



National Report

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Highlights from the Study

Youth Characteristics

- 2,185 4-H youth from 14 state 4-H programs participated in the study.
- Youth were an average age of 15.35 years and started in 4-H at an average age of 11.12.
- Youth primarily self-identified as white (86%), female (67%), were relatively experienced in 4-H (average 4.23 years in 4-H) and were predominately in 8th through 11th grade (76%).
- Gender had no meaningful relation with levels of involvement and/or participation in 4-H.
- Youth who identified as non-white reported lower levels of years in 4-H, lower rates of 4-H involvement in the summer and higher rates of participation in 4-H at the national level.

4-H Program Outcomes

Civic Engagement

- 77% of youth reported liking helping people in their community.
- 50% of youth reported that 4-H has inspired them to volunteer in their community.
- Youth who were inspired to volunteer also tended to contribute to their community at greater levels.
- As respondents reported higher levels of volunteer inspiration, they also reported higher levels of college and career readiness and higher levels of using science to solve everyday problems.
- Youth who reported higher levels of thriving as indicated in the 4-H Thriving Model also reported greater levels of civic engagement, reporting greater levels of helping in their community looking for ways to help with problems in their community, and greater levels of inspiration to volunteer in their community.

College and Career Readiness

- 96% of youth reported that 4-H has helped them identify things they are good at.
- 82% of youth reported that 4-H helped them explore career options.
- 58% of youth reported that 4-H has helped them in their college decision-making.
- As participants increased in age, they were more likely to report they learned about colleges that may be a good fit and more likely to report 4-H has helped with decisions about college.
- As respondents reported higher levels of volunteer inspiration, they also reported higher levels of college and career readiness, and higher levels of using science to solve everyday problems.
- Talking about science was positively associated with learning about colleges that might be a good fit.
- Youth who reported experiencing higher-quality developmental contexts in 4-H reported better identification of their personal strengths and better understanding of future career options.

Healthy Living

- 42% of youth reported that they learned about healthy food choices in 4-H.
- Higher rates of civic engagement were positively associated with healthy eating choices.
- Learning about eating healthier was associated with learning about healthy food choices in 4-H.
- Talking about science to solve everyday problems was also strongly associated with learning about healthy food choices.

Science

- 85% of youth agreed or strongly agreed with the statement, "I like science."
- 69% of youth said 4-H helped them see how science can be used to solve everyday problems.
- 65% of youth reported they would like a job that involved using science.
- A large majority of 4-H participants report learning, applying and enjoying science as part of their 4-H experience.

The 4-H Thriving Model

- The 4-H Thriving Model's structure as reported by Arnold and Gagnon (2019) was replicated in the national index study, this time involving youth from 14 states.
- Youth thriving partially mediates the relation between developmental context and developmental outcomes. This result provides support for the replication of the 4-H Thriving Model structure (Arnold & Gagnon, 2019), indicating youth thriving mediates the relationship between developmental context and developmental outcomes.

Positive Youth Development

- 4-H begins with a high-quality program experience that provides youth a place to belong, explore their sparks and experience developmental relationships. Mean ratings for each of these elements were high, ranging from 5.6 to 5.94 on a seven-point scale.
- The results also show that youth are thriving as measured by six indicators of thriving. Mean ratings for five of the six indicators were high, ranging from 5.39 (openness to challenge and discovery) to 6.03 (growth mindset) on a seven-point scale. Mean ratings for the items related to positive emotionality were notably lower than the other five indicators, with a mean score of 4.20 on a seven-point scale – perhaps an indicator of the ongoing youth mental health emergency in our country.
- Youth also reported strong and positive results across all items related to positive youth development outcomes, with mean ratings ranging from 5.04 (high personal standards) to 5.91 (personal responsibility) on a seven-point scale.
- Youth who experience a high-quality developmental context in 4-H tend to score higher across the four program outcome areas of civic engagement, college and career readiness, healthy living and science.

2022 National 4-H Index Study

Participant Information

For well over a century, 4-H has contributed to the learning and development of youth in significant ways, positioning 4-H as the largest and enduring youth development organizations in the country. While project-based learning and positive youth development have long been the intended outcomes of 4-H, those outcomes have not been systematically measured on a national sample. The 2022 National 4-H Index Study is the first time that both 4-H program outcomes and positive youth development have been measured together in a national 4-H sample.

All land grant universities (LGUS) with 4-H programs were invited to participate in the study. Fourteen LGUS participated in this inaugural study. After the data were screened (see Appendix 1 for details) at total of 2,185 were included in the analysis. Table 1 shows the breakdown of youth participation by LGU/State.

Table 1. Youth Participation by State/LGU

State	Frequency	Percent of total
California	173	7.9%
Colorado	162	7.4%
Delaware	33	1.5%
Georgia	249	11.4%
Idaho	48	2.2%
Iowa	267	12.2%
Louisiana	233	10.7%
Maine	38	1.7%
Nebraska	294	13.5%
New Jersey	86	3.9%
New York	49	2.2%
Ohio	240	11.0%
Oregon	225	10.3%
Texas	88	4.0%
Total: 2,185		

Each LGU secured its own IRB approval for the study. Participants were recruited independently by each LGU and data were submitted via a Qualtrics link to the national database managed by 4-H Common Measures. Data were collected throughout the spring and summer of 2002.

The study instrument consisted of:

- Selected items from four of the 4-H Common Measures program outcomes areas:
 1. Healthy Living
 2. Science
 3. Civic Engagement
 4. College and Career Readiness
- Items from the 4-H Thriving Model instrument that measured:
 1. The Developmental Context
 2. Youth Thriving Indicators
 3. Positive Youth Development Outcomes
- Measures of youth demographic characteristics, youth level, quality and quantity of 4-H experience

Youth Respondents Demographics

Youth ages 13 and up were invited to participate in the study. The lower age limit was established because the Thriving Model instruments are designed for youth at least 13 years of age. As shown in Table 2, respondents were an average age of 15.35 years, started in 4-H at an average age of 11.12, have been in 4-H for an average of 4.23 years and participated in an average of 2.6 4-H projects.

Table 2. Mean Respondent Age and 4-H Participation

	Mean	SD	Min	Max	Range
Age	15.35	1.63	13	19	6
Number of Years in 4-H	4.23	1.34	0.5	5	4.5
Age at Start of 4H	11.12	1.75	8	18.5	10.5
Number of 4-H Projects	2.60	1.76	1	9	8

As shown in Figure 1, participants primarily self-identified as female (67%), with 30% reporting male and 1% as non-binary. Forty-one (2%) of respondents elected not to respond to the gender identity question.

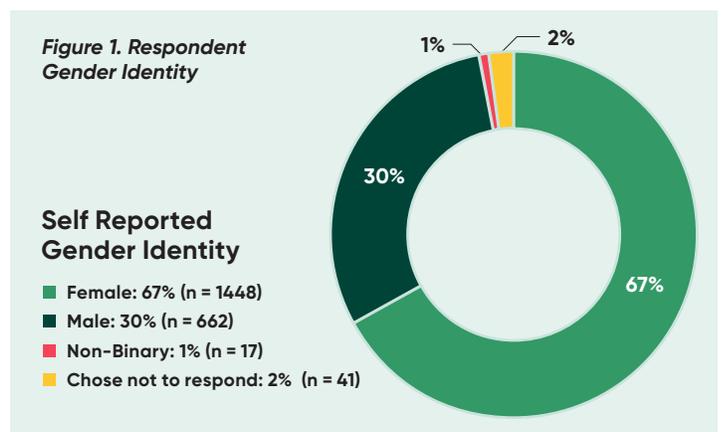


Table 3 presents the complete respondent demographic information based on youth grade, race/ethnicity, 4-H activities and number of unique 4-H projects participated in.

Table 3. Complete Youth Participation Demographics

	N	%
Grade		
6th	7	0%
7th	148	7%
8th	421	21%
9th	381	19%
10th	371	18%
11th	354	18%
12th	271	13%
Graduated in 2022	62	3%
Racial and/or Ethnic Identity		
Asian Origin	32	2%
African American	68	3%
Native American	25	1%
Hawaiian/Pacific Islander	2	0%
White (Non-Hispanic)	1,823	86%
Hispanic	48	2%
Multiple Race	130	6%
4-H Activities*		
Animal and Agricultural Science		28%
Business and Citizenship		6%
Creative Arts		16%
Diversity and Inclusion		2%
Environment & Outdoor Science		10%
Healthy Living & Foods		15%
Practical Skills		9%
Professional Development		5%
Science, Technology, Engineering & Math		9%
Total Number of 4-H Projects Participated In		
1 Unique Project	785	36%
2 Unique Projects	486	22%
3 Unique Projects	355	16%
4 Unique Projects	236	11%
5 Unique Projects	164	8%
6 Unique Projects	73	3%
7 Unique Projects	44	2%
8 Unique Projects	24	1%
9 Unique Projects	18	1%

Note: *indicates a select all that apply option, Ns excluded for parsimony (and to avoid confusion on overall sample size)

4-H Project Participation

Respondents were asked to select the projects they participated in across nine unique offerings. Respondents reported participating in an average of 2.60 4-H projects (SD = 1.76, range = 1 to 9 projects), with most youth reporting participation in one unique project (n = 785, 36%) (Figure 2).

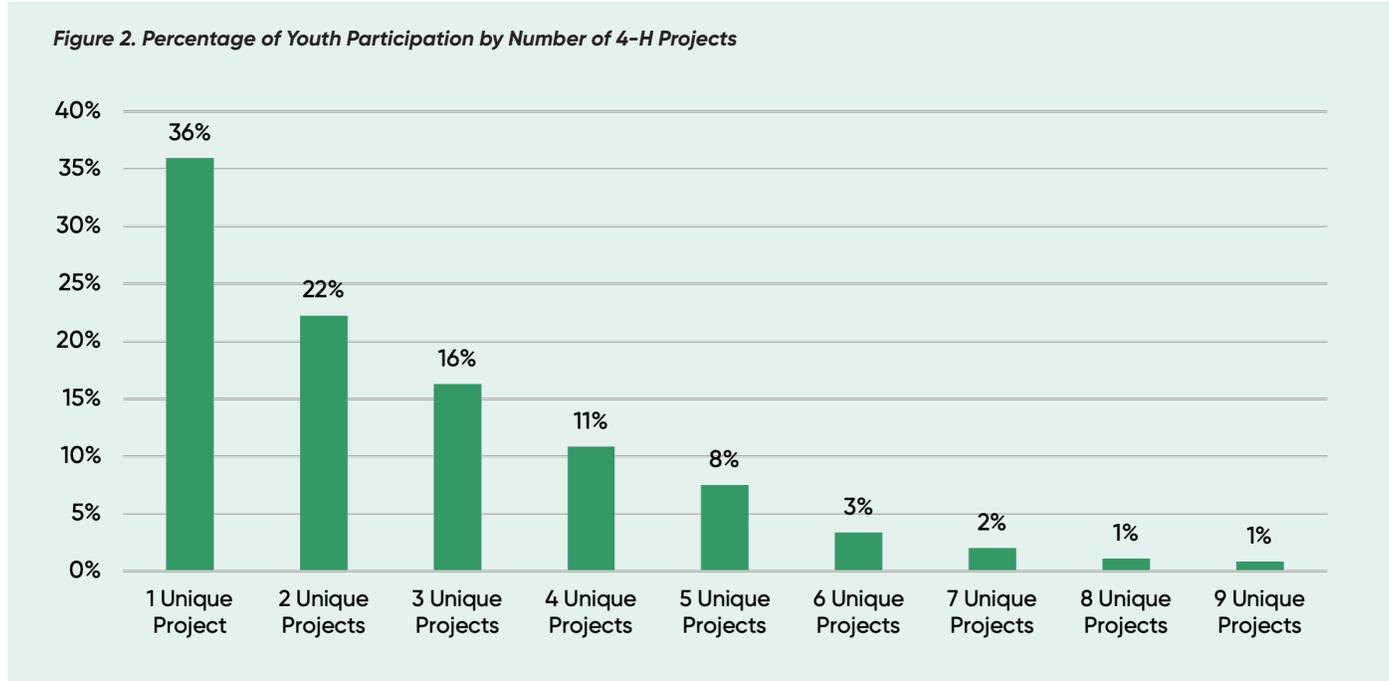
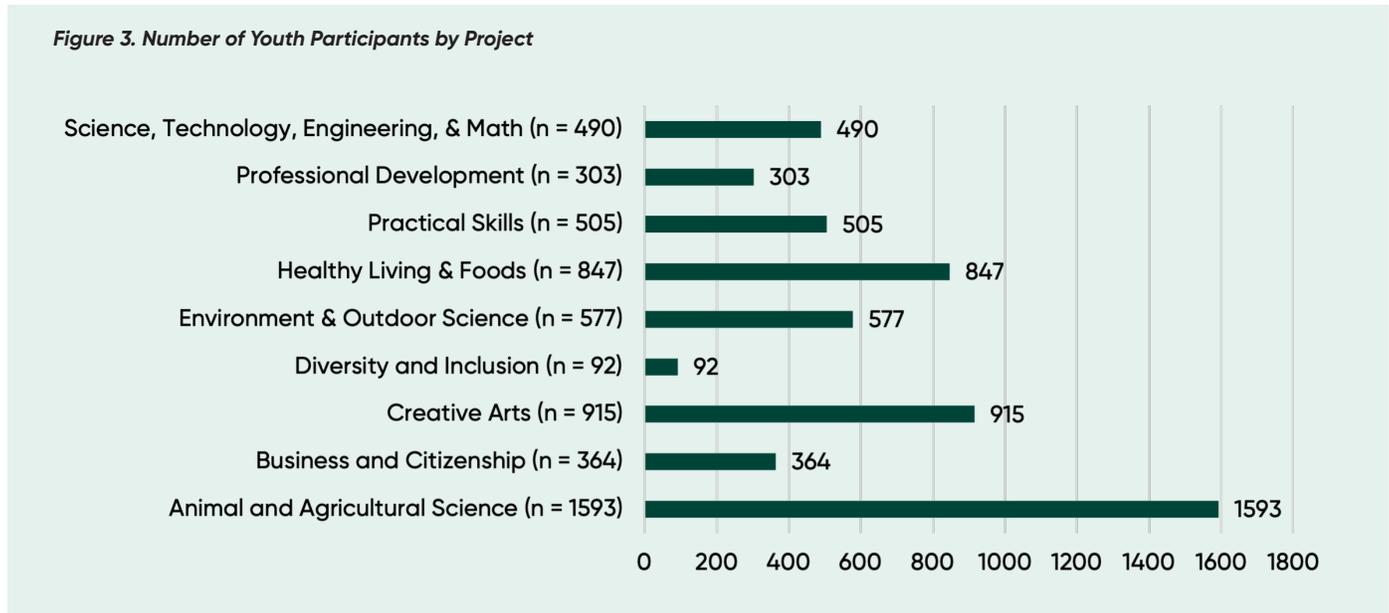


Figure 3 presents the number of youth reporting participating in each of the nine unique project areas, with Animal and Animal Science being the most popular.



4-H Involvement: Time, Level and Type

Respondents were asked to rate the level of involvement in 4-H on a 1 (none) to 7 (very high) scale. Youth indicated an average rating of 4.88 ($SD = 1.68$) during the school year and 5.34 ($SD = 1.77$) during the summer. The difference between these ratings (Mean difference = .467, $SE = .041$, 95% CI: .388, .549) was statistically significant [$t(2,037) = 11.52, p < .001$] indicating higher levels of 4-H involvement in the summer.

Table 4. Level of 4-H Involvement by Time of Year

	Mean	SD
Level of 4-H Involvement During School Year	4.88	1.68
Level of 4-H Involvement During Summer	5.35	1.78

Similarly, respondents reported on their levels of 4-H participation at the county, state and national level. As shown in Table 5, **the greatest level of participation was at the country level**, which was significantly greater than state level participation (Mean Difference = 2.183, $SE = .042$, 95% CI: 2.056, 2.221, $t(2024) = 50.86, p < .001$) and national level participation (Mean Difference = 3.487, $SE = .044$, 95% CI: 3.401, 3.573, $t(2024) = 79.849, p < .001$). Similarly, reported state level participation was significantly higher than national level participation (Mean Difference = 1.349, $SE = .035$, 95% CI: 1.280, 1.418, $t(2024) = 38.225, p < .001$).

Table 5. Level of 4-H by Type

	Mean	SD
Rate of 4-H Participation at County Level	5.03	1.84
Rate of 4-H Participation at State Level	2.89	1.92
Rate of 4-H Participation at National Level	1.54	1.22

To understand the factors that may be related to greater levels of 4-H involvement, a series of bivariate correlations were examined. Because of low numbers of respondents who identified a racial/ethnic group other than white (see Table 3), this variable was recoded for analyses as a continuous variable (0 = White; 1 = Non-White)¹. Similarly, due to low levels of respondents identifying as a gender other than male or female, respondents who did not identify as either male (0) or female (1) were excluded from this analysis. Furthermore, the strength of relationships between variables were assessed utilizing the guidelines illustrated in Table 6a. In the maximum likelihood framework (e.g., NHST), statistical significance is not important when paired with a weak effect size, especially with larger samples (Cohen et al., 2003). Associations that are negligible (i.e., $r < .200$) should be interpreted as indicating no meaningful relation within the present study and sample. As such, the effect size should be considered rather than the statistical significance when making decisions about how to implement the reported data in their own work (see Table 6a).

Table 6a. Pearson Bivariate Correlation Coefficient Effect Size Guide

Pearson r level	Relationship Strength
> .700	Very Strong Relationship
.400-.699	Strong Relationship
.300-.399	Moderate Relationship
.200-.299	Weak Relationship
.010-.199	No or negligible relationship

Note: Strength of relationship is bidirectional and applies to both negative and positive relations.

¹The research team recognizes the potential serious limitations this approach presents regarding interpretation of the study findings (and the lack of homogeneity with a "non-white" racial category).

As shown in Table 6b, there were either statistically insignificant or very weak relations between self-identified gender and years of participation in 4-H ($r = .005, p = .825$), number of 4-H activities participated in ($r = .083, p < .001$), and rates of participation at country, state or national levels, or levels of involvement in the summer and/or school year). This means that **respondent-reported gender had no meaningful relation with levels of involvement and/or participation in 4-H**, and any statistically significant levels are likely an artifact of the large study sample size as indicated by the weak correlation levels (e.g., $r = .083, p < .001$).

Conversely, there was a small but negative association between respondent-reported ethnic/racial group and years of participation in 4-H ($r = -.174, p < .001$), level of 4-H involvement in the summer ($r = -.140, p < .001$) and a positive relation between respondent-reported ethnic/racial group and rate of 4-H participation at the national level ($r = .101, p < .001$). Again, these associations are weak and should be interpreted with caution.

4-H Participation Summary

Youth respondents who identified as non-white reported lower levels of years in 4-H, lower rates of 4-H involvement in the summer and higher rates of participation in 4-H at the national level. Perhaps unsurprisingly, greater years of participation in 4-H was positively associated with 4-H involvement in the summer, school year, and at the county and state levels. Similarly, levels of involvement during both school year and summer were positively associated with greater levels of participation at the county, state and national levels.

Table 6b.

Pearson Bivariate Correlations Between Demographic Variables and Involvement												
Correlations	Mean [SD]	1	2	3	4	5	6	7	8	9	10	11
1. Total Years in 4-H	4.23 [1.34]	--										
2. Total Number of 4-H Activities Participated In	2.6 [1.76]	.272*	--									
3. Bio Sex: 0 = Male; 1 = Female	0.69 [0.46]	.005 (.825)	.083*	--								
4. Age in Years	15.35 [1.63]	.316*	.156*	.032 (.0137)	--							
5. Age of Start at 4-H	11.12 [1.75]	-.469*	-.062*	.028 (.201)	.689*	--						
6. Participant Race (0 = White; 1 = Non-White)	0.14 [0.35]	-.174*	-.043 (.048)	-.016 (.463)	-.071*	.068 (.002)	--					
7. Level of 4-H Involvement During School Year	4.88 [1.68]	.204*	.208*	.093*	.080*	-.081*	.009 (.688)	--				
8. Level of 4-H Involvement During Summer	5.35 [1.78]	.335*	.179*	.060 (.007)	.133*	-.131*	-.140*	.438*	--			
9. Rate of 4-H Participation at County Level	5.05 [1.84]	.333*	.226*	.083*	.132*	-.130*	-.109*	.518*	.562*	--		
10. Rate of 4-H Participation at State Level	2.87 [1.94]	.234*	.286*	.045 (.044)	.156*	-.035 (.113)	-.02 (.367)	.418*	.314*	.495*	--	
11. Rate of 4-H Participation at National Level	1.51 [1.19]	.087*	.156*	.015 (.504)	.110*	.036 (.096)	.101*	.280*	.153*	.218*	.567*	--

Note: * indicates $p < .001$, otherwise all exact p -values provided in parentheses below correlation.

4-H Program Outcomes: Common Measures

Common Measures Outcomes Descriptive Analysis

The each of the tables below (7a – 7d) presents the frequencies and percentages of responses for each response category for each item. Each table is followed by a figure (5a –5d) showing the percentage of respondents who rated the items the highest.

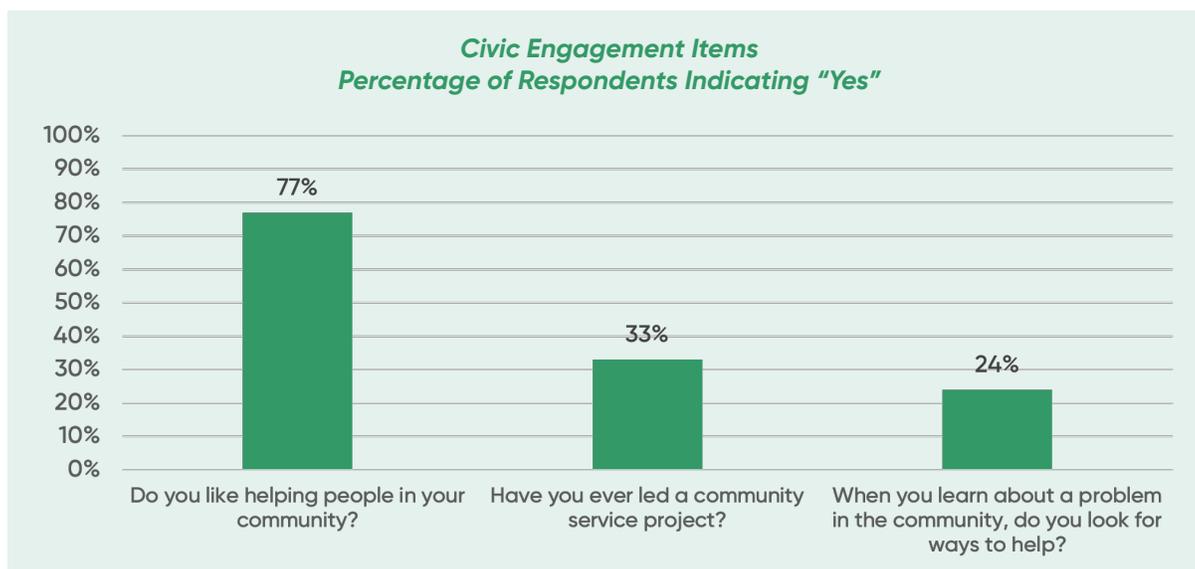
CIVIC ENGAGEMENT



Table 7a. Frequencies and Percentages of Responses: Civic Engagement Common Measure Program Outcomes

Civic Engagement	Yes	A Lot	Sort Of	Usually	A Little	Not Really	Not at All	No
Do you like helping people in your community?	1,697 78%	--	--	444 20%	--	33 1.5%	--	8 .5%
Have you ever led a community service project?	729 33%	--	678 31%	--	--	--	--	773 36%
When you learn about a problem in the community, do you look for ways to help?	530 24%	--	--	965 44%	--	634 29%	--	51 3%
How much has 4-H inspired you to volunteer in your community?	--	1,084 50%	--	--	980 45%	--	117 5%	--

Figure 5a. Percentage of Respondents Indicating "Yes": Civic Engagement Common Measure Program Outcomes



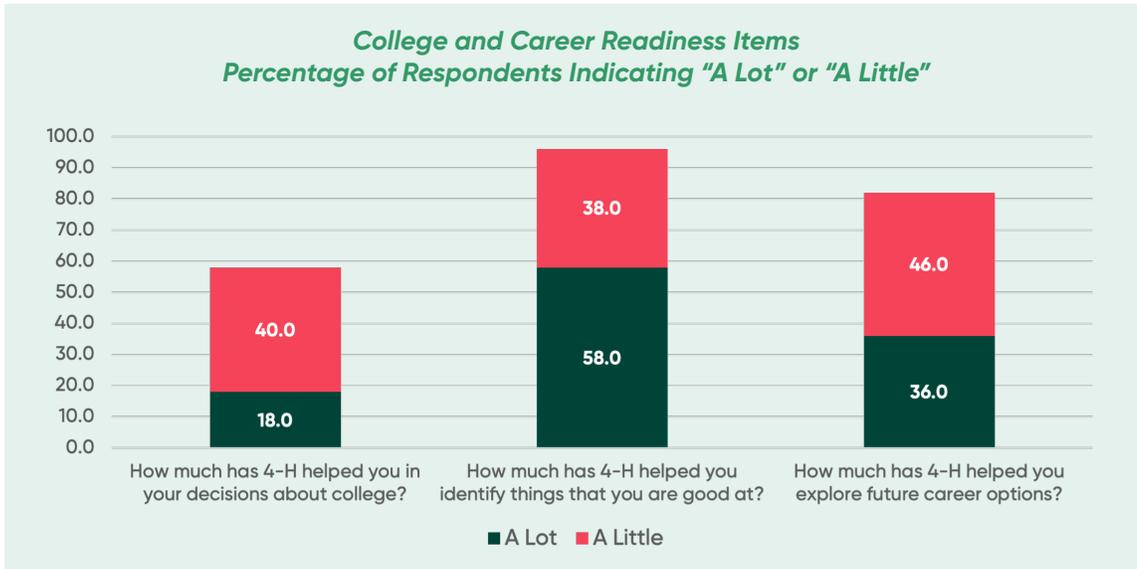
More than half of respondents indicated 4-H had “inspired them to volunteer in their communities.” As demonstrated in Table 8B, this outcome was positively associated with greater rates of respondents leading community service projects ($\rho = .401, p < .001$), greater levels of looking for ways to help solve problems in the community ($\rho = .479, p < .001$) and greater enjoyment of helping others in their community ($\rho = .342, p < .001$). **Put differently, when respondents were inspired to volunteer by 4-H, also tended to contribute to their community at greater levels.**

COLLEGE AND CAREER READINESS

Table 7b. Frequencies and Percentages of Responses: College and Career Readiness Common Measure Program Outcomes

College and Career Readiness	Yes	A Lot	Sort Of	Usually	A Little	Not Really	Not at All	No
At 4-H, did you learn about colleges that might be a good fit for you?	421 19%	--	597 27%	--	--	--	--	1,165 53%
How much has 4-H helped you in your decisions about college?	--	383 18%	--	--	863 40%	--	931 43%	--
How much has 4-H helped you identify things that you are good at?	--	1,256 58%	--	--	818 38%	--	107 5%	--
How much has 4-H helped you explore future career options?	--	773 36%	--	--	998 46%	--	408 19%	--

Figure 5b. Percentage of Respondents Indicating “A Lot” of “A Little”: College and Career Readiness Common Measure Program Outcomes



The primacy of respondents did not indicate their 4-H experience aided in them learning about colleges that may be a good fit or making decisions about college. However, this lack of effect may be related to the age/grade in school distribution of the sample. As such, we conducted a robust version of linear regression (to adjust for the categorical nature of the common measures items) to see if respondent age was associated with their response choices. Perhaps unsurprisingly, we did find a negative relation between respondent age and their response choice on the college and career readiness items (as a reminder to the reader, a lower score on the common measures items suggests more agreement with the statements).

As participants increased in age, they were more likely to report they learned about colleges that may be a good fit at 4-H ($\beta = -.128, SE = .010, p < .001$) and more likely to report 4-H has helped with decisions about college ($\beta = -.140, SE = .009, p < .001$). More simply, 4-H was more helpful for older youth in determining their college path.

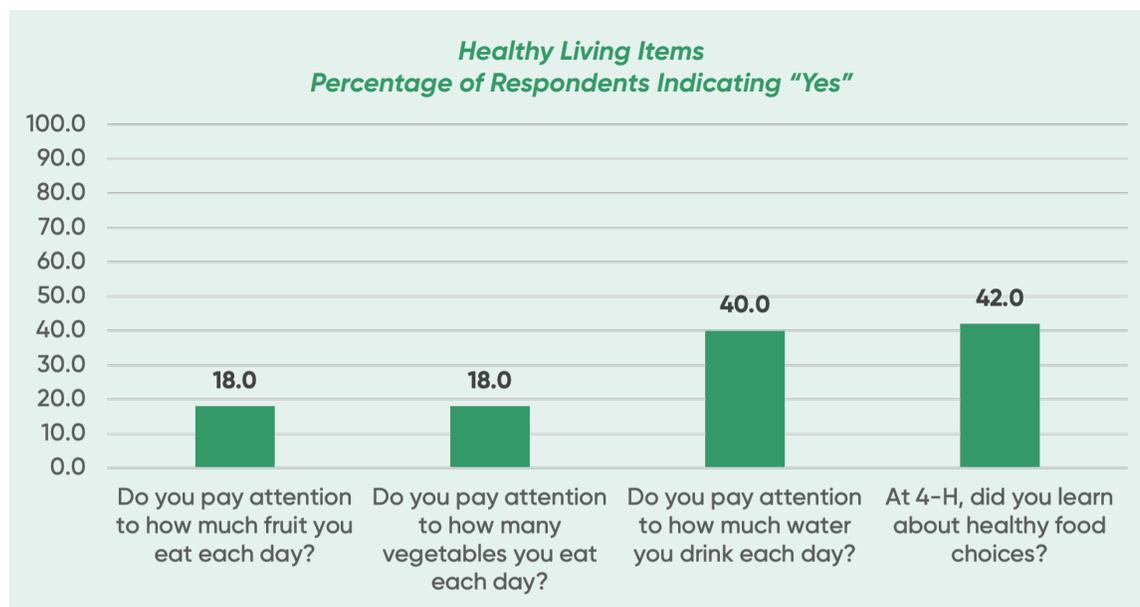
HEALTHY LIVING



Table 7c. Frequencies and Percentages of Responses: Healthy Living Common Measure Program Outcomes

Healthy Living	Yes	A Lot	Sort Of	Usually	A Little	Not Really	Not at All	No
Do you pay attention to how much fruit you eat each day?	388 18%	--	--	559 26%	--	882 40%	--	354 16%
Do you pay attention to how many vegetables you eat each day?	384 18%	--	--	554 25%	--	867 40%	--	378 17%
Do you pay attention to how much water you drink each day?	860 39%	--	--	638 29%	--	472 22%	--	210 10%
At 4-H, did you learn about healthy food choices?	911 42%	--	662 30%	--	--	--	--	604 28%

Figure 5c. Percentage of Respondents Indicating "Yes": Healthy Living Common Measure Program Outcomes



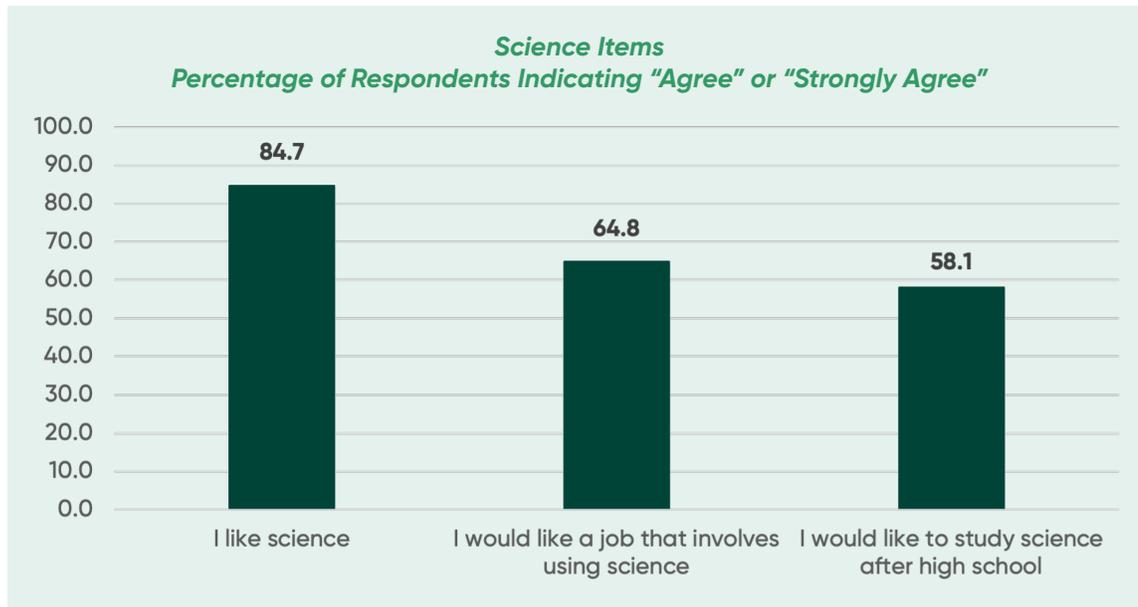
The majority of respondents indicated they learned about healthy food choices in 4-H. Learning about these food choices was positively associated with paying attention to eating fruit ($p = .220, p < .001$), paying attention to eating vegetables ($p = .210, p < .001$), and paying attention to how much water they drank daily ($p = .246, p < .001$). In summary, **respondents indicated their learning about eating healthier was associated with learning about healthy food choices at 4-H.**



Table 7d. Frequencies and Percentages of Responses: Science Common Measure Program Outcomes

Science	Yes	A Lot	Sort Of	Usually	A Little	Not Really	Not at All	No
At 4-H, did you talk about how science can be used to help solve everyday problems?	708 33%	--	785 36%	--	--	--	--	680 31%
	Strongly Agree	Agree	Disagree	Strongly Disagree				
I like science.*	753 30%	1,372 54.7%	310 12.4%	74 2.9%	--	--	--	--
I would like a job that involves using science.*	541 21.6%	1,093 43.2%	695 27%	179 7.1%	--	--	--	--
I would like to study science after high school.*	500 20%	953 38.1%	787 31.5%	262 10.5%	--	--	--	--

Figure 5d. Percentage of Respondents Indicating "Agree" or "Strongly Agree" for Science Program Outcomes



Approximately two-thirds of respondents reported talking about and learning more about science and using it to solve everyday problems at 4-H. This focus was positively associated with selecting a science career after high school ($p = .239, p < .001$).

Common Measures Outcomes Between Variables Correlational Analysis

As noted in Hawley et al. (2016), the common measures items utilized differing response categories both within and across the four common measures content areas (e.g., Yes, Usually, Not Really, No versus A lot, A little, Not at all). Because of the expected challenges related to the differing response categories, a non-parametric (i.e., non-maximum likelihood) approach was selected for analyses of relations between and across study variables where appropriate.

Because of the categorical nature of the common measure items, Spearman's rank-order correlations (ρ) (also known as Spearman's rho) were employed to assess the relations between the four selected Common Measure outcome areas, number of 4-H activities participated in, participant gender identity and participant racial identity (Cohen et al., 2003). The strength of relationships between variables were assessed utilizing the guidelines presented in Table 8a. Importantly, and as noted earlier, statistical significance is not important when paired with a weak effect size, especially with larger samples (Cohen et al., 2003).

Table 8a. Spearman Rank-Order Correlation Coefficient Effect Size Guide

Pearson r level	Relationship Strength
> .700	Very Strong Relationship
.400-.699	Strong Relationship
.300-.399	Moderate Relationship
.200-.299	Weak Relationship
.010-.199	No or negligible relationship

Note: Strength of relationship is bidirectional and applies to both negative and positive relations.

Additionally, three items from the science content area were measured on a 1 (Strongly Agree) to 4 (Strongly Disagree) scale. To enhance parsimony in reporting, a composite score of these three items was created (by summing the items and dividing by 3) which demonstrated acceptable levels of internal consistency ($\alpha = .885$).

As presented in Table 8b, the primacy of Spearman's correlations (i.e., ρ) were relatively weak or negligible across the 17 measured variables when correlated with variables outside of their construct area (e.g., healthy living items tended to have strong relationships with other healthy living items, but weak to negligible relations with other constructs). This was to be expected because the four Common Measures areas represent discreet aspects of 4-H program involvement.

There were, however, a few notable relationships present within the data set:

- There was a positive relationship between "how much 4-H inspired your volunteering" (i.e., civic engagement) and identifying colleges that would be a good fit ($\rho = .383, p < .001$), helping in decisions about college ($\rho = .430, p < .001$), identifying things they are good at ($\rho = .443, p < .001$), exploring future career options ($\rho = .416, p < .001$), and talking about science to solve everyday problems ($\rho = .351, p < .001$). **As respondents reported higher levels of volunteer inspiration, they also reported higher levels of college and career readiness and higher levels of using science to solve everyday problems.**
- Similarly, there was a positive weak relationship between "looking for ways to help with a problem in the community" and paying attention to how much water you drink ($\rho = .231, p < .001$), learning about healthy food choices ($\rho = .295, p < .001$) and a slightly greater positive moderate relationship between how much 4-H inspired your volunteering and learning about health food choices ($\rho = .381, p < .001$). **Higher rates of civic engagement were positively associated with healthy eating choices.**

- There were moderate positive relationships between the college and career readiness variables and learning about healthy food choices. Healthy food choices were associated with learning about colleges that might be a good fit ($\rho = .345, p < .001$), 4-H helping with decisions about college ($\rho = .349, p < .001$), identifying things you are good at ($\rho = .328, p < .001$) and exploring future career options ($\rho = .350, p < .001$). The college and career readiness variables were also positively associated with talking about science to solve everyday problems at a moderate level. **More specifically, talking about science was positively associated with learning about colleges that might be a good fit** ($\rho = .388, p < .001$), 4-H helping with decisions about college ($\rho = .358, p < .001$), identifying things you are good at ($\rho = .312, p < .001$) and exploring future career options ($\rho = .369, p < .001$). **Talking about science to solve everyday problems was also strongly associated with learning about healthy food choices** ($\rho = .492, p < .001$).
- Importantly, there were no statistically meaningful relations (i.e., greater than a weak/negligible level as demonstrated in Table 6) between respondent-reported gender (dummy coded), racial identity (dummy coded), number of reported 4-H projects participated in and any of the 4-H common measures. **Put differently, a respondent who identified as non-white was just as likely to report a “high” score on use of science as a respondent who identified as white.**

Table 8b.

Spearman's Rank Order Correlations of Common Measures Data and Respondent Demographics																		
Item	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	
1. Do you like helping people in your community?	--																	Civic Engagement
2. Have you ever led a community service project?	.254*	--																
3. When you learn about a problem in the community, do you look for ways to help?	.358*	.412*	--															
4. How much has 4-H inspired you to volunteer in your community?	.342*	.401*	.479*	--														
5. At 4-H, did you learn about colleges that might be a good fit for you?	.145*	.265*	.296*	.383*	--													College & Career Readiness
6. How much has 4-H helped you in your decisions about college?	.181*	.260*	.257*	.430*	.664*	--												
7. How much has 4-H helped you identify things that you are good at?	.193*	.251*	.252*	.443*	.393*	.483*	--											
8. How much has 4-H helped you explore future career options?	.157*	.244*	.271*	.416*	.524*	.589*	.541*	--										
9. Do you pay attention to how much fruit you eat each day?	.146*	.132*	.230*	.197*	.154*	.149*	.111*	.151*	--									Healthy Choices
10. Do you pay attention to how many vegetables you eat each day?	.146*	.133*	.236*	.188*	.159*	.156*	.121*	.161*	.873*	--								
11. Do you pay attention to how much water you drink each day?	.111*	.176*	.231*	.195*	.205*	.159*	.164*	.169*	.508*	.512*	--							
12. At 4-H, did you learn about healthy food choices?	.176*	.219*	.295*	.381*	.345*	.349*	.328*	.350*	.220*	.210*	.246*	--						
13. Did you talk about how science can be used to help solve everyday problems?	.169*	.225*	.277*	.351*	.388*	.358*	.312*	.369*	.183*	.172*	.185*	.492*	--					Science
14. Composite of Science Items (See Table 7)	.149*	.152*	.166*	.142*	.115*	.129*	.136*	.127*	.160*	.171*	.115*	.091*	.239*	--				
15. Total number of 4-H Activities Participated In	-.085*	-.265*	-.160*	-.218*	-.127*	-.165*	-.199*	-.135*	.082*	.088*	-.084*	-.275*	-.243*	-.078*	--			
16. Respondent Report Gender** 0 = Male; 1 = Female	-.072*	-.075*	-.070 (.001)	-.092*	-.023 (.292)	-.054 (.014)	-.105*	-.083*	-.145*	-.150*	-.151*	-.039 (.074)	.052 (.018)	-.036 (.097)	-.063 (.004)	--		
17. Dummy Coded Participant** Race (0 = White; 1 = Non-White)	-.011 (.624)	.031 (.147)	-.056 (.010)	-.080*	-.069 (.001)	-.045 (.040)	-.033 (.134)	-.047 (.030)	-.081*	-.075*	-.067 (.002)	-.100*	-.057 (.009)	-.005 (.826)	-.063 (.004)	-.016 (.463)	--	

Note: Exact p-values provided in parentheses below correlation if $p > .001$, other * indicates $p < .001$. **indicates the variable is dummy coded.

Impact of 4-H Participation on Positive Youth Development

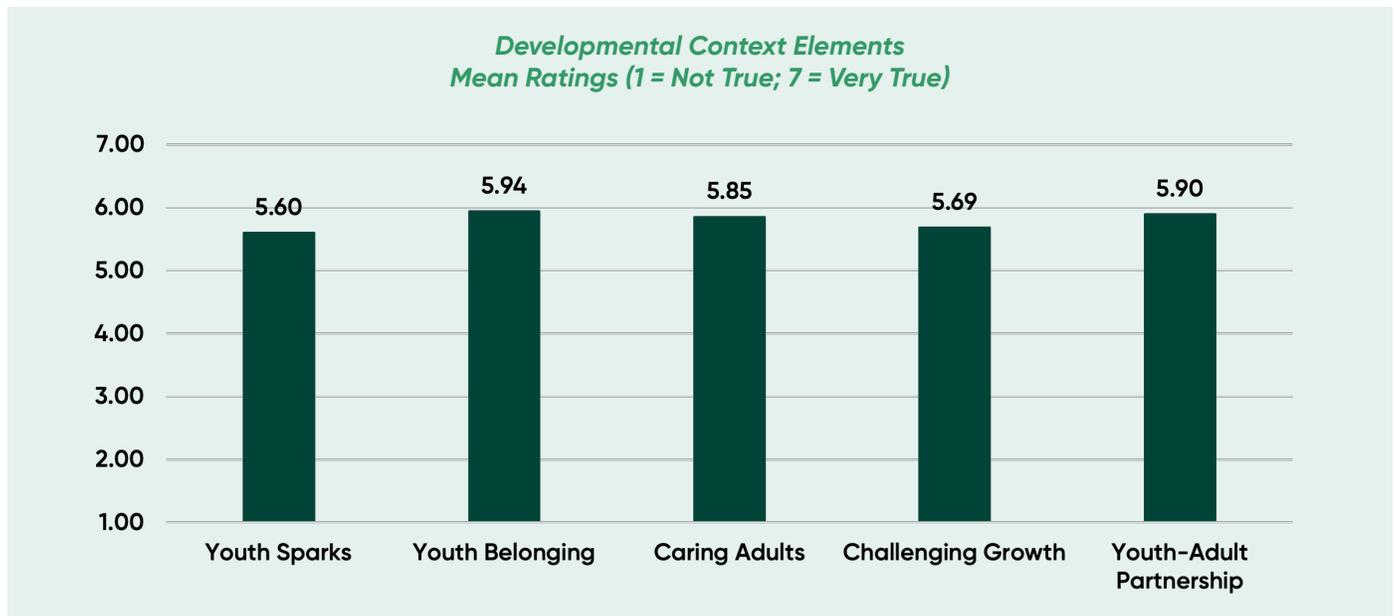
DEVELOPMENTAL CONTEXT



The 4-H Thriving Model shows how 4-H programs can provide a developmental context that leads to positive youth development outcomes. The developmental context is based on a combination of youth having the opportunity to explore their spark and experience a sense of belonging along with building positive developmental relationships with adults and their peers in 4-H. In the 4-H Thriving Model developmental relationships are marked by adults who care, challenge growth and share power through youth-adult partnerships.

Youth respondents reported high levels across each measure of developmental context (mean scores between 4.9 and 6.1), indicating that on average youth are experiencing high-quality positive youth development program settings in 4-H.

Figure 9. Mean Ratings of Developmental Context Elements



Respondents who scored higher on developmental context tended to also report greater levels of inspiration to serve their communities ($p = .433, p < .001$), better identification of their strengths ($p = .446, p < .001$) and better understanding of future career options ($p = .413, p < .001$).

In addition, a higher-quality developmental context was positively associated with greater levels of learning about healthy food choices ($p = .303, p < .001$) and the utilization of science to solve everyday problems ($p = .316, p < .001$).

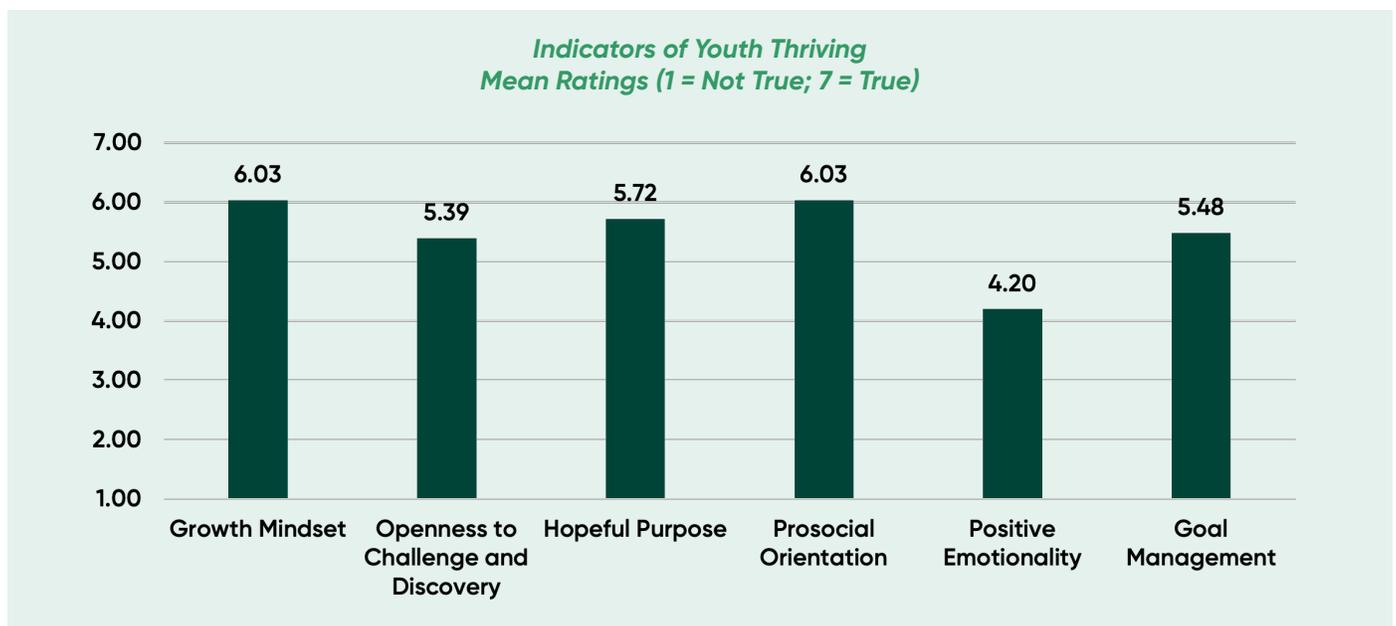


The seven indicators of youth thriving articulated in the 4-H Thriving Model represent the research-based social, emotional, cognitive and behavioral skills, along with the positive habits of mind, that mark movement on a positive trajectory toward adulthood. These seven indicators are:

1. openness to challenge and discovery;
2. growth mindset;
3. prosocial awareness;
4. hopeful purpose;
5. transcendent awareness;
6. positive emotionality; and
7. intentional self-regulation through goal setting and management.

Youth respondents reported high levels across each measure of thriving (mean scores between 4.9 and 6.1), indicating that on average **youth are experiencing high-quality, positive youth development program settings in 4-H**. It is worth noting that the score for positive emotionality is lower than the others. **At 4.9 this score is still considered in the high range, but given its variation from the other indicators, could reflect the ongoing mental health concerns of young people.**

Figure 10. Mean Ratings of Thriving Indicators



When a young person thrives because of their 4-H experience, they are more open to challenges, more curious, higher in emotional intelligence, are focused on self-improvement and are goal-oriented. Youth who reported higher levels of thriving also reported **greater levels of civic engagement**, more specifically youth reported **greater levels of helping in their community** ($\rho = .338, p < .001$), **looking for ways to help with problems in their community** ($\rho = .353, p < .001$) and greater levels of **inspiration to volunteer in their community** ($\rho = .332, p < .001$). Additionally, greater levels of reported youth thriving were associated with youth reporting that 4-H helped them identify things they are good at ($\rho = .281, p < .001$).

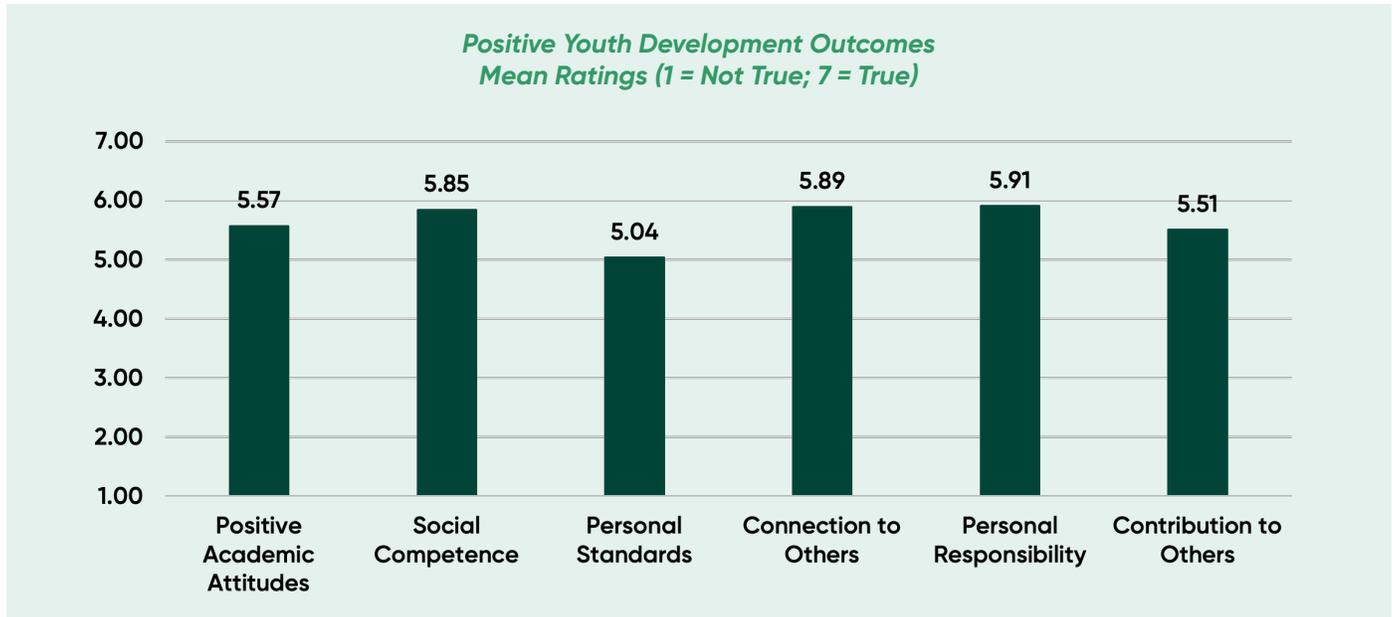
POSITIVE YOUTH DEVELOPMENTAL OUTCOMES



Youth participation in 4-H programs that provide a high-quality developmental setting and opportunities to build thriving indicators result in key positive youth development outcomes. These outcomes include positive attitudes toward academic performance, social competence, high personal standards, a connection to others (peers, adults and their community), a sense of personal responsibility and dedication to contributing to others and community.

Youth respondents reported high levels of attainment for all PYD outcomes (mean scores between 4.9 and 6.1), indicating that on average **youth are achieving important developmental outcomes through participation in 4-H.**

Figure 11. Mean Ratings of Developmental Outcomes



Respondents who scored higher on developmental outcomes also tended to report higher levels of civic engagement. Specifically, respondent scores on developmental outcomes were positively associated with greater levels of **helping people in their community** ($\rho = .407, p < .001$), **leading community service projects** ($\rho = .312, p < .001$), looking for ways to help with problems in their community ($\rho = .399, p < .001$) and feeling more inspired by 4-H to volunteer in their community ($\rho = .417, p < .001$). Put simply, there is a moderate to strong association with youth achieving the developmental outcomes associated with 4-H participation [e.g., positive attitudes toward academic performance, a connection to others (peers, adults and their community), a sense of personal responsibility and an enhanced level of social and emotional competence] also reported greater levels of civic engagement.

Relationship Between Common Measures and Youth Thriving

The potential associations between 4-H program outcomes as measured by the four Common Measures instruments and the three dimensions of the youth thriving model were also examined. As illustrated in Table 12, there were a variety of weak, moderate and strong relations present.

Table 12. Spearman's Rank Order Correlations of Youth Thriving Dimensions, Common Measures Data and Respondent Demographics

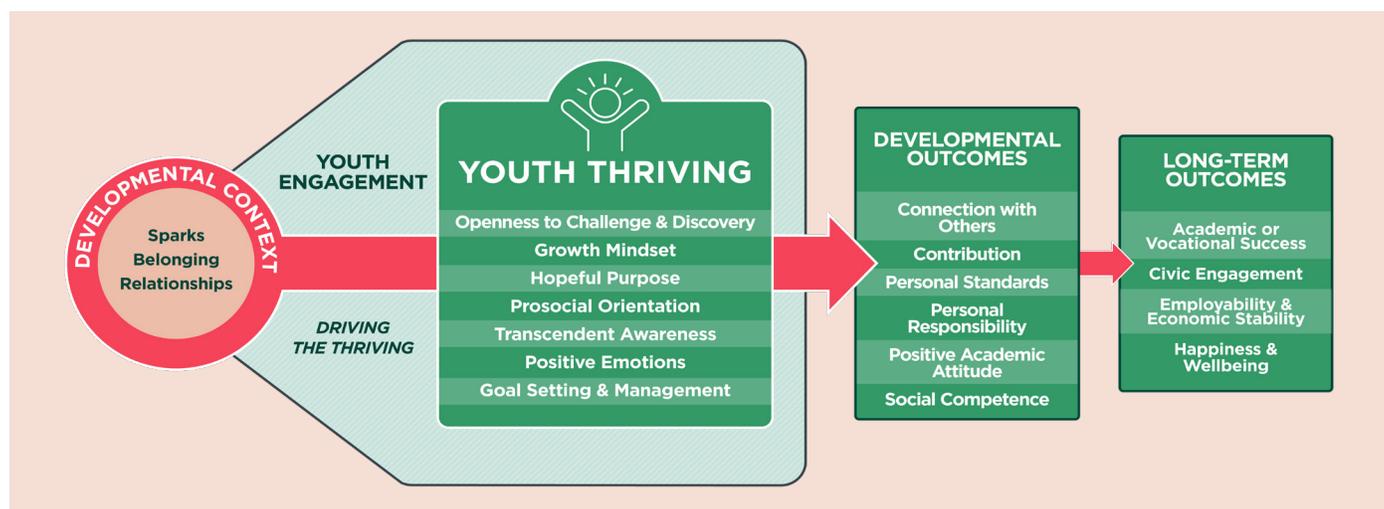
Common Measures Domain	Common Measures Item	Developmental Context	Developmental Outcomes	Youth Thriving
Civic Engagement	1. Do you like helping people in your community?	.287*	.407*	.338*
	2. Have you ever led a community service project?	.226*	.312*	.245*
	3. When you learn about a problem in the community, do you look for ways to help?	.279*	.399*	.353*
	4. How much has 4-H inspired you to volunteer in your community?	.433*	.417*	.332*
College and Career Readiness	5. At 4-H, did you learn about colleges that might be a good fit for you?	.301*	.230*	.226*
	6. How much has 4-H helped you in your decisions about college?	.364*	.272*	.256*
	7. How much has 4-H helped you identify things that you are good at?	.446*	.292*	.281*
	8. How much has 4-H helped you explore future career options?	.413*	.263*	.274*
Healthy Living	9. Do you pay attention to how much fruit you eat each day?	.105*	.236*	.216*
	10. Do you pay attention to how many vegetables you eat each day?	.108*	.248*	.238*
	11. Do you pay attention to how much water you drink each day?	.134*	.261*	.259*
	12. At 4-H, did you learn about healthy food choices?	.303*	.245*	.212*
Science	13. At 4-H, did you talk about how science can be used to help solve everyday problems?	.316*	.222*	.205*
	14. Composite of Science Items (See Table 7)	.108*	.227*	.208*
n/a	15. Total number of 4-H Activities Participated In	-.123*	-.141*	-.084*
n/a	16. Respondent-Reported Gender** (0 = Male; 1 = Female)	-.055 (.011)	-.146*	-.098*
n/a	17. Dummy Coded Participant** Race (0 = White; 1 = Non-White)	0.013 (.551)	-0.026 (.221)	-0.001 (.957)

*Note: Exact p-values provided in parentheses below correlation if $p > .001$, other * indicates $p < .001$. **indicates the variable is dummy coded; The Thriving Items were reverse coded (only) for this analysis to be on the same "scaling" as the common measures' items.*

Replication of the 4-H Thriving Model

The 4-H Thriving Model (Arnold, 2018) advanced the measurement of the impact of 4-H by identifying the processes through which 4-H contributes to the positive development of youth. As shown in Figure 6, The 4-H Thriving Model outlines the connection between participation in high-quality 4-H programs (the developmental context), the effect of that participation on youth thriving and how thriving youth, in turn, achieve key developmental outcomes, setting them up to achieve longer-term outcomes in adulthood. The model has been successfully tested and established as the model that shows how 4-H contributes to the positive development of youth (Arnold & Gagnon, 2019).

Figure 6. The 4-H Thriving Model



The 2022 National Index Study included measurement of the 4-H Thriving Model components consisting of:

- **Developmental Context Items** – that measure the quality of the 4-H program setting, and include the elements of youth sparks, belonging and developmental relationships. Developmental relationships are measured based on youth experiences with adults that express care, challenge growth and share power through positive youth-adult partnerships.
- **Indicators of Youth Thriving Items** – that measure the research-based social, emotional, cognitive and behavioral skills, along with the positive habits of mind, that indicate movement on a positive trajectory toward adulthood. These seven indicators are:
 1. openness to challenge and discovery;
 2. growth mindset;
 3. prosocial awareness;
 4. hopeful purpose;
 5. transcendent awareness;
 6. positive emotionality; and
 7. intentional self-regulation through goal setting and management.

- **Positive Youth Development Outcomes Items** – that measure positive attitudes toward academic performance, social competence, high personal standards, a connection to others (peers, adults and their community), a sense of personal responsibility and dedication to contributing to others and community.

Each item is measured on a 1-7 scale with "1" indicating the item was not true and "7" indicating the item was very true.

Using this measurement provided the opportunity to replicate the model's structure on a larger, multi-state data set, and to explore the potential associations between 4-H program outcomes and positive youth development for the first time. Data from the National Index Study allowed us to test the model's structure and psychometric properties on a larger, more representative sample and see if the structural model and mediational processes found by Arnold and Gagnon (2019) occur in a larger, more representative sample.

Planned Missing Data Design

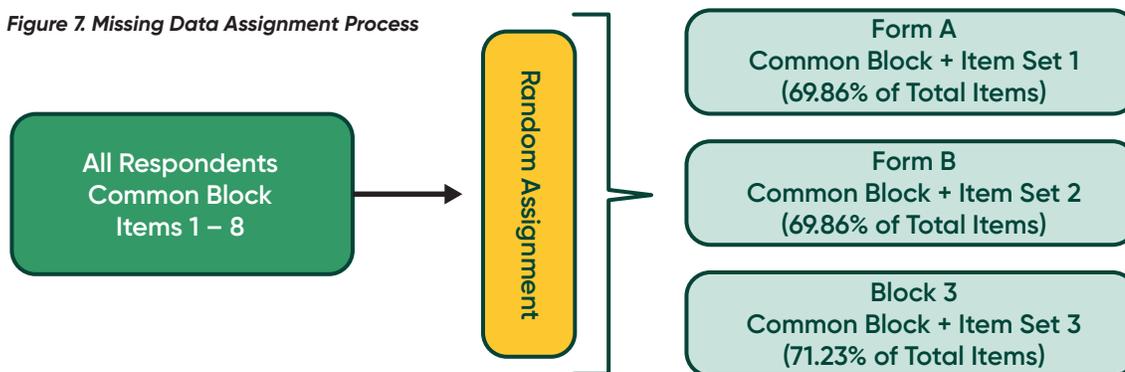
The thriving model was designed to reflect the deep complexity of the processes that inform developmental contexts, developmental outcomes and youth thriving. Correspondingly, the measurement instrument is relatively lengthy with 73 items. To reduce the potential fatigue respondents may encounter with such a lengthy scale, a planned missing data design was employed. In brief, a planned missing data design randomly assigns respondents to a condition where they complete an abbreviated version of a questionnaire. As illustrated in Table 9 and Figure 7, the respondents receive a set of common items, and then are randomly assigned to one of three conditions. This randomization process facilitates the missing data to be missing completely at random (MCAR), which indicates the data are not missing due to a measured participant characteristic. Further, the MCAR conditioning of the data allows for contemporary missing data management techniques. Specifically, in a planned missing data design, the missing data points are then estimated and/or imputed utilizing a technique such as multiple imputation (MI), expectation maximization (EM), or in the case of the present study, Full Information Maximum Likelihood (FIML). With a FIML technique, all available points of data are employed to estimate a respondent's missing values (thus the "Full" in Full Information Maximum Likelihood). The items associated with the three specific missing data conditions are presented in Table 9.

Table 9. Planned Missingness Design

	Common Items (8-Items) + (Item Set 1, 2 or 3)	Item Set 1 (43-Items)*	Item Set 2 (43-Items)*	Item Set 3 (44-Items)*
Form A	X	X	X	•
Form B	X	•	X	X
Form C	X	X	•	X

*Note: All respondents received common items; X indicates respondent received item; • indicates planned missing data; * is total number of items in set excluding common items.*

Figure 7. Missing Data Assignment Process



Data Diagnostics and Analytic Plan

As the framework used to test the measurement properties of the scale and study hypotheses assumes multivariate normality, the data were screened for multivariate normality utilizing the MissMech package (version 1.0.2; Jamshidian et al., 2014). This analysis indicated the data were multivariate non-normal (Hawkins's test $p < .001$; Anderson Darling k -sample test, $p = .035$). Because of this, robust estimation techniques were employed to adjust for the violation of normality necessary for maximum likelihood (ML) analyses. Specifically, maximum likelihood estimation with robust (i.e., MLR) standard errors were utilized as they reduce potential Type 1 error and/or misinterpretation of model fit and parameter estimates (Du & Bentler, 2022). The data were then screened for multivariate outliers utilizing a combination of Mahalanobis distance and the chi square distribution. This analysis suggested 102 respondents were significantly ($p < .001$) non-normal. As such, two models were produced for both the measurement and hypotheses testing, one with and one without the outliers in the data set. Comparison of model fits with the two data sets did not indicate statistically meaningful differences across the model fit indices. As such the outliers were retained.

The measurement properties and hypotheses were tested through confirmatory factor analysis (CFA) and structural equation modeling (SEM) utilizing the lavaan package (version 0.6-12; Rosseel, 2012) and the semTools package (version 0.5-6, Jorgensen et al., 2022) in R (version 4.2.2). The acceptability of model fit for both the CFA and SEM were examined utilizing a robust version of the Root Mean Squared Error of Approximation (RMSEA), where values closer to zero indicate a model fit that reflects the properties of the data (e.g., RMSEA $< .070$). Similarly, the standardized root mean square residual (SRMR) was utilized, which assesses the differences between observed correlations and hypothesized/predicted correlations, and values closer to zero also indicate better model fit (e.g., SRMR $< .100$) (Kline, 2016). Additionally, the Tucker Lewis Index (TLI) and Comparative Fit Index (CFI) were employed, as they assess the degree to which the specified model is an improvement over a null/non-specified model. In both the TLI and CFI, scores closer to one are preferable (e.g., TLI $> .900$) (Loehlin & Beaujean, 2017). Model fit criteria were not assessed on arbitrary fixed cutoff scores (e.g., RMSEA = $.071$ is unacceptable versus RMSEA = $.069$ is acceptable), rather they were assessed based upon the model complexity and past model performance (Chen et al., 2008).

In addition to model fit, the measurement model was also examined for convergent and discriminant validity. Within the tests of convergent validity, the factor loadings were assessed (e.g., the degree to which the theorized factor reflects the specified items), where scores closer to one suggest a stronger predictive influence of the factor on the item, and lower scores (i.e., $\lambda < .400$) suggest the item may need to be respecified within the measurement model. The convergent validity was also assessed by employing the McDonald's omega (ω), a measure of internal consistency that performs better than Cronbach's Alpha (i.e., α), as it does not have the generally unmet threshold of tau equivalence informing a (Hayes & Coutts, 2020). Additionally, the Average Variance Extracted (AVE) levels were examined to ensure the factors were accounting for more variance than error (i.e., AVE $> .500$). The discriminant validity of the scales was also examined to ensure the scales were reflecting distinct constructs. The between factor correlations were examined, where lower values indicate the factors are accounting for unique variance (i.e., $r < .700$). Specifically, the square root of the AVE was examined to ensure the variables were accounting for more unique variance than sharing with other factors in the model ($\sqrt{\text{AVE}} \geq r$). Similarly, the heterotrait-monotrait ratio of correlations (HTMT) was examined, where values less than one indicate discriminant validity (i.e., HTMT ratio < 1.00) (Henseler et al., 2015).

4-H Thriving Model Confirmatory Factor Analyses

Paralleling the process identified in Arnold and Gagnon (2019) the psychometric properties of the 73-item, 22-factor scale were examined through confirmatory factor analysis with supporting statistics. **The results indicated acceptable model fit:** $\chi^2(2533) = 7198.449, p < .001, TLI = .912, CFI = .915, RMSEA = .029$ (90%, CI .028 to .030), SRMR = .056. As illustrated in Table 11, all factors demonstrated acceptable levels of internal consistency, with ω ranging from .714 to .950 across the 22 factors. Similar evidence of acceptable item loadings was identified across all items/factors with loadings ranging from .575 to .962. Similarly, the AVE values for the three primary factors all exceeded .500 (Developmental Context AVE = .698; Developmental Outcomes AVE = .618; Youth Thriving AVE = .636), which indicates the factors explain more variance than error. To assess levels of discriminant validity, the \sqrt{AVE} levels and between factor correlations were examined for the three primary factors. As shown in Table 10, there is relatively mixed evidence for the discriminant validity of the three-factor model, specifically relating to the high correlation between developmental outcomes and youth thriving ($r = .923, p < .001$), a similarly high HTMT ratio, but below one, (HTMT ratio = .924), and neither the \sqrt{AVE} of developmental outcomes ($\sqrt{AVE} = .786$) or youth thriving ($\sqrt{AVE} = .797$) exceeded the between factor correlation. However, given the prior evidence of a high correlation between these factors (Arnold & Gagnon, 2019) and the otherwise acceptable psychometric properties of the measures, the hypothesized model was retained, and the proposed mediational model was examined through SEM.

Table 10. Tests of Discriminant Validity

	AVE	\sqrt{AVE}	HTMT Ratio	Between Factor Correlations		
				F1	F2	F3
F1. Developmental Context	0.698	0.835	F1:F2 (.609)	--		
F2. Developmental Outcomes	0.618	0.786	F1:F3 (.582)	.607 [.686]	--	
F3. Youth Thriving	0.636	0.797	F2:F3 (.924)	.547 [.506]	.923 [.781]	--

**Note: AVE is Average Variance Extracted; \sqrt{AVE} is the square root of AVE; Correlations between F1, F2, and F3 all $p < .001$; [Square Bracketed Values] are correlation values from Arnold and Gagnon (2019). HTMT is the ratio of heterotrait-monotrait correlations between factors.*

Table 11. Descriptive Data from Confirmatory Factor Analyses

Factor/Item	M (SD)	ω	λ
Developmental Context** (Blended 2nd and 3rd Order Factor)		.782	
Developmental Relationships*			.815
Youth Belonging			.950
Youth Sparks			.727
Developmental Relationships*		.939	
Caring Adults			.949
Challenging Growth			.962
Youth-Adult Partnerships			.933
Youth Sparks		.906	
4-H gives me the opportunity to explore something I really care about. ^{ABC}	5.74 (1.454)		.801
I am passionate about the things I do in 4-H. ^{ABC}	5.87 (1.403)		.896
I want to learn all I can about the topic of my 4-H program. ^{ABC}	5.47 (1.543)		.827
4-H is an important part of who I am. ^{ABC}	5.40 (1.724)		.822
Youth Belonging		.922	
I feel welcome in this 4-H program. ^{ABC}	6.01 (1.430)		.882
I feel safe in this 4-H program. ^{ABC}	6.40 (1.091)		.780
I feel supported by other kids in 4-H. ^{ABC}	5.73 (1.529)		.860
I feel like I matter in 4-H. ^{ABC}	5.72 (1.603)		.913
Caring Adults		.946	
At 4-H adults pay attention to me. ^{BC}	5.94 (1.412)		.904
At 4-H adults like me. ^{AC}	6.05 (1.321)		.851
At 4-H adults invest time in me. ^{AB}	5.87 (1.457)		.941
At 4-H adults show an interest in me. ^{BC}	5.89 (1.441)		.954
Challenging Growth		.920	
At 4-H adults help me see future possibilities for myself. ^{AC}	5.55 (1.644)		.876
At 4-H adults expect me to do something positive with my future. ^{AB}	6.08 (1.380)		.873
At 4-H adults stretch me and push me in new ways. ^{BC}	5.65 (1.624)		.889
At 4-H adults hold me accountable. ^{AC}	5.89 (1.444)		.801
Youth-Adult Partnerships		.950	
At 4-H adults listen to my ideas. ^{AB}	5.72 (1.534)		.902
At 4-H adults treat me fairly. ^{BC}	6.07 (1.395)		.919
At 4-H adults take me seriously. ^{AC}	5.96 (1.400)		.923
At 4-H adults respect me. ^{AB}	6.14 (1.310)		.899

Note: * indicates 2nd Order Factor; ** indicates 3rd Order Factor; λ indicates factor loading; ω indicates Composite Reliability (i.e., Omega); Within 2nd and 3rd order factors, 1st and 2nd order factors act as "items." A, B and C superscript indicate missing data condition.

Table 11. Descriptive Data from Confirmatory Factor Analyses (Continued)

Factor/Item	M (SD)	ω	λ
Developmental Outcomes**		.863	
Positive Academic Attitudes			.661
Social Competence			.762
Personal Standards			.878
Connection to Others			.811
Personal Responsibility			.788
Contribution to Others			.801
Positive Academic Attitudes		.900	
I think the things I learn in school are useful. ^{BC}	5.29 (1.451)		.697
Being a student is one of the most important parts of who I am. ^{AC}	5.17 (1.620)		.732
I want to learn as much as I can at school. ^{AB}	5.58 (1.458)		.862
I think it is important to earn good grades. ^{BC}	6.13 (1.238)		.791
I think a lot about how to do well in school. ^{AC}	5.71 (1.528)		.864
School is very important for later success. ^{AB}	6.04 (1.309)		.804
Social Competence		.868	
I get along well with people who are different than me. ^{BC}	5.88 (1.247)		.714
I listen to the opinions of others. ^{AC}	5.85 (1.154)		.798
I control my anger when I have a disagreement with someone. ^{AB}	5.66 (1.267)		.679
I follow the rules when I am in a public setting. ^{BC}	6.41 (.934)		.677
I respect the views of others, even if I disagree. ^{AC}	5.92 (1.130)		.778
Personal Standards		.867	
It is important for me to do the right thing. ^{AB}	6.52 (.816)		.781
It is important for me to be a role model for others. ^{BC}	6.16 (1.170)		.834
It is important for me to do my best. ^{AC}	6.50 (.848)		.830
It is important that others can count on me. ^{AB}	6.43 (.935)		.807
Connection to Others		.843	
I have people in my life to whom I look up and admire. ^{BC}	6.39 (1.066)		.676
I think it is important to be involved with other people. ^{AC}	6.09 (1.198)		.837
Having friends is important to me. ^{AB}	6.15 (1.244)		.691
I feel connected to my friends. ^{BC}	5.98 (1.281)		.706
I feel connected to others in my community. ^{AC}	5.39 (1.478)		.734
Personal Responsibility		.876	
I take responsibility for my actions. ^{AB}	6.17 (1.010)		.769
I can be counted on to follow through on things I say I will do. ^{BC}	6.11 (1.069)		.841
I am a responsible person. ^{AC}	6.18 (1.041)		.839
I do the things I promise to do without being reminded. ^{AB}	5.51 (1.266)		.754

Note: * indicates 2nd Order Factor; ** indicates 3rd Order Factor; λ indicates factor loading; ω indicates Composite Reliability (i.e., Omega); Within 2nd and 3rd order factors, 1st and 2nd order factors act as "items." A, B and C superscript indicate missing data condition.

Table 11. Descriptive Data from Confirmatory Factor Analyses (Continued)

Factor/Item	M (SD)	ω	λ
Contribution to Others		.911	
I volunteer in my community. ^{BC}	5.45 (1.630)		.761
Giving back to my community is important to me. ^{AC}	5.56 (1.412)		.916
It is important for me to contribute my time to help others. ^{AB}	5.69 (1.318)		.899
I have things that I can contribute for the well-being of others. ^{BC}	5.76 (1.299)		.839
Youth Thriving**		.810	
Hopeful Purpose			.794
Prosocial Orientation			.835
Positive Emotionality			.694
Challenge & Discovery			.861
Goal Management			.794
Challenge & Discovery*		.714	
Growth Mindset			.764
Openness to Challenge & Discovery			.805
Growth Mindset		.886	
No matter how intelligent I am, I can always improve my level of intelligence. ^{AC}	6.24 (1.195)		.834
I can get smarter by working hard at learning. ^{AB}	6.16 (1.245)		.884
If I keep working at something I will get better at it. ^{BC}	6.29 (1.094)		.834
It is possible to change how smart I am. ^{AC}	6.01 (1.387)		.768
Openness to Challenge and Discovery		.921	
I like to try new things. ^{AB}	5.69 (1.335)		.880
I am not afraid of trying new things, even if they seem hard. ^{BC}	5.44 (1.487)		.810
I like to be challenged by new things. ^{AC}	5.64 (1.425)		.907
I like to try new things, even if I am not very good at them at first. ^{AB}	5.29 (1.485)		.850
Hopeful Purpose		.898	
I am excited about my future. ^{BC}	5.98 (1.346)		.832
I trust my future will turn out well. ^{AC}	5.90 (1.338)		.823
My life will make a difference in the world. ^{AB}	5.56 (1.530)		.843
I am doing things now that will help me achieve my purpose in the world. ^{BC}	5.95 (1.298)		.834
Prosocial Orientation		.897	
It is important for me to understand how other people feel. ^{AC}	5.84 (1.269)		.769
I am happy when others succeed. ^{AB}	6.17 (1.063)		.844
I care about how my decisions affect other people. ^{BC}	6.02 (1.185)		.829
I can be counted on to help if someone needs me. ^{AC}	6.36 (.946)		.733
I care about the feelings of my friends. ^{AB}	6.43 (.941)		.777

Note: * indicates 2nd Order Factor; ** indicates 3rd Order Factor; λ indicates factor loading; ω indicates Composite Reliability (i.e., Omega); Within 2nd and 3rd order factors, 1st and 2nd order factors act as "items." A, B and C superscript indicate missing data condition.

Table 11. Descriptive Data from Confirmatory Factor Analyses (Continued)

Factor/Item	M (SD)	ω	λ
Positive Emotionality		.866	
When I want to feel a more positive emotion, I change the way I am thinking about a situation. ^{BC}	5.27 (1.466)		.874
I control emotions by changing the way I think about the situation I am in. ^{AC}	5.19 (1.442)		.911
When something upsets me, I try to express how I am feeling rather than pretend I am not upset. ^{AB}	4.48 (1.791)		.575
When I want to feel fewer negative emotions, I change the way I am thinking about the situation. ^{AC}	4.99 (1.557)		.873
Goal Management		.878	
I develop step-by-step plans to reach my goals. ^{AC}	5.07 (1.603)		.730
If I set goals, I take action to reach them. ^{AB}	5.65 (1.335)		.883
It is important for me that I reach my goals. ^{BC}	6.08 (1.205)		.853
I know how to make my plans happen. ^{AC}	5.53 (1.393)		.802

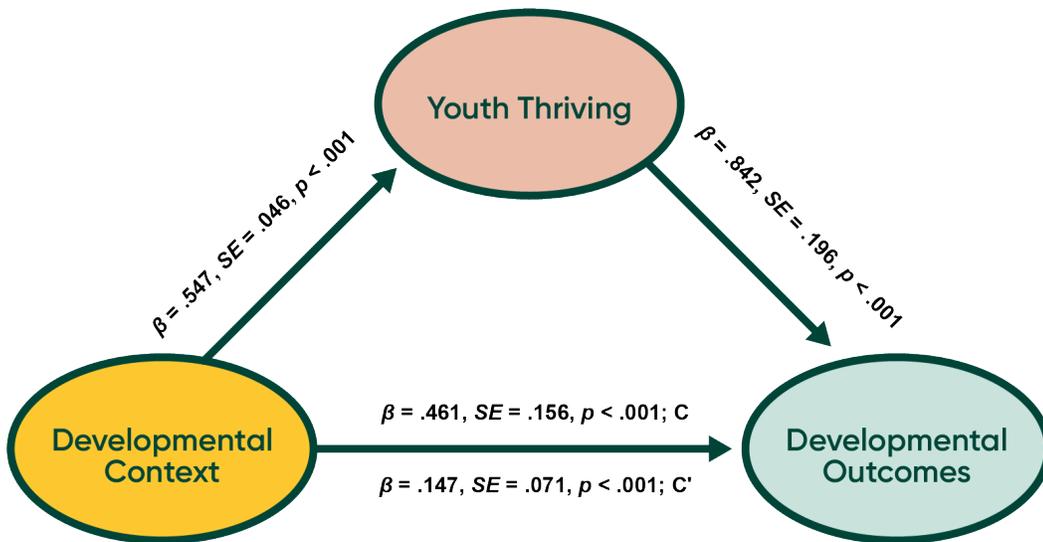
Note: * indicates 2nd Order Factor; ** indicates 3rd Order Factor; λ indicates factor loading; ω indicates Composite Reliability (i.e., Omega); Within 2nd and 3rd order factors, 1st and 2nd order factors act as "items." A, B, and C superscript indicate missing data condition.

Testing the 4-H Thriving Model Structure

The SEM results indicated acceptable model fit: $\chi^2(2533) = 7198.449, p < .001, TLI = .912, CFI = .915, RMSEA = .029$ (90%, CI .028 to .030), SRMR = .056. Notably, the model fit(s) were identical to those reported in the CFA results. This replication is due to the measurement and structural models having the same number of parameters.

As illustrated in Figure 5, every one-unit increase in developmental context was associated with a .547 ($SE = .046, p < .001$) unit increase in youth thriving, and youth thriving was a significant predictor of developmental outcomes ($\beta = .842, SE = .196, p < .001$). The indirect effect of developmental context on developmental outcomes through youth thriving was significant ($B = 1.261, \beta = .461, SE = .156, p < .001$). Put differently, for a one-unit increase in developmental context, we predict a .461-unit increase in developmental outcomes through the mediating variable youth thriving. The direct effect of developmental context on developmental outcomes was also statistically significant ($B = .401, \beta = .147, SE = .071, p < .001$), due to the direct effects of developmental context (effects that are not mediated by youth thriving). The Sobel test for the indirect effect was statistically significant ($z = 8.089, SE = .155, p < .001$); therefore, it was concluded that a partial mediation occurred between developmental context on developmental outcomes via youth thriving. Youth thriving partially mediates the relation between developmental context and developmental outcomes. This result provides additional support for the findings of Arnold and Gagnon (2019), indicating that youth thriving mediates the relationship between developmental context and developmental outcomes.

Figure 8. Mediating Effect of Youth Thriving



Note: First and Second Order Factors, Items excluded for parsimony of presentation. See Table 11 for a comprehensive list of factors and items.

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APPENDIX A

Data Screening and Processing

Prior to examination of the research questions, the data were examined for non-normality, outliers, missingness and eligibility. This examination indicated evidence of respondent nondifferentiation in the form of straight-lining. Specifically, *"nondifferentiation (sometimes called "straight-lining") occurs when respondents fail to differentiate between the items with their answers by giving identical (or nearly identical) responses to all items..."* (Yan, 2008, p. 521). Put differently, the preliminary examination of the data set suggested there was straight-lining across responses to items within the questionnaire. The lack of variance across respondent data could harm the overall conclusions realized from the analyses; as such the data were screened for straight-lining by comparing their level of variance in response to the questionnaire to past evidence of variance based upon the work of Kim et al. (2019) and Yan (2008). Specifically, standard deviation (*SD*) scores were created for all respondents, where a score of zero indicated no variance across the 104 items (e.g., a participant scoring zero selected only 4 on a 1-5 scale across all potential items).

Three potential criteria were considered in determining what level of straight-lining was acceptable for exclusion from study analyses. First, based upon values within the data set if a participant's *SD* was zero then they could be removed ($n = 271$; 10.8% of potential sample). However, this more liberal approach would allow for a respondent who selected only "4" for 103 of 104 items but selected "3" for 1 of 104 items to remain in the data set. As such, prior research utilizing the thriving scale (i.e., Arnold & Gagnon, 2019) was considered for respondent exclusion. Specifically, utilizing a more moderate approach, the smallest item level *SD* from the 2019 study ($SD = .308$) resulted in the exclusion of 341 respondents (13.5% of potential sample). Third, the low end of the 95% confidence interval *SD* from the 2019 study [95% CI (.667, .764)] was also considered. This more conservative approach would lead to the exclusion of 711 respondents (28.1% of potential sample). Given the need to balance precision in study estimates and retaining a sufficient sample for adequately powered analyses, the moderate approach was selected (i.e., those respondents with an overall $SD < .308$ excluded), leading to a sample of 2,185 respondents.

The data were then screened for multivariate outliers utilizing a combination of Mahalanobis distance and the chi square distribution function. This approach was selected as it determines if a respondent is an outlier based upon their responses to all items within a questionnaire, including those of a categorical or continuous nature. The screening for multivariate outliers suggested 102 respondents were significantly ($p < .001$) non-normal. As such, two data sets were produced, one with and one without outliers. Comparison of model fits, parameter estimates and descriptive statistics with the two data sets did not indicate statistically meaningful differences across the two approaches in study results. Importantly, outlier screening in larger data sets with higher rates of variables can require a more extreme cutoff criteria (e.g., $p < .00001$) (Cohen et al., 2003; Dashdondov & Kim, 2021). As such the outliers were retained within the data set for proceeding analyses.

The data were screened for missingness, to determine rates of unresponsiveness (i.e., skipped questions and/or incomplete questionnaires). For demographic reporting (e.g., gender identity) skipped/missed responses were omitted. However, for relationship testing (e.g., the mediating influence of youth thriving), missing responses were simulated utilizing a Full Information Maximum Likelihood (FIML) approach (described in more detail in the following youth thriving section). Finally, the data were screened for individual state level descriptive reporting. Specifically, to be eligible for state level descriptive reporting, the state needed a minimum sample of at least 100 responses. However, data from states that did not meet this threshold (see Table 1) were included in national level reporting.