

Insights from National Student Clearinghouse Data: 4-H Alumni and Choice of Academic Fields of Study

Favour C. Ojike, Purdue University
Dr. Casey D. Mull, Purdue University

Introduction

Youth-serving organizations and institutions in the United States are instrumental in preparing youth for higher education and careers in diverse fields that drive both the national and global economy. These efforts help meet workforce demands (Oyewole, 2010; Szirmai, 2008, as cited in Aarts & Greijn, 2010) and generate various individual and societal benefits (Chan, 2016; Hermannsson et al., 2017; McMahan, 2018; McMahan, 2021). Despite this, college enrollment in the U.S. has declined in recent years (National Center for Education Statistics [NCES], 2023; Pavlov & Katsamakos, 2020). In response, youth-serving organizations such as 4-H, FFA, and Junior Achievement continue to help address this decline and stir youth's interest in diverse academic fields (Bates et al., 2019; Detgen et al., 2021; Horrillo et al., 2021; Knaggs et al., 2013; Xing et al., 2020). The largest positive youth development program, 4-H, equips K-12 youth with life and academic skills through hands-on programs, which prepare youth to be healthy, productive, and engaged.

For over 120 years, Purdue University has been delivering 4-H programs across all 92 counties in Indiana (Smith & Kirkpatrick, 1990). Indiana 4-H has collected short-term college intention data from graduating seniors and has more recently adopted self-reported surveys. However, the method limited accuracy in college enrollment, completion, or the fields of study they pursued. As 4-H alumni transition through various geographical locations and experiences following high school graduation, measuring medium to long-term outcomes using surveys poses challenges. First, change of 4-H alumni contact information makes it difficult to reach alumni directly (Aichholz, 2021). Second, medium-to-long-term studies often require multiple data collections (i.e., longitudinal studies), which may result in participants' attrition due to loss of interest. Third, publicly available higher education databases like the Integrated Postsecondary Education Data System (IPEDS) and the Statewide Longitudinal Data System (SLDS) either collect and report educational data at the institutional level (not the individual level) or focus solely on in-state data, making it difficult to track mobile alumni (Dynarski et al., 2015; Glennie et al., 2014; Levesque et al., 2015; NCES, n.d.). Finally, self-reported surveys are often associated with low response rates, incomplete or inaccurate responses (Aichholz, 2021; Mosier, 2008; Nayak & Narayan, 2019; Ratkos & Knollenberg, 2015; Wahaloski, 2013).

Researchers such as Hetherington (2020) and Howell and Howell (2018) have identified and utilized the National Student Clearinghouse (NSC) as a secure, reliable, and reputable secondary data source to track and obtain educational information on students across the United States. Using personal identifiable information (i.e., names and dates of birth), the NSC houses data on 97% of students enrolled in 3,600 U.S. colleges and universities (National Student Clearinghouse [NSC], n.d.). The NSC report includes individual, semester-based data on college name, state, and type; enrollment dates and status; class levels; enrollment majors; and graduation details (status, date, degree title, and major). The NSC operates in accordance with the Family Educational Rights and Privacy Act (FERPA) and other applicable laws (NSC, n.d.).

Theoretical/Conceptual Framework

This study builds on the 4-H Thriving model, a research-based Positive Youth Development (PYD) framework widely adopted by National 4-H (Arnold, 2018; Arnold & Gagnon, 2020). The model emphasizes that a supportive developmental context is essential for fostering youth success. Within this context, specific indicators of youth thriving emerge over time, ultimately leading to developmental outcomes and long-term outcomes. Academic success, one long-term outcome of the 4-H Thriving model, is the primary focus of this study. We conceptualize academic success as high school completion and successful enrollment in higher education institutions across various fields of study. To support this, excelling on college entrance exams, such as the Scholastic Aptitude Test (SAT) and American College Test (ACT), is considered a measure of academic success (Bourdeau et al., 2014).

Purpose and Research Questions

The purpose of the study was to explore the college enrollment of Indiana 4-H alumni who graduated from high school between 2018 and 2023, as well as their fields of study during the first semester of enrollment. To address methodological limitations noted earlier, the population study used the NSC's StudentTracker service as a tool to obtain long-term academic outcomes.

Research Questions

1. How do postsecondary enrollment patterns among Indiana 4-H alumni vary by different high school graduation cohorts and gender?
2. What fields of study do Indiana 4-H alumni most commonly pursue in college, and how do these patterns vary by gender?
3. How effective is the NSC's StudentTracker in capturing the scope and timing of postsecondary educational enrollment and majors among Indiana 4-H alumni?

Methods/Procedures

Participant Description

The study included a population of 15,173 Indiana 4-H alumni who graduated high school between the academic years 2017-2018 (10.6%), 2018-2019 (12.1%), 2019-2020 (20.7%), 2020-2021 (17.1), 2021-2022 (20.4%), and 2022-2023 (19.0%). Participants were between 17 and 20 years old at high school graduation and identified as male (38.8%), female (60.8%), or other (0.41%). The study applied a quantitative descriptive design and received approval from the Purdue University Human Research Protection Program (HRPP). Participant consent was not required; however, data obtained from the NSC were de-identified.

Data Collection

Purdue University secured a contract and provided 4-H alumni data formatted according to a NSC guide. A 'requestor return field' in the data file was utilized to code the demographic information of all alumni and generate a unique code for all alumni, re-linking NSC educational data to private 4-H demographic information. The prepared file was submitted to the NSC

through a secure portal. The NSC processed and sent educational reports of participants. Frequency analysis was followed using the Statistical Package for the Social Sciences (SPSS).

Results

From the NSC reports, results showed that educational data were available for 71% of the submitted sample, indicating that at least 71% of Indiana 4-H alumni in the study enrolled in higher education institutions. The unmatched 29% may be attributed to several factors: some alumni may not have enrolled in college, are pursuing other non-educational postsecondary opportunities, enrolled in institutions that do not report to the NSC, or had mismatched personally identifiable information in the submission file. Among the matched cases, 82 students had FERPA blocks, making them unidentifiable. As a result, gender results may be slightly underestimated for those enrolled and overestimated for those who we assume did not enroll in college. Table 1 presents the college-going rates of Indiana 4-H alumni in the study by high school graduation year, revealing a downward trend over time. However, Indiana 4-H alumni consistently enrolled in higher education at higher rates than the state average for comparable cohorts (61% in 2017–2018, 59% in 2018–2019, and 53% in both 2019–2020 and 2020–2021) (Indiana Commission for Higher Education, n.d.). Table 2 shows enrollment rates by gender, with females enrolling at higher rates than males.

Table 1
College-Going Rate by High School Graduation Year

4-H High School Graduation Year	Going to college		Not going to college		College-going rate
	<i>N</i>	<i>n</i>	<i>n</i>		%
2017-2018	1,600	1,207	393		75.4
2018-2019	1,824	1,384	440		76.0
2019-2020	3,139	2,325	814		74.1
2020-2021	2,592	1,819	773		70.2
2021-2022	3,111	2,164	947		70.0
2022-2023	2,905	1,823	1,082		63.0
Total	15,173	10,722	4,449		

Table 2
College-Going Rate by Gender

Gender	College		No College		College-going rate
	<i>n</i>	%	<i>n</i>	%	%
Male	3,554	33.1	2,341	52.6	60.3
Female	7,132	66.5	2,077	46.7	77.4
Nonbinary	-	-	2	0.0	0.0
Not Provided	36	0.3	29	0.7	55.4
Missing	-	-	2	0.0	0

The study also examined the field of study first enrolled in by Indiana 4-H alumni and how these choices varied by gender. Because a universally accepted categorization of majors that directly fit the study population was not available, the researchers developed a classification scheme by drawing upon existing frameworks from the Integrated Postsecondary Education Data

System (IPEDS) and the ACT resources, while also applying researcher judgment to align majors into broader categories. Although these categories are not standardized, they were designed to best reflect the distribution of majors within the study dataset. Table 3 summarizes key findings, highlighting the major fields of study. In the discussion section, the top two majors for the first four fields in Table 3 were highlighted. The STEM field had the highest percentage (23.4%), with 46% in science and 40% in engineering. Health was the second most enrolled field (17%), with 44% enrolled in nursing and 18% in a healthcare specialist major. Agriculture and Natural Resources followed at (14.1), led by animal agriculture (35%) and agricultural business majors (22%). In the humanities, liberal arts, and social sciences (12.6%), 22% enrolled in psychology and behavioral sciences, while 20% enrolled in law, crime, and politics majors.

Across various fields, gender-based patterns were observed; females enrolled at a higher rate in fields like health and education, and males enrolled at higher rates in STEM and trade and vocational studies. These patterns are consistent with a meta-analysis finding from MacDonald et al. (2023) in their study of gender differences in occupational interests among adolescents. MacDonald et al. (2023) reported that boys have a higher interest in realistic and investigative fields, while girls show greater interest in social, artistic, and conventional fields. Notably, the strong female representation in STEM fields may reflect the impact of programs aimed at encouraging young girls to pursue STEM fields of study. It is important to note that some students often change majors, which could be in the same field or a different one. This study did not capture those changes. Additionally, the “Others” category in Table 3 includes general, undeclared, or first-year exploration fields of study, appearing in the NSC data without any specific field of study at the time of data collection.

Table 3

Fields of Study pursued by Indiana 4-H Alumni in the study?

Fields of Study	General		Gender: Male		Gender: Female		Gender: Others
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	
STEM	2505	23.4	1349	53.9	1150	46.0	3
Health	1826	17.0	190	10.4	1624	89.3	5
Agriculture and Natural Resources	1510	14.1	560	37.2	946	62.8	1
Humanities, Liberal Arts, and Social Sciences	1347	12.6	260	19.3	1081	80.4	3
Business	1140	10.6	481	42.2	656	57.6	2
Education	819	7.6	120	14.7	699	85.3	0
Visual and Performing Arts	236	2.2	67	28.4	169	71.6	0
Trade and Vocational Studies	183	1.7	152	84.0	29	16.0	0
Hospitality and Food Service	83	0.8	19	22.9	64	77.1	0
Sports	73	0.7	37	50.7	36	49.3	0
Religion	40	0.4	21	52.5	19	47.5	0
Others	960	8.9	-	-	-	-	-
Total	10722	100					

Conclusion, Implications, and Recommendations

Indiana 4-H leveraged the NSC to provide accurate and reliable insights into the higher education pursuits of its alumni and their initial fields of study. The finding that at least 71% of its alumni enrolled in a higher education institution is a promising indication that, despite the national trends of declining college enrollment (NCES, 2023; Pavlov & Katsamakos, 2020), progress is possible when stakeholders actively engage with the factors contributing to the decline. Indiana 4-H enrollment rate remains significantly higher than the total Indiana population. However, within the Indiana 4-H population, a gradual decline in college enrollment for the years studied signals a need for Indiana 4-H practitioners to reassess their college readiness initiatives across the 92 counties and the different demographic groups they serve. Furthermore, the results of the fields of study not only highlight the broad distribution of Indiana 4-H alumni in various fields and by gender but also reveal the fields that are of most interest to them. It is important to note that the study was not designed to establish a causal link between Indiana 4-H and college enrollment. Rather, it explored higher education outcomes of its alumni, an academic success outcome anticipated by the 4-H Thriving model (Arnold, 2018; Arnold & Gagnon, 2020).

Evaluating the effectiveness of the NSC in achieving the research objectives, we conclude that the NSC was largely effective. It enabled the collection of valid and reliable data on a large sample located across the United States, eliminating challenges of contacting alumni, low response rates, and inaccurate data associated with self-reported surveys. However, the study does have limitations, including the assumption that unmatched records did not enroll in higher education institutions. Also, the study excluded Indiana 4-H alumni who did not register as a senior for the academic years studied. The study did not account for the impact of COVID-19.

Practical implications of this study include sharing the data with stakeholders, identifying improvement areas for Indiana 4-H college readiness, increasing targeted interventions across gender and various academic fields, and justifying the efforts of Indiana 4-H while seeking additional investment. Beyond 4-H, some implications that extend to other youth-serving organizations include utilizing the NSC to track and determine various postsecondary outcomes of their diverse participants. Some research implications include studying college persistence and completion among Indiana 4-H alumni and their majors/fields at the time of graduation. Future studies may consider a causal study to examine 4-H's influence on higher education pursuits. In conclusion, the study indicates that Indiana 4-H contributes to equipping its members to pursue higher education and succeed academically, positioning them to contribute meaningfully across diverse sectors of the economy.

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