)=104.97$, $p<.01$).

Influence of Parent Engagement on Academic Outcomes: Growth trajectories of youth who participated in the 4-H program and who had a range of active involvement by parents as volunteers in the 4-H program in 2006 were examined to investigate whether levels of parent engagement influenced youth's academic outcomes. Results of LMM analysis revealed mixed findings regarding the influence of parent engagement on academic outcomes. Parent engagement was significantly associated with higher math scores (1.04, $t(3,170)=2.22$, $p=.03$) but was not associated with better school attendance (0.00, $t(3,068)=1.11$, $p=.27$) or higher reading scores (-0.20, $t(3,203)=-0.39$, $p=.70$). Significant effects were seen for some but not all grade levels. Even the 4-H youth without parental volunteers, however, were doing better than the overall sample of non-4-H youth in each grade on all three indicators.

Influence of Duration of 4-H Involvement on Academic Outcomes: An examination of the influence of the duration of youths' 4-H involvement was conducted to further understand differences in academic outcomes within the group of youth who participated in 4-H. For this analysis, four groups of 4-H youth with different participation profiles were developed. Participation profiles included youth with 4-H participation ranging from only a little participation early in their K-12 years and little to none later in their K-12 years to early and sustained participation over most or all of their K-12 years. Results of LMM analysis revealed mixed findings across academic outcomes and across various grade levels. However, when significant differences were found, youth with more extensive involvement over the years had significantly higher attendance and better reading and math scores over the five years studied than youth with low or moderate levels of involvement.

Separate analyses suggested that differences in attendance, math and reading proficiency, and graduation appeared between 4-H youth non-4-H youth even among sub-samples of non-white youth, youth eligible for free or reduced lunch, or youth who were both non-white and eligible to receive free or reduced lunch.

Figure 1. Attendance Rates of 4-H and Non-4-H Youth Over Time

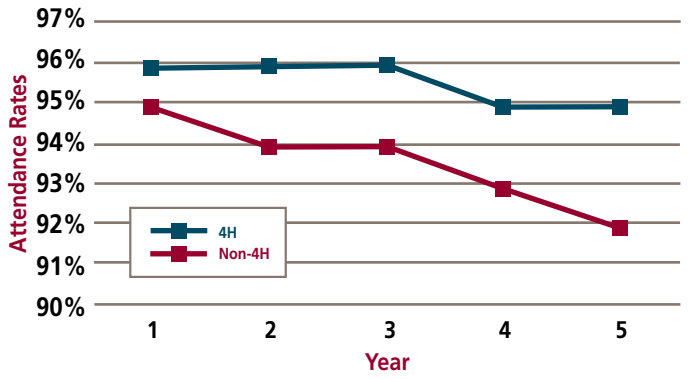


Figure 2. Math and Reading Scores of 4-H and Non-4-H Youth Over Time

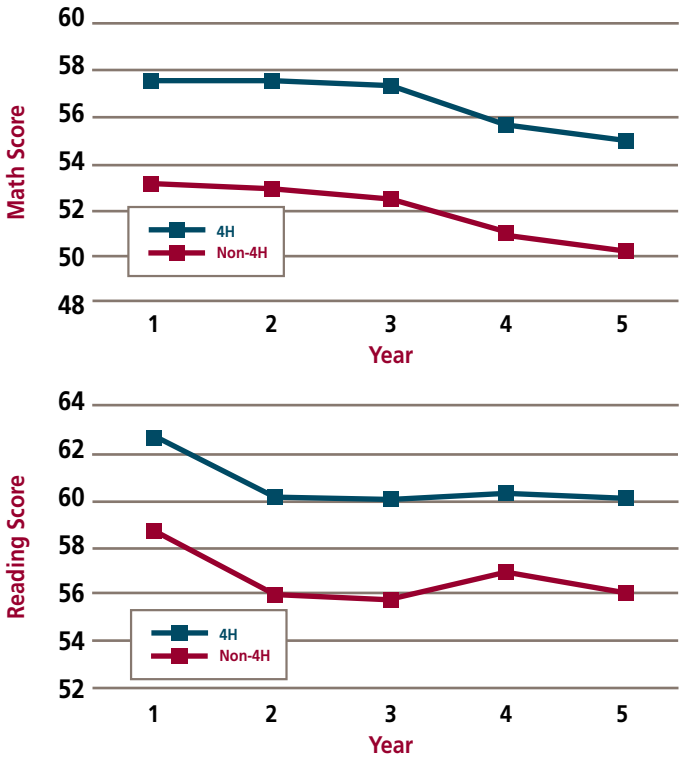
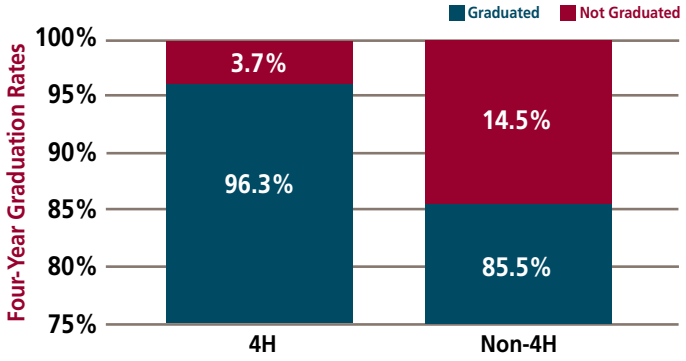


Figure 3. Four-Year Graduation Rates of 4-H and Non-4-H Youth



Conclusion

The Minnesota 4-H program gives youth opportunities to focus on science, technology, engineering & math (STEM); citizenship & leadership; healthy living; animal science; expressive arts & communication; shooting sports & wildlife; family & consumer sciences; gardening & agriculture; and environmental & earth science. Minnesota 4-H supports both rural and urban youth in these areas of interest. With that in mind, 4-H provides a non-formal experiential approach for learning and engagement of youth (regardless of youths' current academic standing and achievement levels).

Findings from this study suggest that the youth who participate in Minnesota's 4-H program are on a better course for academic learning starting early in their academic careers than youth who do not participate in 4-H. Youth who are involved in 4-H attend school at consistently higher levels, and score significantly higher on standardized tests of math and reading than their non-4-H peers, regardless of the duration or intensity of their participation. However, for some groups of youth, extensive 4-H involvement over time is associated with significantly better attendance and higher reading and math scores as compared to youth who are involved in 4-H for shorter durations of time. Parent involvement in 4-H is associated with increased math scores, but not with increased reading scores or school attendance.

Limitations

Several limitations should be noted about this study. First, this study compared academic outcomes of 4-H and similarly situated youth who did not participate in 4-H. Because of the limited information available about family- and community-level factors, this study was unable to identify other factors (outside of 4-H participation) which might have contributed to the group differences found in this study. Similarly, 4-H records did not contain reliable information about specific activities in which individual 4-H youth engaged. Therefore, associations between specific activity type (e.g., STEM) and outcomes of interest (e.g., math scores) were not possible. Finally, this study looked specifically at academic outcomes of youth; 4-H may have effects on other facets of well-being that are unmeasured in the current study.

Differences in attendance and achievement between 4-H and non-4-H youth start early and persist over time. It appears that 4-H-involved youth and their families are committed to and/or prepared for learning in an academic setting. Clearly, these differences are not all caused by 4-H participation; however, differences are at least partially related to youths' duration of involvement and parent engagement in 4-H. In that sense, 4-H programming may promote a community of learners that engages youth from a wide variety of ages and interests in learning.

Future research aimed at understanding the associated effect of youth 4-H participation on academic achievement can build on these findings by investigating the factors that predispose youth and their families to choose 4-H involvement and that lead to parent engagement in the program.

References

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The Center for Advanced Studies in Child Welfare (CASCW) is a resource for child welfare professionals, students, faculty, policy-makers, and other key stakeholders concerned about child welfare in Minnesota. **Minn-LInK** is a unique collaborative, university-based research environment with the express purpose of studying child and family well being in Minnesota using state administrative data from multiple agencies.

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