

How Do 4-H Leaders Think the Program Contributes to Youth Purpose?

Insights from Machine Learning



PRYDE

Program for Research
on Youth Development
and Engagement

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INTRODUCTION

Positive Youth Development (PYD) is a cornerstone of 4-H programming.¹ With its wide variety of activities and focus on helping youth build relationships with others and the community, 4-H supports youth in becoming the best version of themselves that they can be. Recognized within the PYD framework endorsed by 4-H is a collection of inter- and intrapersonal strengths thought to contribute to adolescent flourishing called **developmental assets**.²⁻⁴ Developmental assets help youth navigate their world in more successful ways. Though many developmental assets lend themselves to achieving the PYD goals of 4-H, having a sense of **purpose in life**⁵ might be particularly relevant for helping youth reap the benefits of program enrollment. With this in mind, we have been interested in exploring the ways 4-H promotes youth purpose. As a first step in this research, the goal of this study was to map how those on the front lines — 4-H educators and volunteers — believe their program helps youth build this important developmental asset.

What is purpose in life?

Purpose is something that gives life a sense of direction.⁶ Purposeful youth report making progress on a meaningful life aim that can influence the world around them.^{7,8} Purpose often influences the types of goals that people pursue. For example, an individual with a purpose “to help others” might choose goals like becoming a police officer, daycare worker, or doctor. Importantly, purpose is a lifelong developmental asset. Its roots begin in early childhood, when kids learn they can set goals and achieve them (e.g., choosing what to wear).⁹ Teenagers broaden their purpose as they start thinking about who they are, determine their personal values, select certain friends, or choose a vocation.^{10,11} As youth approach adulthood, purpose can help ease the transition toward psychological independence.^{12,13} Finally, and perhaps most amazingly, older adults with a greater sense of purpose tend to have a lower risk of mortality and better physical and cognitive performance!¹⁴⁻¹⁶ Given these lifelong benefits, a sense of purpose is worthy of supporting as early in life as possible.



How is purpose relevant to 4-H?

The benefits of purpose do not end at its positive associations with health and development. In an interview-based study of youth enrolled in arts and leadership programs, Dawes and Larson⁵ found that the key to fostering program engagement and motivation was youth being able to find a connection between program/activity goals and their own. Youth were better able to find this connection when they felt like they were learning for the future, becoming more competent, and working toward a greater purpose. As engagement is thought to tie program enrollment to the psychological and developmental benefits of being involved in out-of-school programs,¹⁷ finding ways to promote a sense of purpose could help youth get more out of 4-H. Supporting this idea, Burrow, Agans, and Rainone¹⁸ asked a group of youth to write about their purpose and how it can impact the world around them. For older youth in particular, those who wrote about their purpose reported greater engagement with a subsequent 4-H activity. Purpose, then, might be one way to combat drop-offs in program engagement that are commonly observed as youth age.¹⁷

How can 4-H support youth purpose development?

Research has identified three pathways to finding purpose.^{19,20} First, the **proactive purpose pathway** involves deliberate sampling. For example, a high schooler could engage with the proactive purpose pathway by registering for different types of classes to gain a breadth of understanding across topics. Second, the **reactive purpose pathway** involves developing purpose in response to an experience. For example, someone might find purpose in studying medicine after losing a loved one to cancer or living through a severe childhood illness. Finally, the **social learning purpose pathway** involves learning about and imitating purposeful role models. For example, someone that sees Ashton Kutcher fighting to stop human trafficking could be inspired to find ways to make women and children feel safer in their community.

4-H may be able to provide social and physical support to youth who are exploring their options for purpose. For one, 4-H exposes youth to new ideas, experiences, opportunities, and people. 4-H also gives youth who have a purpose opportunities for enacting and refining their direction. Finally, 4-H's emphasis on becoming a competent and contributing member of the community can help youth think about how their actions can impact others and the world around them.

How can studying 4-H leaders determine if 4-H helps youth develop purpose?

Educators and volunteers are on the front lines of 4-H. They may interact directly with youth or orchestrate events for youth to engage with others within their county/region. As such, 4-H leaders bring 4-H to life by enacting and teaching its mission, vision, and values. As 4-H leaders become more aware of the benefits of youth purpose, we can examine the ways they strive to promote this sense through their programs. We can eventually take this information and compare it to the facets of the program that actually relate to youth reports of purpose. As such, by understanding 4-H leaders' beliefs, we can move one step closer to creating the most effective version of 4-H possible.

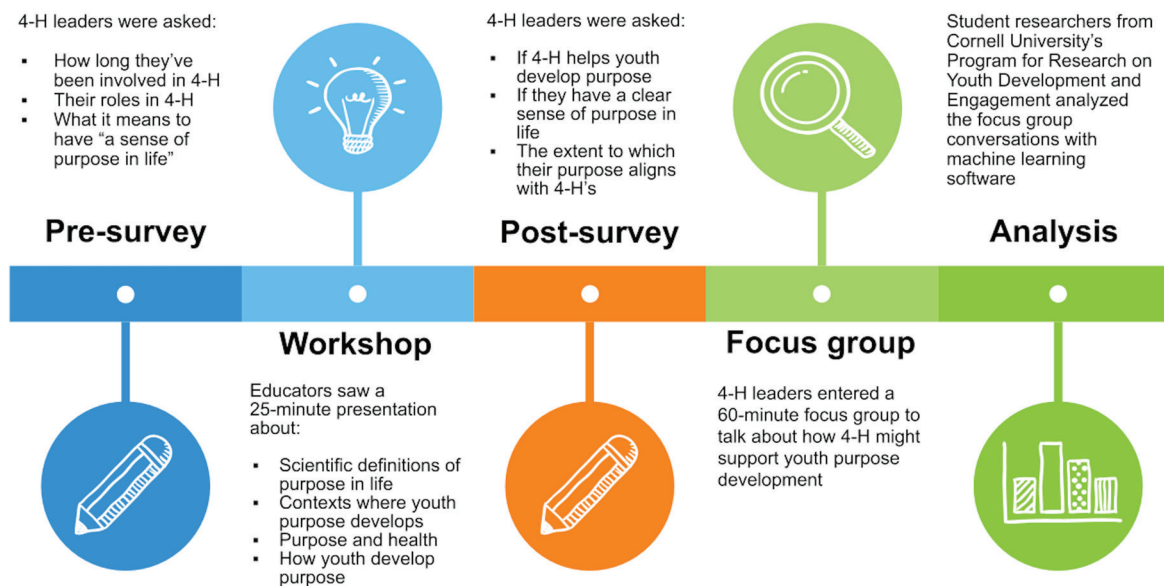


METHOD

Participants, Materials, and Procedure

We conducted eight focus groups across five counties/regions in New York State. In total, 63 4-H educators and volunteers participated in the focus groups. There were 42 educators, 17 volunteers, and 6 who indicated their role as “other” (e.g., administrator, parent of a 4-H youth). Participants were allowed to select more than one role. A total of 39.7% indicated that they had participated in 4-H themselves as a youth. Participants indicated a median of 11 years total involvement with 4-H, with a duration that extended from less than a year to 51 years. Below is our *Research Timeline*, which describes our research materials and procedures.

Research Timeline



Analytic Strategy

To analyze focus group responses, we learned how to use a machine learning technique called *Latent Dirichlet Allocation (LDA)*.²¹ We took the recorded focus group conversations, transcribed them to the computer, and then wrote a computer script to analyze the text. From the algorithm, we were able to summarize the main ideas discussed across focus groups.

How does LDA work?

LDA assumes that the *terms* people say appear near each other because they are connected to the same underlying *topic*. It might be helpful to think about this with an example. Let's say we asked 1,000 people to write about how they learned to ride a bicycle. Across responses, we might expect to see similar terms (e.g., “wheel,” “helmet,” “fall,” “handlebars,” “shaky”). However, some of these terms

appear closer to other terms because they share some kind of a relationship. LDA tells you which terms are most likely to be related, or “cluster” together within a topic (e.g., “fall” and “shaky” vs. “wheel,” “helmet,” and “handlebars”). It is then up to the researcher to determine the underlying topic that connects the terms. In the first cluster, words like “fall” and “shaky” might belong to a topic like “challenges faced when learning to ride a bicycle.” In the second cluster, words like “wheel,” “helmet,” and “handlebars” might belong to a topic like “parts of a bicycle.” Each term is also assigned a **beta weight** for each cluster returned by the computer. Terms with larger beta weights tend to be more central to the underlying topic.

We used three special techniques for analysis to generate cleaner, more interpretable results. First, **stemming** reduces repeat terms by collapsing words with similar meaning to their “stems.” For example, “develop,” “develops,” “developing,” “developed,” and “development” would collapse to “develop.” You can see that the meaning of the word is retained. Second, **removing stopwords** takes out the most common articles in the English language (e.g., “and,” “the,” “a”). Stopwords are vague and do not tell you much about what a person is actually saying. Finally, **bigram analysis** groups words in the data by twos. Therefore, each “term” in the analysis is actually two words. Using pairs of words as terms allows us to see context.

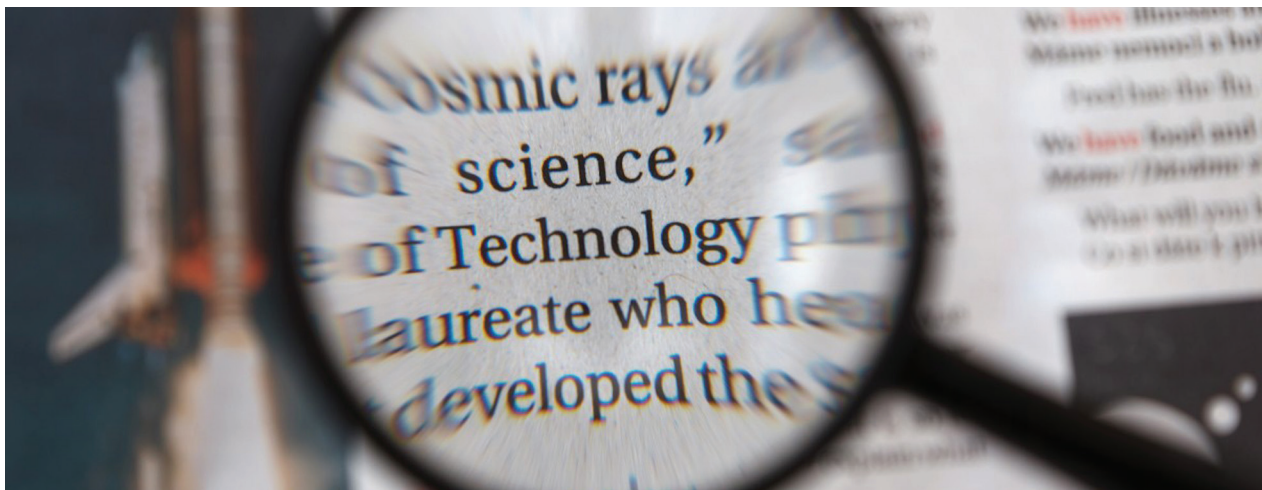
Why did we use LDA?

LDA can analyze a lot of text at once. In fact, it is designed to analyze datasets many times larger than ours (like hundreds of thousands of Tweets)! It is not only more time efficient, but it is also more objective. When humans read text, they often look at it through a biased lens. In other words, what people see is shaped by what they expect to be there. Because researchers often enter research projects with expectations, allowing a machine to analyze the text helped us reduce bias.

```
1 # install.packages("ggplot2")
2 # load package and data
3 options(scipen = 999) # turn-off scientific notation
4 library(ggplot2)
5 theme_set(theme_bw()) # pre-set the bw theme.
6 data("midwest", package = "ggplot2")
7 # midwest <- read.csv("http://goo.gl/G1K41K") #
8
9 # Scatterplot
10 gg <- ggplot(midwest, aes(x = area, y = poptotal))
11   geom_point(aes(col = state, size = popdensity))
12   geom_smooth(method = "loess", se = F) +
13   xlim(c(0, 0.1)) +
14   ylim(c(0, 500000)) +
15   labs(subtitle = "Area Vs Population",
16        y = "Population",
17        x = "Area")
```

PROBLEMS 1 OUTPUT DEBUG CONSOLE TERMINAL

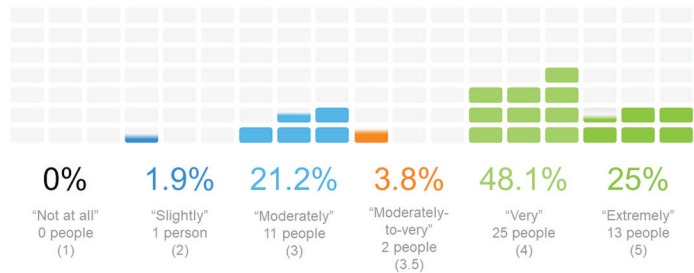
R is a collaborative project with many contributors.



FINDINGS

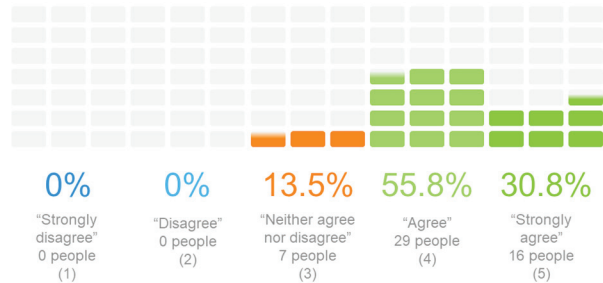
A total of 52 people completed the post-survey. On a scale ranging from 1 (“Not at all”) to 5 (“Extremely”), 4-H leaders generally believed that 4-H helps youth develop purpose (*Mean* = 3.98, *SD* = 0.74).

How much does 4-H help youth develop purpose?



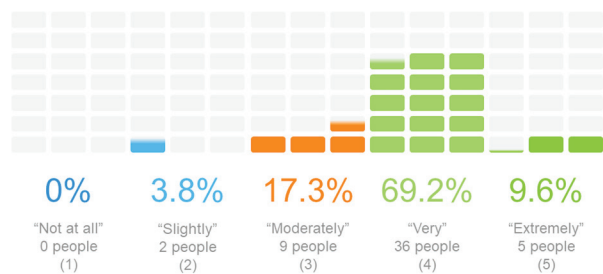
On a scale ranging from 1 (“Strongly disagree”) to 5 (“Strongly agree”), leaders also tended to believe that they themselves have a clear sense of purpose in life (*Mean* = 4.17, *SD* = 0.65).

How much do you agree with the statement, “I have a clear sense of purpose in life”?



Finally, on a scale of 1 (“Not at all”) to 5 (“Extremely”), 4-H leaders tended to express moderate-to-strong agreement with the idea that their purpose in life aligned with the purpose of 4-H (*Mean* = 3.85, *SD* = 0.64).

How much does your purpose align with 4-H’s purpose?



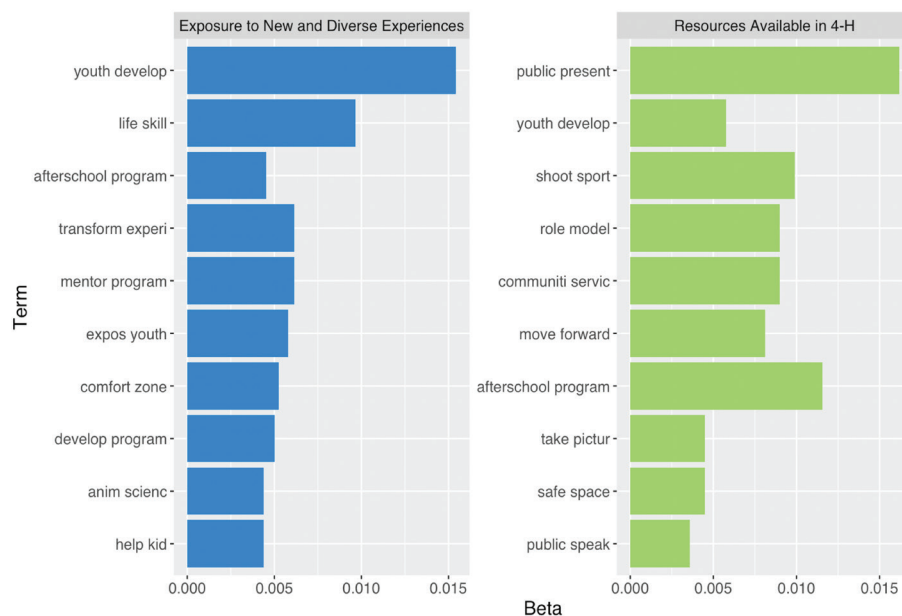
After stemming and removing stopwords, the dataset contained over 12,000 words for analysis. The data occupied over 560 rows of text. We began our LDA text analysis by testing between 2 and 50 underlying topics. The LDA suggested a two-topic model, meaning, the terms used by focus group participants best grouped together when we allowed the computer to form only two different clusters.

You can check out our figure, “*Term by Topic Distributions*,” to see how the terms clustered across underlying topics. We believe that the first cluster (#1) represents a topic called “*Exposure to New and Diverse Experiences*.” Terms such as “expos youth,” “comfort zone,” and “transform experi” are most indicative of this title. Not every term in the topic fits into this category, but examining the words as a whole, we believe 4-H educators and volunteers discussed how purpose development can be facilitated by giving youth access to a wide variety of experiences. One participant in the focus groups stated 4-H has “got something for everybody.” Since each person’s purpose is unique, being able to explore a number of different types of experiences in 4-H could help decide between interests. This might be one mechanism underlying how leaders believe 4-H helps youth develop purpose.

We believe the second cluster (#2) contains examples of opportunities that are available in 4-H. Some of the top terms are “public present,” “afterschool program,” “shoot sport,” “communiti servic,” “take pictur,” and “public speak.” You might recognize these terms as specific activities that can be found within 4-H. As such, we called this topic “*Resources Available in 4-H*.” Other terms, such as “role model,” are not concrete activities, but still represent a type of experience youth may have within 4-H. The term “safe space” may reflect educators’ belief that 4-H is an environment where youth are safe to explore their interests. In this way, 4-H might facilitate purpose development by allowing youth to try new things without restrictions.

Interpreting these results together, it is possible that a common theme across focus group conversations was that youth gain *Exposure to New and Diverse Experiences* (Topic #1) through the *Resources Available in 4-H* (Topic #2). Furthermore, these exposures may be facilitated and amplified through abstract resources, like the fact 4-H creates a safe space for youth to explore their interests. These two ideas could work together to sketch for us one common way 4-H leaders believe their program contributes to youth purpose development.

Term by Topic Distributions



CONCLUSIONS

What did we find?

Overall, 4-H leaders feel they have a clear sense of purpose in life, and this purpose aligns with the purpose of the broader 4-H program. Leaders also seem to believe 4-H helps youth develop purpose. Our analysis of focus group conversations suggested that leaders may think 4-H helps build youth purpose through *exposure to new and diverse experiences*, and these experiences might happen because of the wide variety of *resources available in 4-H*.



Where do we go from here?

This study provides important insight into how 4-H leaders think about youth purpose development within the program. However, it does not offer any information from the perspective of youth in 4-H. What is actually related to 4-H youth's sense of purpose? Understanding the answer to this question would help 4-H leaders tailor programming to support purpose development. Purpose is a powerful tool that influences many aspects of youth's lives, including their engagement in out-of-school programs. Focusing 4-H resources on purpose development, then, could have widespread impact on youth's health and development.

In a second future project, understanding the ways in which 4-H youth describe their sense of purpose can help leaders foster an environment that aids in its continued development. Research indicates that program engagement relies on alignment between personal goals and program goals.⁵ One way to explore this could be through an LDA analysis of youth's written responses to questions about purpose. These analyses could help determine if 4-H youth have purposes that align with 4-H goals/activities. If so, 4-H can continue expanding these activities in meaningful ways. If not, a study like this could provide insight into what types of activities 4-H could benefit from developing further. In this way, aligning 4-H programming with the content of youth's purposes could also support youth purpose development.

Can you help us?

In research, it is important findings represent what is actually happening in the world. We want to ensure that the way we have interpreted 4-H leaders' beliefs about youth purpose development within the program truly reflects what leaders believe. Regardless of whether you participated in the study described here, we want to hear from you about the results. What, if anything, did we get right? What, if anything, did we get wrong? Your feedback helps verify the findings. Please consider telling us what you think here: <http://bit.ly/4Hstudy>

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WHO ARE WE?



Kaylin Ratner is a Ph.D. candidate in the Department of Human Development at Cornell University. She has worked with the Program for Research on Youth Development and Engagement for over 3 years. Her research focuses on how adolescents and emerging adults think about their senses of identity, purpose, and meaning in life, and how these senses interact with mental health.



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Rachel Sumner, Ph.D. is the Associate Director of the Intergroup Dialogue Project at Cornell University. Prior to this position, she completed her Ph.D. in Developmental Psychology at Cornell University, and served as a post-doctoral Research Associate for the Program for Research on Youth Development and Engagement for 2 years. Dr. Sumner's research focuses on identity and purpose development across adolescence and emerging adulthood.

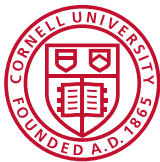


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