Long-Term Outcomes of Youth Development Programs: Insights from University of California Early Adult 4-H Alumni

Steven M. Worker
University of California, Agriculture and Natural Resources, smworker@ucanr.edu

Roshan Nayak
Virginia Tech, roshanayak@vt.edu

Anne M. Iaccopucci
University of California, Davis, amiaccopucci@ucdavis.edu

Nicole Marshall-Wheeler
University of California, Agriculture and Natural Resources, nmarshall@ucanr.edu

Abstract
A young person's engagement in high-quality youth development programs should lead to stronger positive outcomes as a young adult. Theoretical literature advances broad indicators that mark success in young adulthood; however, there is a dearth of empirical publications reporting long-term outcomes to support this assumption. Admittedly, there are many challenges in conducting this type of research. We conducted a cross-sectional survey study to report on three long-term outcomes (economic stability, health and well-being, and community involvement) of young adult (aged 19 to 34) alumni of the University of California 4-H Youth Development Program. We compared 4-H alumni outcomes to matched peers using secondary data sources. The 4-H alumni sample demonstrated more positive results than the comparison samples on almost all indicators (except family income). We sought ways to overcome the significant biases inherent in this type of research and encourage future empirical research to grow the literature reporting long-term young adult outcomes experienced by previous participants in youth development programs.

Keywords: young adult outcomes, 4-H alumni, youth development, propensity score matching

Acknowledgements
We thank Kali Trzesniewski and three anonymous reviews for providing feedback to improve the manuscript.

Introduction

Positive youth development theory posits that sustained youth-adult relationships (developmental relationships), cultivating a sense of belonging, and providing opportunities for learning and mastery (including exploration of one's 'spark') may help set youth on the path of self-sufficiency, indicated by economic self-sufficiency, good health and well-being, and connection to community (Arnold, 2018; Lerner et al., 2009). The theoretical assumption is that participation in high quality organized youth development experiences may help set youth on a positive thriving pathway and contribute to stronger outcomes in emerging adulthood (Lerner et al., 2021). The transition to adulthood – the age between 18 and 24 (Arnett, 2000) or up to 34 (Medley, 1980) – is marked by becoming a self-sufficient person, accepting responsibility for oneself, and making independent decisions, while concurrently taking on new roles such as employee, student, spouse, and/or parent (Arnett, 2000; 2004; 2007; Medley, 1980; Reifman et al., 2007). During this life stage, one's economic, health, and community involvement have been influenced by a developmental trajectory formed during childhood and adolescence (Scales et al., 2016). Behavioral and cultural patterns established and shifted by individual ↔ context relations influence this trajectory (Lerner, 2006; Lerner et al., 2021).

Empirical work on youth development practices, outcomes, and the relationship between the two have blossomed (Roth & Brooks-Gunn, 2016; Smischney et al., 2018). Despite the growth of literature, there is a dearth of empirical work reporting on long-term outcomes experienced by young adult (emerging adult) alumni of youth development programs. While long-term outcomes are often listed in youth development frameworks (e.g., Arnold, 2018; Dogan et al., 2012) or advanced in the literature (e.g., Gambone et al., 2002; Scales et al., 2016), there is much less published empirical evidence that reports on multiple outcomes and their metrics. Admittedly, there are challenges in conducting such studies and attributing these long-term outcomes to participation in youth development programs.

The advancement of theoretical frameworks, coupled with a dearth of published empirical research on those frameworks, motivated us to undertake the present study. The context was in the University of California 4-H Youth Development Program, a publicly funded program administered by Cooperative Extension, a partnership between the U.S. Department of Agriculture, the University of California, and 58 California county governments. As a publicly funded organization, an evaluation of program effectiveness can inform program direction and future investments. The youth development experiences provided to 4-H youth participants is hypothesized to influence long-term early adult outcomes (Arnold, 2018; Dogan et al., 2012). Our goal was to test this hypothesis and the effectiveness of the California 4-H Youth Development Program Framework (Dogan et al., 2012) using a quasi-experimental design. The first objective was to report on the state of young California 4-H alumni (who were 19 to 34 at the time of data collection) that participated in the 4-H program from 2008 to 2020. The second objective was to compare the California 4-H alumni sample to their peers using secondary data sources. The present manuscript reports on 693 California 4-H alumni, between 19 and 34, who were highly engaged in 4-H as young people, and responded to our survey in the fall of 2021.

Positive Youth Development

Positive youth development takes an asset-based, youth empowerment approach, placing young people and their context at the fore (Arnold, 2018; Heck & Subramaniam, 2009; Lerner et al., 2011). The long-term goals of youth development programs are to help young people develop positive norms, skills, and attitudes to successfully negotiate a transition into adulthood; i.e., a common vision for the long-term outcomes of youth development is to support the development of *"healthy, happy, thriving people who make a positive difference in their communities"* (Dogan et al., 2012). Positive youth development frameworks predict that by engaging youth in high quality programs as a young individual, those youth will experience better outcomes and fewer adverse health or risk-taking behavior as adults. There is strong evidence that high quality youth development programs contribute to public good, particularly with improved school achievement, graduation rates, and improved college attendance; decreased incidence of risk behaviors that may reduce reliance on public health systems; and increased sense of empathy and civic-minded attitudes (Campbell et al., 2013; Durlak et al., 2010; Ramey et al., 2018). For example, the landmark study – National 4-H Study of Positive Youth Development, which involved 7,000 youth between 2002-2012 – found that when youth engaged in youth development programs and developed competence, confidence, connection, caring, and character, they would contribute to their communities (Bowers et al., 2014; Lerner et al., 2013); however, the study did not follow youth into emerging adulthood.

While the empirical literature has grown tremendously around advancing our collective understanding of the relationships between program elements, practices, and context with youth development short-term outcomes (i.e., identification of one's passion, developmental relationships, nurturing a sense of belonging, and promoting involvement in/with the community; Arnold & Gagnon, 2019; Benson et al., 2006; Hamilton et al., 2004; Lerner et al., 2009; National Research Council and Institute of Medicine [NRCIM], 2002), less has been published reporting on long-term outcomes, the anticipated markers of a successful transition into adulthood (that is, between 19 and 34 years of age).

Emerging Adult (Long-Term) Outcomes

Indicators marking of success in emerging adulthood have been proposed in the literature (e.g., Gambone et al., 2002; Hawkins et al., 2009; O'Connor et al., 2011; Federal Interagency Forum on Child and Family Statistics [FIFCFS], 2014; Scales et al., 2016; Schoor & Marchand, 2007; Tayfur et al., 2021). Although we know that outcomes defining developmental success vary with cultural contexts, having lists of indicators is helpful in defining and measuring the *long-term outcomes* of youth development, that is, the outcomes experienced by youth who have become young adults.

Gambone et al. (2002) published one of the earliest frameworks that advanced three young adult outcomes: (1) economic self-sufficiency (i.e., able to support themselves and family, graduated from a four-year college, employed full-time with the ability or education to change jobs), (2) healthy family and social relationships (i.e., adults are in good mental and physical health, as well as being good caregivers and having positive relationships with family and friends), and (3) community involvement (i.e., active contributors to their community, low levels of illegal

activity, volunteers in community service). The three long-term outcomes have remained prevalent in scholarship during the past twenty years. Within California 4-H, Dogan et al. (2012) advanced four long-term (early adult) outcomes: workforce preparedness and economic self-sufficiency, contributes to community, and healthy lifestyles. The outcomes were adapted from Gambone et al. (2002), with a delineation between workforce preparedness and economic self-sufficiency. More recently, Arnold (2018) and Arnold and Gagnon (2019) aligned with Gambone et al.'s (2002) framework for their national 4-H Thriving Model, with vocational or academic success, civic engagement, employability, and economic stability, and happiness and well-being (4-H Thriving Model Task Force, n.d.). Similarly, Temescal Associates' (2018) *Youth Development Guide 2.0* for after-school programming advanced the same three young adult outcomes: economic self-sufficiency, healthy family and social relationships, and contributing to community. Other indicators have been proposed, and they generally align with those advanced by Gambone et al. (2002); these include: (a) civic action and engagement, social competence, life satisfaction, trust and tolerance of others, and trust in authorities and organizations (Hawkins et al., 2009; O'Connor et al., 2011); (b) education, economic circumstances, family formation, civic and social personal behavior, and health and safety (FIFCFS, 2014); (c) physical health, emotional well-being, life skills, ethical behavior, healthy relationships, educational attainment, educational and occupational engagement, and civic engagement (Scales et al., 2016); or (d) behavioral problems, peer problems, substance use, prosocial skills, self-evaluations, aspirations, and physical activity (Tayfur et al., 2021).

In the present study, we use Gambone et al.'s (2002) three outcomes, given their commonality in the literature, and because the study was conducted with California 4-H, which used a youth development framework adapted from Gambone et al. (2002) and NRCIM (2002). The framework specified youth development practices and their theorized relationship to youth development and educational outcomes. California 4-H disseminated the program framework throughout programming in 2012 (Campbell et al., 2013), with accompanying curricula and professional development offered to 4-H educators (Miner & Horrillo, 2021; Miner, et al., 2021; Worker et al., 2021), and outcome evaluations assessing youth development and educational outcomes (Lewis et al., 2021). For the present study, we selected metrics that were available with large national representative samples (e.g., U.S. Census, Pew Research), cross-cutting and easy to understand, and reflected current criteria of success in adulthood.

Economic stability

Economic stability includes financial self-sufficiency (Arnold, 2018; Gambone et al., 2002; Temescal Associates, 2018), employment status (Gambone et al., 2002; Temescal Associates, 2018; Scales et al., 2016; Arnold, 2018; U.S. Census Bureau, 2021), educational attainment (FIFCFS, 2014; Scales et al., 2016; U.S. Census Bureau, 2021), and family income (Scales et al., 2016; Arnold, 2018; U.S. Census Bureau, 2021).

Hypotheses. Compared to their peers who did not participate in California 4-H as young people, California 4-H alumni will (1) attain higher levels of college degree, (2) have greater full-time employment, and (3) have higher levels of family income.

Rationale. Nationally, the 4-H program supports economic stability through experiential education focusing on college and career readiness, the development of subject matter mastery, and the development of life skills. California 4-H is managed by the University of California (and other state 4-H programs are managed by their respective Land-Grant Universities), providing a connection to other college readiness programming, university resources, and facilities. Nationally, young people often have exposure to campus life and course offerings, as well as other college and workforce readiness education, through their participation in 4-H (Horrillo et al., 2021; Mitchell-Hawkins & Mellon, 2022). This exposure through 4-H supports college awareness and develops positive attitudes for post-secondary education (Smith et al., 2022). Montana and Colorado 4-H youth members demonstrated an increase in decision-making skills and academic achievement – both support educational attainment – compared to their peers who had not participated in 4-H (Astroth & Haynes, 2002; Goodwin et al. 2007). Radhakrishna et al. (2009) reported that Pennsylvania 4-H alumni completed challenging tasks within the 4-H program, an experience that could better prepare 4-H participants for the challenges associated with college degree attainment. As a youth development program, 4-H also supports the development of life skills; a broad body of empirical work demonstrates that participating in 4-H programming leads to enhanced professionalism, communication skills, collaboration skills, and problem-solving skills (Anderson & Karr-Lillienthal, 2011; Astroth & Haynes, 2002; Clary, 2018; Goodwin et al., 2007; Marshall-Wheeler et al., 2022; Radhakrishna et al., 2009; Radhakrishna et al., 2013). Strengthening these types of life skills increases the likelihood of economic stability through higher degree obtainment and full-time employment (Anderson & Karr-Lilienthal, 2011; Clary, 2018). Furthermore, young people who participate in 4-H focus on subject matter mastery, which may translate into career development (e.g., Smith et al., 2014; Espinoza et al., 2023).

Health and well-being

Health and well-being include healthy family and social relationships (i.e., community connection; Gambone et al., 2002; Lerner et al., 2009; Hawkins et al., 2009; Scales et al., 2016; Temescals Associates, 2018), life satisfaction (Arnold, 2018; Hawkins et al., 2009), and physical and mental health (Dogan et al., 2012; Scales et la., 2016).

Hypotheses. Compared to their peers who did not participate in 4-H programming as young people, California 4-H alumni will report: (4) better physical and mental health, (5) better social health, and (6) higher levels of economic satisfaction.

Rationale. The 4-H program engages young people in project-based learning in skills necessary to lead a healthy lifestyle, specifically cooking, nutrition, stress-management, and decision-making. For example, 4-H youth participants in the *4-H Healthy Habits* program learned how to make health choices, why it is important to eat a healthy diet, and that being active was good for them (deBlois et al., 2018). Participation in California 4-H Student Nutrition Advisory Council (SNAC) Clubs (Klish & Soule, 2021) and the five-state iCook 4-H program (White et al., 2019) resulted in increased family engagement during mealtimes, increased fruit, vegetable and whole-grain consumption, and decrease in consumption of soda and junk foods. Additionally, 4-H programs are increasingly emphasizing mindfulness; the California 4-H Mindfulness Retreat demonstrated gains in confidence in using mindfulness practices to manage stress (Lewis et al.,

2020). Furthermore, 4-H programming supports young people practicing and learning decision-making skills through reducing risk-taking behaviors like drinking, shoplifting, or using drugs (e.g., Seevers et al., 2011).

Community involvement

Community involvement includes contributions and commitment to community (Lerner et al., 2009), civic engagement (Hawkins et al., 2009; FIFCFS, 2014; Scales et al., 2016; Arnold, 2018), voting in democratic elections, and volunteering (Scales et al., 2016).

Hypotheses. Compared to their peers who did not participate in 4-H programming as young people, California 4-H alumni will (7) report more positive attitudes towards involvement in community issues, (8) vote more frequently, and (9) volunteer more.

Rationale. Nationally, 4-H programs emphasize civic engagement and other forms of community involvement, such as community service and service-learning, providing education about civics, and opportunities to meet elected officials and learn about government thru immersive events. (Swanson, 2018). Research has shown that adults who participated in 4-H as youth report 4-H positively attributed to volunteering, holding leadership positions in their communities, and voting (Radhakrishna & Sinasky, 2005; Pennington & Edwards, 2006; Merten, et al., 2014). For example, Oklahoma 4-H alumni reported 4-H contributed to their "giving skills", such as community service and volunteering, citizenship, contribution to group efforts, leadership, and that 96% voted in the last three years (Pennington & Edwards, 2006). Texas 4-H alumni reported being motivated to help their communities, as well as seek out leadership positions in community organizations (Merten et al., 2014). Pennsylvania 4-H alumni described 4-H as contributing to their development of citizenship and service skills (Radhakrishna & Sinasky, 2005).

Methods

The primary study goal was to assess early adult outcomes of those transitioning into adulthood (aged 19 to 34) who had participated in the University of California 4-H Youth Development Program. We used a quasi-experimental design sampling the entire 4-H alumni population that met inclusion criteria. The secondary study goal was to compare these 4-H alumni to their counterparts on three domains: economic stability, health and well-being, and community involvement. To do so, we designed a survey instrument that included measures from three secondary datasets (wherein the secondary data was used as a type of 'control' group; sources included U.S. Census, Pew Research, and a separate Internet panel conducted by Edge Research). The University of California, Davis Institutional Review Board approved the study protocol. We used the following analytical steps:

Step 1 – Survey Development and Secondary Data Sources

We developed a survey instrument with items from three secondary sources and where datasets were available for use (Rea & Parker, 2014). The items and the secondary sources are described below, available in Table 1 while detailed specific item-level detail is included in Appendix B, and demographic information is included in Table 3.

For economic stability, we used the U.S. Census Bureau's (2021) *Current Population Survey: 2021 Volunteering and Civic Life Supplement.* We adapted three items: highest level of education, employment status, and family income. We filtered the data for California respondents only. We also used the California census data to compare the average hours per week individuals spend in volunteering, under the community involvement outcome.

For health and well-being, we used the National 4-H Council and Edge Research Inc. (2019) survey of U.S. adult population conducted between May 15 and June 4, 2019 (N=1,124 total; filtered to 18-to 34-year-old participants resulted in N=373) using industry-standard Internet panel services (Callegaro et al., 2014). We obtained raw data under a data-sharing agreement. The survey used an adapted 11-item life satisfaction scale from Carman et al. (2018) and Gallup (2019), which contained three factors: physical and mental health (3 items), social health (4 items), and economic satisfaction (4 items).

For community involvement, we used both the *U.S. Census Bureau's 2021 Volunteering and Civic Life Supplement* (1 item: volunteer hours – filtered for California only) and Pew Research Center's *Trends in American Values 1987-2012* (2 items: community involvement and voting frequency). We filtered the Pew Research data for the most recent year of data collection, 2012 and set the age range for participants, between 19-34 years old resulted in a comparable sample size of 544 (N).

The survey also included demographic questions including gender, race/ethnicity, age (now as an adult), years in California 4-H (as youth), and self-assessment of how involved they were in 4-H.

Table 1

Study outcomes and hypotheses with their corresponding measures and their sources; see Appendix B for a greater level of detail.

Long Term Outcomes	Hypothesis Metric	Response Options & Data Merging	Metric and Secondary Data Sources
Economic Stability	1. Highest level of education	9 nominal options; data merged to reduce to 4.	Data: U.S. Census Bureau (2021)
	2. Employment status	9 nominal options; data merged to reduce to 5.	
	3. Family income	16 ordinal options; data merged to reduce to 5.	
Health and well-being	11-item life satisfaction - *Thinking about your own life and experiences, how satisfied are you with each of the following aspects in your life?*	5 ordinal response options coded as 5= Very satisfied, 4=Somewhat satisfied, 3=Neutral, 2=Somewhat dissatisfied, 1=Very dissatisfied. Multi-item scales treated as interval data.	Scale: Carman et al. (2018) & Gallup (2019) Data: National 4-H Council and Edge Research, Inc. (2019)
	4. Physical and mental health (3-items)		
	5. Social health (4-items)		
	6. Economic satisfaction (4-items)		
Community Involvement	7. Community involvement - *Everyone has a duty to be involved in community activities to address local issues.*	4 ordinal response options coded as 4=Completely Agree, 3=Mostly Agree, 2=Mostly Disagree, 1=Completely Disagree	Data: Pew (2012)
	8. Voting frequency – *How often would you say you vote?*	5 ordinal response options coded as 5=Always, 4=Nearly always, 3=Part of the time, 2=Seldom, 1=Never vote	
	9. Volunteering - *How many hours per week (on average) do you volunteer?*	Open text; coded as interval data	Data: U.S. Census Bureau (2021)

Step 2 – Collecting California 4-H Alumni Sample

The targeted California 4-H alumni population accessed from the 4-H enrollment system consisted of 44,925 names and email addresses for individuals who had participated in 4-H between 2008 and 2020. We detected the presence of duplicate email addresses associated with multiple youth using the same email address to enroll in 4-H, originating from a single family, and included text instructing all 4-H alumni to respond to the survey. We administered the survey using Qualtrics from August 5, 2021, to January 2, 2022, and sent reminders to non-respondents. Several surveys were not delivered, because of errors related to misspelled and outdated email addresses, resulting in a survey sample of 35,011. Additionally, the survey link was disseminated across various social media platforms targeting California 4-H alumni. The provided weblink incorporated screening questions designed to mitigate the occurrence of duplicate responses. In total, using mail and weblink modes of survey administration, we received 693 (N) responses from individuals who were 19 to 34 years old. The 1.98% response rate was expected given that young people tend to change email addresses as they age, other youth had used a parent's or guardian's email to which they no longer had access, and lack of incentives for survey completion. Each survey included a personalized request prompting recipients to forward the correspondence to the appropriate individual, thereby minimizing the likelihood of erroneous inclusion or duplication of respondents within the survey cohort.

Most respondents were involved in California 4-H for 5 to 10 years and reported being extremely or very involved as a young person (see Table 2; or refer to Appendix C). In California 4-H overall, the average length of participation is only 2 to 3 years with fewer staying involved for five or more years (Lewis et al., 2022); however, 73 % of survey respondents reported ≥ 5 years and 45 % ≥ 7 years. The duration of participation, while related, is distinct from intensity or level of involvement; yet a chi-square test of independence showed that the number of years respondents were involved in 4-H was significantly associated with their level of involvement (Chi-Square = 222.25, df = 12, $p < .001$). Thus, the resulting sample of California 4-H alumni, on average, represented the program's longest duration and most involved participants between 2008 and 2020.

Regarding demographics, in comparison to California 4-H enrollment, our study sample skewed female and white; for example, in the 2016 year: there were 59% female and 41% male youth participants, but our sample was 73% female and 27% male and there were 67% White and 33% non-White youth participants and our sample was 85% white and 16% non-White). Based on our experience conducting surveys with 4-H youth, we have observed higher response rates from female participants; for instance, 68% of survey respondents were female in 2019, and 67% in 2020 (Nayak, 2021; 2022). This pattern is also somewhat reflected in responses to a multistate survey with individuals previously affiliated with 4-H (75% females) (Miner et al., in press). Future research might explore reasons for such trend with this population. For the purposes of this study, we treat the 4-H alumni sample as broadly, but not perfectly, representative of all 4-H youth members.

Table 2

California 4-H alumni sample years involved and engagement (see Appendix C for more detail)

Sample Source	**California 4-H Alumni N=693**	
Years Involved in 4-H	*n*	*%*
1 to 2 years	88	12.7
3 to 4 years	93	13.4
5 to 7 years	200	28.9
7 to 10 years	212	30.6
More than 10 years	99	14.3
Not sure / Cannot recall	1	0.1
Reflecting back, how involved were you in 4-H?	***n***	***%***
Extremely	269	38.8
Very	246	35.5
Moderately	152	21.9
Minimally	26	3.8

Table 3

Gender, ethnic, racial, and age demographics by sample source.

Sample Source	California 4-H Alumni 2021		U.S. General Population Internet Panel (National 4-H Council and Edge Research, Inc., 2019)		U.S. Census Bureau Current Population Survey: 2021 Volunteering and Civic Life Supplement Sample for California		Pew Research Center's Trends in American Values National Sample, 2012	
	N=693		**N=373**		**N=1821**		**N=544**	
	n	*%*	*n*	*%*	*n*	*%*	*n*	*%*
Gender								
Female	505	72.9	201	53.9	899	49.4	264	48.5
Male	187	27.0	171	45.8	922	50.6	280	51.5
Non-Binary, Not listed	1	.1	1	0.2	0	0	0	0
Prefer not to state or missing	0	0	0	0	0	0	0	0
Ethnicity								
Non-Hispanic or Latino	626	90.3	307	82.3	1052	57.8	447	82.2
Hispanic or Latino	67	9.7	66	17.7	769	42.2	97	17.8
Race								
White	586	84.6	286	76.7	1262	69.3	357	65.6
Black or African American	8	1.2	47	12.6	117	6.4	91	16.7
American Indian or Alaska Native	8	1.2	4	1.1	28	1.5	8	1.5
Asian, Native Hawaiian or Other Pacific Islander	38	5.5	19	5.1	363	20	36	6.7
Multiple Races, Undetermined, Other, Preferred Not to Say	53	7.6	17	4.6	51	2.8	52	9.6
Age								
Mean (SD)	23.6 (3.3)		Not available*		26.6 (4.6)		26.5 (4.7)	
Median	23				27		27	

* Age asked as an ordinal variable: 18-24, 25-34, 35-44, 45-54, 55-64, 65+

Step 3 – Propensity Score Matching

We performed propensity score matching (PSM) to better compare and balance the characteristics of individuals (covariates) between the California 4-H alumni sample and secondary data samples. The demographic characteristics of the samples are presented in Table 3. The age range of 19–34 was set prior to PSM (*age 18 was included for the Edge Research sample). Propensity scores were calculated for each individual element in the samples using covariates specified below as confounding or predictor variables. Except age, all other covariates in the propensity score analysis (PSA) were treated as categorical variable. Post-PSM results were further evaluated to determine balance in the matched samples relative to unmatched samples using PS plot and Standardized Mean Difference (SMD) comparisons.

U.S. Census. Only individuals from California were selected from the U.S. Census data set. From the California 4-H alumni sample, 575 (N) individuals were matched with a similar number of California census samples using covariates age (19 to 34), ethnicity (Hispanic or non-Hispanic), and gender. No missing data was reported for any of the covariates; therefore, no data imputation was performed prior to PSA. For PSM, an acceptable value of .02 tolerance value was set to for each sample element. To evaluate the matching, the distribution of propensity scores was reviewed both before and after matching and SMD values were calculated. The SMD values for all the covariates in the matched samples were less than .25, meeting the acceptable criteria as described in Stuart (2010). The histograms of PS for matched samples and the SMD values showed a successful matching.

Edge Research. To study health and wellbeing, the California 4-H alumni sample was matched to U.S. General Population (National 4-H Council and Edge Research) using covariates gender, ethnicity (Hispanic or non-Hispanic), family income, employment status, and educational level. Commonly used models in estimating PS are not efficient in handling missing values in the covariates (Zhao et al., 2021), and missing values were detected for family income, employment status and educational level. To address missing values, we performed missing data analysis followed by multiple imputations. The final processed dataset contained 1031 individuals, comprised of 373 in Edge research sample and 658 in California 4-H alumni sample. We performed PSA using MatchIt R package (Ho et al., 2011) and Nearest Neighbor method and setting caliper at .02. In total, 250 (N) individuals from the California 4-H alumni group and the US population census were matched based on propensity scores. The SMD values and the PS distribution plots demonstrated improved balance in covariates for the matched samples.

Pew. To compare California 4-H alumni's attitudes towards voting and volunteerism, the sample was compared to Pew Research Center's 2012 data. Age (19 to 34), ethnicity (Hispanic or non-Hispanic), gender, education, and family income were used as covariates to match the sample element. Prior to PSM, these covariates were analyzed to detect missing values. Missing data analysis showed the presence of missing data for education level and family income. Using multiple imputation techniques and selected deletion method of cases, we selected 1202 cases (Pew sample=544 and California 4-H alumni=658). In performing PSM, we set the caliper value at .02, and 244 (N) individuals were matched based on PS values. The review of the distribution

of propensity scores and the SMD values from balanced for matched data helped ensure successful matching for the post-matching analysis.

See Appendix A for final demographic profiles, the evaluation results of PSM models and PS plots for all three matchings, including the demographic distributions of matched samples. To enhance comparability, we applied a relatively stringent nearest-neighbor propensity score matching procedure instead of full matching, which would have retained every respondent. This conservative choice produced smaller, yet better balanced, analytic samples. The likelihood that any individual appears in more than one sample is minimal. The Edge Research and Pew Research samples were fielded in different years (Pew was in 2012) and with PSM controlling for age likely reduced probability of the 4-H alumni sample also being included in either of these two samples. The probability is quite low for duplications with the U.S. Census dataset given its enormous size, scope, and methodology.

Step 4 – Data Analyses

We compared samples using *z-score* proportional test, independent samples *t*-tests, the Chi-squared test of independence, or other statistical tests as appropriate. We performed Chi-squared (χ^2) and odd-ratios tests to determine the relationships among the education levels and sample types.

For health and well-being, we adapted a life satisfaction scale consisting of 11-items. Exploratory Factor Analysis was used to reduce the number of items to a set of key underlying factors for streamlined data interpretation. The Kaiser-Meyer-Olkin and Bartlett's test (χ^2=2511, 11, *df*=55, $p<.001$) of the California 4-H alumni sample indicated that the life satisfaction data was appropriate for factor analysis. Three factors were extracted using Principal Axis Factoring with varimax rotation. The three factors explained 50.7% of the total variance present in the life satisfaction data. The life satisfaction items were grouped into three factors based on the factor loading values: "*physical and mental health*" (3 items), "*social health*" (4 items), and "*economic satisfaction*" (4 items). We calculated internal consistency reliability (Cronbach alpha) for the three factors, and all were greater than 0.70. Average composite scores were calculated for the scale and three factors. The composite mean scores were compared using independent samples *t*-tests between the California 4-H alumni and U.S. general population samples. Cohen's *d* values were calculated to measure the effect size.

For community involvement measures, we compared the California 4-H alumni sample to U.S. Census. We converted annual average volunteer hours to weekly hours by dividing each data point by 52 for the mean comparison. The average weekly volunteer hours are compared for both samples using independent *t*-test statistics.

Findings

We report findings by the three long-term outcomes, each with their hypotheses, first for California 4-H alumni and then in comparison to a secondary data sample.

Economic Stability

Economic stability and self-sufficiency are educational degree attainment, employment, and sufficient income to provide for themselves and family.

Hypothesis 1. Education

California 4-H alumni will attain higher levels of college degree, compared to their peers who did not participate in 4-H.

A majority of California 4-H alumni (57%) reported attaining a college degree, specifically a bachelor's (42.9%) or advanced degree (14.1%) (see Figure 1). Thirty-six percent reported completing an associate degree or some college while only 8% of California 4-H alumni had only attained a high school degree. The results for completing some college, but not attaining a degree made sense given the California 4-H alumni sample demographics skewing younger (mean was 24 years old, see Table 3). A bachelor's degree typically takes four to six years to complete, thus those in their late 20s would have had more time to complete degree requirements. Compared to the U.S. Census Bureau's California sample, California 4-H alumni generally attained higher levels of education (see Figure 1); for example, for bachelor's degree attainment, 26% of California adults achieving compared to 43% of California 4-H alumni. While only 9% of Californians in the Census sample reported an advanced degree, 14% of California 4-H alumni reported similarly. However, for obtaining an associate degree or attending some colleges, the California census reported slightly higher percentage than 4-H alumni.

A chi-square test of association between the sample types and education level was found to be significant (χ^2=81.88, $p < 0.05$). Based on the standardized residual values, California 4-H alumni were more likely to have a bachelor's or an advanced degree than the general California population, see Table 4. Furthermore, the odds of success in obtaining a bachelor' or an advance degree for California 4-H alumni were 2.4 times the odds of the general California population.

Figure 1.

Highest level of education level comparison by sample.

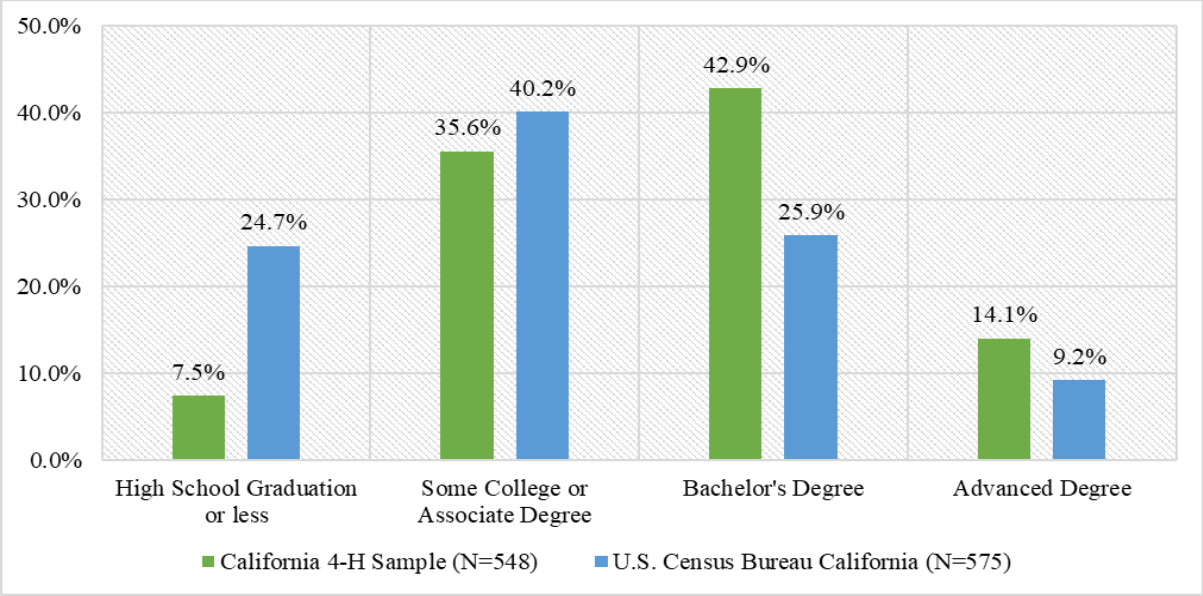


Table 4

Highest attained education level by sample and chi-square test of association between samples.

Education	Samples						**Total**	
	California 4-H Alumni			U.S. Census Bureau California				
	N	%	Standardized Residual	N	%	Standardized Residual	N	%
Advanced degree	77	14.1	1.7	53	9.2	-1.7	130	11.6
Bachelor's degree	235	42.9	3.5	149	25.9	-3.4	384	34.2
Some College or associate degree	195	35.6	-0.9	231	40.2	0.9	426	37.9
Highschool or less	41*	7.5	-5.1	142	24.7	5.0	183	16.3
Total	**548^**	**100.0**		**575**	**100.0**		**1349**	**100.0**
χ^2 =81.88, *df* =3, *p* <.05.								

Notes. ** California 4-H alumni did not report any educational level less than a high school degree. ^27 respondents did not report their educational attainment in the 4-H alumni sample.*

Hypothesis 2. Employment

California 4-H alumni will have greater full-time employment, compared to their peers who did not participate in 4-H.

Nearly 21% of California 4-H alumni were students; 61% were employed full time, 12% employed part-time, and 27% not employed. More California adults enrolled as students (40%) compared to California 4-H alumni (21%); however, general population adults were employed full time at lower levels (38.6%) compared to California 4-H alumni (60.6%). See Table 5.

Table 5

Student and employment status between samples.

Student and Employment Status	**California 4-H Alumni N=548***	**U.S. Census Bureau California Sample N=575**
Student Status		
Student	20.8%	39.8%
Non-Student	79.2%	60.2%
Employment Status		
Employed full-time	60.6%	38.6%
Employee part-time	12%	20.2%
Not employed or other	27.4%**	41.2% ^

Note. **27 respondents in California 4-H sample did not report their student or employment status.*

***includes homemaker, retired, or unemployed (and students).*

^ includes individuals not at work but usually full-time or part-time, unemployed full-time, and not in the labor force, and employment data not provided (0.7%).

Hypothesis 3. Family income

California 4-H alumni will have higher levels of family income, compared to their peers who did not participate in 4-H.
Nearly 41% of California 4-H alumni reported income levels of $75,000 or greater, while 37% reported income levels between $30,000 and $74,999, and 21% less than $30,000 (see Table 6). At the highest earning levels ($75,000 or more), California adults (50%) reported a family income 9 points higher compared to California 4-H alumni (41%). There was more middle income ($30,000-$74,999) California 4-H alumni (37%) compared to California adults (29%).

Table 6
Family income levels by sample.

Family Income	**California 4-H Alumni N=493***	**U.S. Census Bureau California Sample N=575**
Up to $29,999	21.3%	20.9%
$30,000 to 49,999	12.8%	14.4%
$50,000 to 74,999	24.5%	14.3%
$75,000 to 99,999	10.6%	14.6%
$100,000 or more	30.8%	35.8%

Note. **82 respondents in the California alumni sample did not report their family income*

Health & Well-Being

Health and well-being are the physical, mental, and social conditions of individuals necessary to care for oneself and have high life satisfaction.

Hypothesis 4. Physical and mental health

California 4-H alumni report better physical and mental health, compared to their peers who did not participate in 4-H.
California 4-H alumni reported, on average, that they were "*somewhat satisfied*" with their physical and mental health (5 item ordinal scale; 4.2 mean, 0.8 standard deviation; see Table 7). Independent sample *t*-test comparison of sample mean scores showed that California 4-H alumni were significantly more satisfied (mean=4.2) than the U.S. general population sample (mean=3.6) about their physical and mental health (t=6.96, p <0.001, Cohen's d=0.63).

Hypothesis 5 Social Health

California 4-H alumni will report better social health, compared to their peers who did not participate in 4-H.
California 4-H alumni reported, on average, that they were "*somewhat satisfied*" with their social health (5 item ordinal scale; 4.3 mean, 0.7 standard deviation; see Table 7). Comparison between samples showed that California 4-H alumni were significantly more satisfied (mean=4.3) than

the U.S. general population sample (mean=3.8) with their social health (t=6.8, $p < 0.001$, Cohen's d=0.61).

Hypothesis 6 Economic Satisfaction

California 4-H alumni will report higher levels of economic satisfaction, compared to their peers who did not participate in 4-H.
California 4-H alumni reported an average of "somewhat satisfied" with their economic health (5 item ordinal scale; 4.4 mean, 0.7 standard deviation; see Table 7). Comparison between samples showed that California 4-H alumni were significantly more satisfied (mean=4.4) than the U.S. general population sample (mean=3.7) on their physical and mental health (t=9.3, p <0.001, Cohen's d=0.84).

Table 7
Health and well-being comparison of two samples using independent samples t-test.

	California 4-H Alumni				**U.S. General Population (Edge Research)**			*Mean Diff.*	*SE*	*t value**	*Cohen's d*
	n	*Mean*	*SD*		*n*	*Mean*	*SD*				
Metric 4: Physical and Mental Health	244	4.2	0.8		250	3.6	1.0	0.6	0.08	6.96	.63
Metric 5: Social Health	244	4.3	0.7		250	3.8	0.8	0.5	0.07	6.8	.61
Metric 6: Economic Satisfaction	244	4.4	0.7		249	3.7	1.0	0.7	0.08	9.3	.84

Notes. *Response options coded as 5= Very satisfied, 4=Somewhat satisfied, 3=Neutral, 2=Somewhat dissatisfied, 1=Very dissatisfied; *p<.001; ^3 Cases removed from analysis because of missing data for the metrics 4, 5, and 6 resulting N=303.*

Community Involvement

Community involvement is a sense of civic responsibility and active contribution to one's community through service and/or volunteerism.

Hypothesis 7 Community Involvement

California 4-H alumni will report more positive attitudes towards involvement in community issues, compared to their peers who did not participate in 4-H.
The majority of California 4-H alumni reported positive attitudes towards community involvement (94% mostly agreed or completely agreed; see Table 8). California 4-H alumni were nearly 7-points higher in their agreement (mostly agreed or completely agreed) for community involvement when compared to the Pew national sample. Statistical comparison was significant

($z = 2.01$; $p < .05$), demonstrating that California 4-H alumni reported more positive attitudes towards community involvement.

Table 8
Community involvement attitudes by sample.

Everyone has a duty to be involved in community activities to address local issues	**California 4-H Alumni N=231**	**2012 National Sample (Pew, 2012) N=107**
Completely Agree	37.7%	41.1%
Mostly Agree	55.8%	45.8%
Mostly Disagree	5.6%	12.1%
Completely Disagree	0.9%	0.9%

Note. *The difference the two sample sizes were due to missing responses.*

Hypothesis 8 Voting Frequency

California 4-H alumni will vote more frequently, compared to their peers who did not participate in 4-H.

In the California 4-H alumni sample, 90% reported *always* or *nearly always* voting. California 4-H alumni vote more often compared to their national sample counterparts (only 62% of the matched sample reported voting always or nearly always). See Table 9. The 28-point difference was statistically significant ($z = 7.07$; $p < .001$). Additionally, only 3% of California 4-H alumni stated they never vote, while 11% of the matched national sample said they never vote.

Table 9
Voting frequency by sample.

How often would you say you vote?*	**California 4-H Alumni N=232**	**2012 National Sample (Pew, 2012) N=237**
Always	66.4%	32.1%
Nearly always	23.3%	29.5%
Part of the Time	3.4%	13.5%
Seldom	3.4%	13.9%
Never vote	3.4%	11.0%

Note. **Sample excluded individuals selecting the voting options Other, Don't Know, etc.*

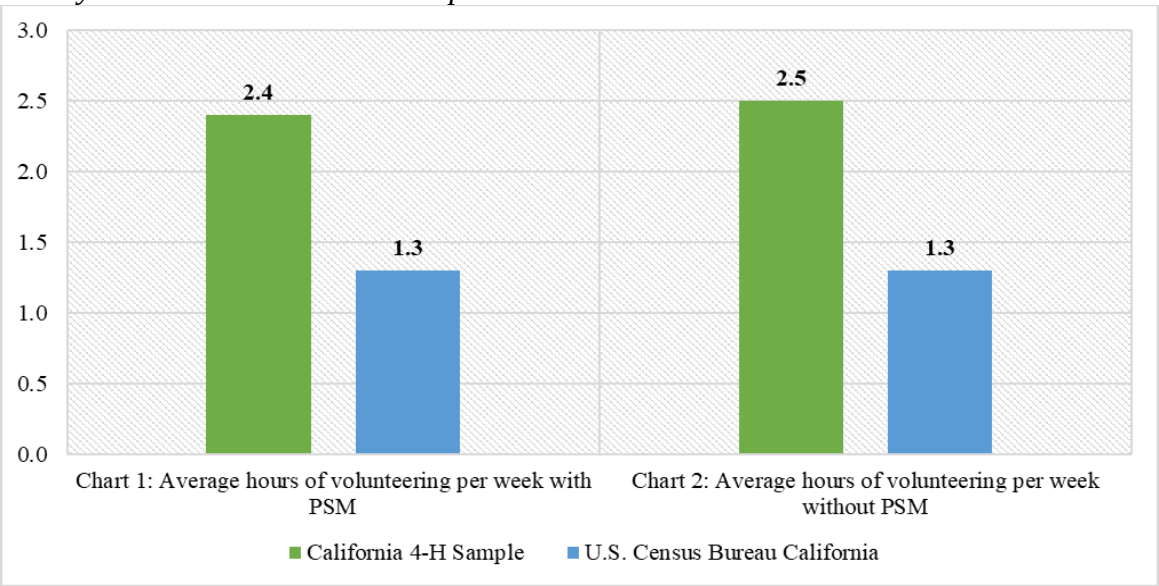
Hypothesis 9 Volunteering

California 4-H alumni will volunteer more often, compared to their peers who did not participate in 4-H.

California 4-H alumni reported volunteering 2.4 hours weekly on average ($n = 430$, $SD = 4.6$ hours; see Figure 2), which was more time volunteering than their California adult counterparts (1.3 hours, $n = 41$, $SD = 2.5$ hours). Assuming non-equal variances in the average number of hours volunteered by individuals, the results showed that the difference between the two sample means was statistically significant ($t = 2.32$; $p < .05$, Cohen's $d = 0.23$). As it can be seen in the

charts 1 and 2 of figure 2, we didn't observe any major difference in the average volunteer hours per week when comparing the sampled group with and without propensity score matching.

Figure 2.
Weekly volunteer service hour comparison between 4-H alumni and Census



Notes. Chart 1: *After removing missing data from both PSM samples, we compared the average volunteering hours of 430 4-H alumni with those of 41 individuals from the general population.* ***Chart 2****: Average mean volunteering hours comparison between two samples without PSM (N for California 4-H and general population was 513 and 127, respectively).*

Discussion

Guided by the theoretical and empirical literature, we collected data from young adult (19- 34-years old) long-tenure California 4-H alumni and compared their long term outcomes to matched counterparts from secondary data samples on three long-term outcomes, each with three hypotheses (nine total): economic stability (education, employment, and income), health & well-being (physical and mental health, social health, and economic satisfaction), and community involvement (civic attitude, voting, and volunteerism). For eight hypotheses, these extended duration California 4-H alumni demonstrated more positive outcomes than the comparison samples. In only one metric (Hypothesis 3. Family income) did the comparable sample of adults demonstrate higher levels of family income compared to the California 4-H alumni sample.

Economic Stability

Economic stability is an important outcome for young adults, as it generally indicates that one can provide for themselves (and their families) without relying on social supports. Our study indicated that highly engaged California 4-H alumni have generally attained higher levels of education, and that California 4-H alumni have 2.25 times odds of achieving an advanced degree compared to their peers. In summary, our findings demonstrated that compared to their peers who did not participate in California 4-H as young people, extended tenure California 4-H alumni have:

1) attained higher levels of college degree (e.g., 57% of California 4-H alumni hold a college degree, compared to only 35% of their peers),
2) greater full-time employment (61% of California 4-H alumni are employed full-time, compared to 39% of their peers), and
3) ***lower*** levels of family income (41% of California 4-H alumni report incomes of $75,000 or more, which is lower than the 50% of California adults reporting similar income levels).

Previous research shows that 4-H programming leads to college and career awareness and readiness as well as life skills development. We find it likely that the experiences California 4-H alumni had in the 4-H program as young people likely improved attitudes for higher education and development of skills useful in the workplace, and thus, benefitted them as young adults. Although California 4-H alumni were more likely to hold college degrees and work full-time, their median family income lagged the California population in the two highest earning bands. We offer a few possible explanations. First, the California 4-H alumni sample mean age was mid-twenties, a career stage in which the financial returns to formal education are still emerging. Second, 4-H alumni have high community involvement attitudes, and there is some evidence that 4-H alumni gravitate toward agriculture, public service, education, and science occupations (e.g., Lerner et al., 2024). These fields often require post-secondary credentials but offer moderate entry-level salaries; however, we did not collect industry data, so we could not test this directly. Third, the outcome variable captures total *family* income. A 4-H alumnus earning a competitive wage may still fall below the top brackets if a co-earner partner works in a lower-pay sector, thereby reducing the combined household total. Future research might investigate age, education, and family income to clarify whether 4-H alumni incomes eventually rise to match or exceed those of their peers.

Health and Well-Being

Health and well-being are another salient young adult outcome. Our findings demonstrated that compared to their peers who did not participate in California 4-H as young people, highly involved California 4-H alumni reported

4) better physical and mental health (California 4-H alumni mean score was 4.2 of 5 compared to their counterparts with 3.6 of 5),
5) better social health (California 4-H alumni mean score was 4.3 of 5 compared to their peers with 3.8 of 5), and
6) higher levels of economic satisfaction (California 4-H alumni reported an average score of 4.4 of 5 compared to the population with 3.7 of 5).

Improving one's health-related skills and attitudes, including cooking, nutrition, and stress-management will lead to better health and life satisfaction as a young adult. We believe it likely that it was their participation in 4-H, and the experiential learning opportunities they were provided to improve their health-related skills and attitudes, that have benefited them as young adults. It may also be that increased community values influenced connection and social relationships.

Community Involvement

Contributing to one's community by voting or volunteering is an important young adult outcome. Our findings demonstrated that compared to their peers who did not participate in California 4-H as young people, long-time involved California 4-H alumni:

7) report more positive attitudes towards involvement in community issues (94% of California 4-H alumni agree that community involvement is important, compared to 87% of their peers),
8) vote more frequently (90% of 4-H alumni compared to 62% of the comparison vote always or nearly always), and
9) volunteer more (California 4-H alumni volunteer an average of 2.4 hours per week, significantly more than the 1.3 hours reported by California adults).

California 4-H emphases civic engagement in its programs, and thus, the California 4-H alumni likely participated in community service, service learning, or deeper forms of involvement with civic learning. As previous research has shown that other 4-H alumni report that 4-H positively influenced their attitudes towards volunteering, voting, and community service, we contend that this participation in 4-H likely influenced their attitudes and involvement as young adults.

Long-Term Outcomes

Overall, our findings show that these California 4-H alumni who had long duration and high involvement in 4-H as youth, were "*healthy, happy, thriving people who make a positive difference in their communities*", achieving the vision advanced in the California 4-H program framework. There were positive relationships between the outcome variables and both years of 4-H participation and level of involvement (see Appendix C). At first glance, it might appear that more years in 4-H as a young, and a higher level of involvement, may lead to more positive long-term outcomes. An easy recommendation is to improve access to and engagement with the 4-H program and/or other youth development programs. However, we note the substantial limitations involved and recommend caution when interpreting results. These results, while including some 4-H alumni who were only involved a few years and/or responded that they were less involved, were mostly the long-tenure, highly active participations. Additionally, we cannot attribute all positive outcomes alumni may experience to their engagement in the 4-H program because people develop in an ecosystem (Bronfenbrenner, 1979; 2005). We argue, nonetheless, that the activities and relationships within the 4-H program (and likely in other youth development programs) create a microsystem, which in turn influences other aspects of participants' lives and development. Thus, alumni's participation in 4-H likely helped them access and leverage other developmental experiences. Furthermore, community relationships and networks develop as part of the 4-H experience and likely contribute to the development of social capital. Specifically, youth who participate in community service projects have higher degrees of social capital than youth who do not engage in community service projects (Enfield & Nathaniel, 2013). Building social capital and connections have compounding positive impacts on the future of 4-H participants. We recommend future research should focus on studying the characteristics of less actively engaged alumni samples, possibly through exploratory studies.

Conceptual Considerations

Although the long-term outcomes we included in the present study were from theoretical literature, we do wonder whether they are the most appropriate or relevant in today's society. Are these three long-term outcomes still important to young adult success? We relied on Gambone et al.'s (2002) seminal framework – economic self-sufficiency, healthy families and social relationships, and community involvement – which has remained prevalent in the scholarship over the past twenty years. While others have proposed alternative, supplemental, or specific outcomes (e.g., Hawkins et al., 2009, O'Connor et al., 2011, Scales et al., 2016), they overlap with the three proposed by Gambone et al. (2002), relying on similar specific metrics for their assessment. A difficulty is identifying the most salient outcomes, and their metrics, that may be measured with a degree of validity and reliability, which are culturally appropriate, and align with post-pandemic economic realities (e.g., is educational degree attainment going to continue to be as important as it was once considered?). Scales et al. (2016) made productive progress in outlining a consensus view of outcomes/dimensions and indicators of successful young adult development. They also suggested assessment indicators from a wide variety of sources, which would be resource-intensive to combine in a comprehensive evaluation effort. We would like to see future work to identify culturally relevant and salient indicators that youth development programs can use to assess their alumni and then compare to secondary data sets.

Methodological Considerations

Our study is an effort to collect and report on long-term outcomes shared by young adults who were 4-H participants in their youth using long-term outcomes identified in existing frameworks (Gambone et al., 2002) and literature (e.g., Scales et al., 2016). We believe we were successful in achieving our goal and provided a baseline to build upon by other youth development programs. A significant challenge was collecting data, primarily because once youth depart the program, their contact information begins to go stale. Tapping into peer networks and local adult mentors was helpful in boosting the survey response rate. Future efforts may also want to collect additional demographic data and program engagement data (i.e., intensity); e.g., do young people who participated more frequently with longer duration experience better long-term outcomes as young adults?

Another goal was to compare the California 4-H alumni sample to existing comparable data sets. We believe we were only partially successful in achieving this goal and have provided a pathway for others to build upon and improve. We note that it may be cost prohibitive for youth organizations to collect their own comparison samples, therefore, the use of reliable secondary data, collected by reliable organizations (e.g., Census, Pew) may be more feasible. In our study, we relied on three comparable samples as no one sample contained data sets for each of the three outcomes (or nine metrics). Relying on many comparable data sets introduces potential bias, increases researcher burden managing multiple data sets (particularly as each has their own methodology, unique variable names, and response options), and makes sharing the results more complex. While collecting a comparable sample instead of relying on secondary data might improve research rigor, we contend that the resource savings make a compelling argument for using secondary data for comparison.

Limitations

Our conclusions should be interpreted and applied cautiously as there are several limitations.

Conceptual bias: The study drew on a narrow set of outcome metrics that were available in national data sets. Not including other constructs may yield an incomplete picture of adult thriving and might understate program effects that occur in those domains. Also, we did not include alumni of other youth programs, so our results are limited in their generalizability across the broader positive youth development field.

Selection bias at enrollment: Youth who join 4-H and remain engaged for many years tend to have supportive families, reliable transportation, and other enabling resources. These pre-existing advantages might have fostered the positive adult outcomes we observed, making it difficult to isolate the specific contribution of 4-H participation.

Attrition and dosage bias: 73% of California 4-H alumni reported at least five years of participation, and a majority reported high levels of involvement, whereas this duration and intensity is not the norm for most 4-H members. Focusing on this high-dosage subset may overestimate program impact, because longer engagement is correlated with stronger developmental gains. Although, the correlations between duration and intensity and positive outcomes suggest the possibility that longer duration and intensity of participation has beneficial effects.

Survey response and non-response bias: The 4-H alumni response rate was low, indicating that respondents might have been those who were more involved, feel most positive about 4-H, are easier to reach, or have more stable life circumstances. Their experiences could be systematically different from non-respondents, which limits the external validity of the findings.

Matching and sample-size limitations: We used conservative nearest-neighbor propensity score matching to achieve tight covariate balance. Although this reduced residual confounding, it also cut analytic sample sizes, lowering statistical power and widening confidence intervals.

Multiple comparison-group bias: No single national data set contained all desired constructs, so we used three separate secondary datasets. Variations in survey year, item wording, and sampling frame introduced heterogeneity that may affect the comparability of estimates across outcomes.

Temporal bias: We collected data during the COVID-19 pandemic, whereas two comparison surveys predate the pandemic and one (Pew 2012) is more than a decade old. Disparities in economic conditions and social attitudes between time periods could lead to spurious differences unrelated to program participation.

Possible overlap across data sets: It is possible that a small number of 4-H alumni appear in both the alumni and a comparison sample. This possibility is likely small, but any overlap would bias effect estimates toward the null.

Contextual bias: California 4-H offers multiple delivery modes, such as community clubs, summer camps, and short-term programs that differ in depth, quality, and duration. California 4-H alumni may have participated in higher-quality programs, and their outcomes may not reflect the average 4-H program experience.

Taken together, these biases suggest that the positive associations reported should be interpreted as preliminary and specific to long-tenure California 4-H alumni who elected to respond. Future studies can strengthen inference by recruiting more diverse tenure groups, capturing richer outcome domains, and aligning primary and comparison data collection periods.

Conclusion

The study provides insights into the long-term outcomes of participating in a youth development program as youth, through comparative analyses using multiple data samples. By examining factors such as economic stability, health and well-being, and community involvement, the study underscores the importance of youth development programs like 4-H in shaping individuals' long-term success and well-being. We hope our work begins to pave the way for additional empirical efforts to advance understanding of the long-term outcomes experienced by youth who participate in youth development programs. Ultimately, these long-term outcomes suggest the value and positive impacts youth development programming can have on individuals. We encourage future researchers to measure and report on the long-term outcomes of previous program participants. A better understanding of the long-term outcomes experienced by 4-H alumni may allow the development of stronger, evidence-based youth development frameworks.

References

4-H Thriving Model Task Force (n.d.). *4-H thriving model of positive youth development*. https://helping-youth-thrive.extension.org/

Anderson, K., & Karr-Lillienthal, L. (2011). Influence of 4-H horse project involvement on development of life skills. *Journal of Extension, 49*(5). https://doi.org/10.34068/joe.49.05.14

Arnett, J. J. (2000). Emerging adulthood: A theory of development from the late teens through the twenties. *American Psychologist, 55*(5), 469–480. https://doi.org/10.1037/0003-066X.55.5.469

Arnett, J. J. (2004). *Emerging adulthood: The winding road from the late teens through the twenties.* Oxford University Press.

Arnett, J.J. (2007). Emerging adulthood: What is it, and what is it good for? *Child Development Perspectives, 1*, 68-73. https://doi.org/10.1111/j.1750-8606.2007.00016.x

Arnold, M. E. (2018). From context to outcomes: A thriving model for 4-H youth development programs. *Journal of Human Sciences and Extension, 6*(1), 141-160. https://doi.org/10.54718/NBNL5438

Arnold, M. E., & Gagnon, R. J. (2019). Illuminating the process of youth development: The mediating effect of thriving on youth development program outcomes. *Journal of Human Sciences and Extension, 7*(3), 24-51. https://doi.org/10.54718/GHUP2927

Astroth, K. A., & Haynes, G. W. (2002). More than cows & cooking: Newest research shows the impact of 4-H. *Journal of Extension, 40*(4). https://tigerprints.clemson.edu/joe/vol40/iss4/9

Benson, P. L., Scales, P. C., Hamilton, S. F., & Sesma, A. (2006). Positive youth development: Theory, research, and applications. In W. Damon & R. M. Lerner (Eds.), *Handbook of Child Psychology* (Sixth ed., Vol. 1, pp. 894-940). John Wiley & Sons, Inc.

Bronfenbrenner, U. (1979). *The ecology of human development.* Harvard University Press.

Bronfenbrenner, U. (Ed.). (2005). *Making human beings human: Bioecological perspectives on human development.* Sage Publications Ltd.

Bowers, E. P., Geldhof, G. J., Johnson, S. K., Hilliard, L. J., Hershberg, R. M., Lerner, J. V., & Lerner, R. M. (Eds.) (2015). *Promoting Positive Youth Development: Lessons Learned from the 4-H Study.* Springer.

Callegaro M., Baker R. P., Bethlehem J., Göritz A. S., Krosnick J. A., Lavrakas P. J. (2014). Online panel research: History, concepts, applications and a look at the future. In Callegaro M., Baker R. P., Bethlehem J., Göritz A. S., Krosnick J. A., Lavrakas P. J. (Eds.), *Online panel research: A data quality perspective* (pp. 1–22). Wiley.

Campbell D, Trzesniewski K, Nathaniel K, Enfield R, Erbstein N. 2013. Positive youth development merits state investment. *California Agriculture 67*(1):38-46. https://doi.org/10.3733/ca.v067n01p38.

Carman, K. G., Chandra, A., Weilant, S., Miller, C., & Tait, M. (2018). *2018 National survey of health attitudes: Description and top-line summary data.* RAND Corporation [2019]. https://www.rand.org/pubs/research_reports/RR2876.html.

Clary, C. D. (2018). Picture this: 4-H press corps builds life skills. *The Journal of Extension, 56*(2). https://doi.org/10.34068/joe.56.02.15

deBlois, M., Tanoue, K., Avery, DeeDee, & Walsh, M. (2018). *Evidence-informed best practices among Walmart Foundation-funded 4-H Healthy Habits programs.* National 4-H

Council. https://4-h.org/wp-content/uploads/2022/09/26143709/4-H-Healthy-Habits-White-paper_FINAL.pdf

Dogan et al. (2012). *UC 4-H youth development program framework.* University of California, Agriculture and Natural Resources. https://4h.ucanr.edu/files/146514.pdf

Durlak, J. A., Weissberg, R. P., & Pachan, M. (2010). A meta-analysis of afterschool programs that seek to promote personal and social skills in children and adolescents. American Journal of Community Psychology, 45(3–4), 294–309. https://doi.org/10.1007/s10464-010-9300-6

Enfield, R., Nathaniel, K.C. (2013). Social capital: Its constructs and survey development. *New Directions for Youth Development: Youth Programs As Builders of Social Capital*. Jossey-Bass.

Espinoza, D. M., Iaccopucci, A. M., Horowitz, M., & Nayak, R. (2024). UC 4-H youth spread the facts – not the disease – during COVID 19. *California Agriculture*, *77*(3-4). https://doi.org/10.3733/ca.2023a0013

Federal Interagency Forum on Child and Family Statistics (2014). *America's Young Adults: Special Issue*. U.S. Government Printing Office. https://www.childstats.gov/pdf/ac2014/YA_14.pdf

Gallup. (2019). *Americans largely satisfied with 10 personal life aspects.* https://news.gallup.com/file/poll/248351/2019-02-12LifeAspectsSatisfaction.pdf

Gambone, M. A., Klem, A. M., & Connell, J. P. (2002). *Finding out what matters for youth: Testing key links in a community action framework for youth development.* Youth Development Strategies, Inc., and Institute for Research and Reform in Education. http://www.ydsi.org/ydsi/pdf/whatmatters.pdf

Goodwin, J., Carroll, J. B., & Oliver, M. (2007). Accentuating the positive: Colorado 4-H impact study. *Journal of Extension, 45*(5). https://tigerprints.clemson.edu/joe/vol45/iss5/19

Hamilton, S.F., Hamilton, M.A., & Pittman, K. (2004). Principles for youth development. In S.F. Hamilton & M.A. Hamilton (Eds.), *The Youth Development Handbook: Coming of Age in American* Communities (pp.3-22). Sage Publications, Inc.

Hawkins, T., Letcher, P., Sanson, A., Smart, D., & Toumbourou, J. W. (2009). Positive development in emerging adulthood. *Australian Journal of Psychology, 61*(2), 89-99. https://doi.org/10.1080/00049530802001346

Heck, K. E. & Subramaniam, A. (2009). Youth development frameworks. *Monograph*. University of California, 4-H Center for Youth Development. https://ucanr.edu/sites/UC4-H/files/29164.pdf

Ho, D., Imai, K., King, G., & Stuart, E. A. (2011). MatchIt: Nonparametric Preprocessing for Parametric Causal Inference. *Journal of Statistical Software, 42*(8), 1–28. https://doi.org/10.18637/jss.v042.i08

Horrillo, S. J., Smith, M. H., Wilkins, T. R., Diaz Carrasco, C. P, Caeton, N. W., McIntyre, D., & Schmitt-McQuitty, L. (2021). A positive youth development approach to college and career readiness. *Journal of Youth Development, 16*(1). https://doi.org/10.5195/jyd.2021.966

Klisch, S., & Soule, K. E. (2021). 4-H student nutrition advisory councils support positive youth development and health outcomes among underserved populations. *Journal of Extension, 59*(3). https://doi.org/10.34068/joe.59.03.19

Lerner, R. (2006). Developmental science, developmental systems, and contemporary theories of human development. In W. Damon & R. M. Lerner (Eds.), *Handbook of Child Psychology* (Sixth ed., Vol. 1, pp. 1-17). John Wiley & Sons, Inc.

Lerner, R. M., Lerner, J. V., Buckingham, M. H., Le, T. U., Park, Y., & Kim, E. J. (2024). *The positive development of young people: Findings from the Reconnection and Replication of the 4-H Study of Positive Youth Development.* National 4-H Council. https://www.4-h.org/wp-content/uploads/2024/01/23154204/2023-06-07-The-Reconnection-and-Replication-of-the-4-H-Study-of-PYD-Final-Report.pdf

Lerner, R.M., Lerner, J.V., Murry, V.M., Smith, E.P., Bowers, E.P., Geldhof, G.J. and Buckingham, M.H. (2021), Positive Youth Development in 2020: Theory, Research, Programs, and the Promotion of Social Justice. *Journal of Research on Adolescence*, *31*: 1114-1134. https://doi.org/10.1111/jora.12609

Lerner, J.V., Phelps, E., Forman, Y., Bowers, E. P. (2009). Positive youth development. In R. M. Lerner & L. Steinberg (Eds.), *Handbook of Adolescent Psychology* (Third ed., Vol. 1, pp. 524-558). John Wiley & Sons, Inc.

Lerner, R. M., Lerner, J. V. & Colleagues. (2013). *The positive development of youth: Comprehensive findings from the 4-H study of positive youth development.* National 4-H Council.

Lerner, R. M., Lerner, J. V., Lewin-Bizan, S., Bowers, E. P., Boyd, M. J., Mueller, M. K., Schmid, K. L., & Napolitano, C. M., (2011). Positive youth development: Process, programs, and problematics. *Journal of Youth Development, 6*(3), 41-64. https://doi.org/10.5195/jyd.2011.174

Lerner, R. M., Lerner, J. V., Murry, V. M., Smith, E. P., Bowers, E. P., Geldhof, J., & Buckingham, M. H. (2021). Positive youth development in 2020: Theory, research, programs, and the promotion of social justice. *Journal of Research on Adolescence, 31*(4). https://onlinelibrary.wiley.com/doi/abs/10.1111/jora.12609

Lewis, K. M., Hensley, S., Bird, M., Rea-Keywood, J., Miller, J., Kok, C., & Shelstad, N. (2022). Why youth leave 4-H after the first year: A multistate study. *Journal of Human Sciences and Extension, 10*(3), 5. https://doi.org/10.55533/2325-5226.1429

Lewis, K. M., Kok, C. M., Worker, S., & Miner, G. (2021). Exploring the relationship between program experience and youth developmental outcomes. *Journal of Human Sciences and Extension, 9*(3), 68-106. https://www.jhseonline.com/article/view/1137

Lewis, K. M., Iaccopucci, A. M., & Soule, K. E. (2020). Engaging teens and adults in mindfulness: The University of California 4-H mindfulness retreat. *Journal of Extension, 58*(4). https://doi.org/10.34068/joe.58.04.07

Marshall-Wheeler, N., Meng, Y., & Worker, S. (2022). Exploring public speaking self-efficacy in the 4-H presentation program. *Journal of Extension, 60*(4). https://doi.org/10.34068/joe.60.04.12

Medley, M. L. (1980). Life satisfaction across four stages of adult life. *The International Journal of Aging & Human Development, 11*(3), 193–209. https://doi.org/10.2190/D4LG-ALJQ-8850-GYDV

Merten, K., Locke, D., Williams, M., Carter., M., & Lehman, K. (2014). Impact of 4-H on alumni's community involvement. *Journal of Extension, 52*(2). https://doi.org/10.34068/joe.52.05.04

Miner, G. M. & Horrillo, S. J. (2021) *iChampion: Leading healthy.* University of California, Agriculture and Natural Resources. https://shop4-h.org/products/ithrive-ichampion-facilitators-kit

Miner, G. M., Iaccopucci, A., & Horrillo, S. J. (2021) *iChampion: Leadership U.* University of California, Agriculture and Natural Resources. https://shop4-h.org/products/ithrive-ichampion-facilitators-kit

Miner, G., Nayak, R., Butterfield, C., Schwarting, D., & MacArthur, S. (in press). Engaging generation Z: Exploring volunteering preferences and influential factors for 4-H programming. *The Journal of Extension.*

Mitchell-Hawkins, V., & Mellon, J. (2022). 4-H summer of STEM: A practical approach to increasing workforce readiness. *Journal of Extension, 60*(4). https://doi.org/10.34068/joe.60.04.05

National 4-H Council and Edge Research, Inc. (2019). *4-H alumni research: National online survey. Programming: 5-8-19* [Unpublished raw data NFH1901].

National Research Council and Institute of Medicine. (2002). *Community programs to promote youth development.* National Academy Press.

Nayak, R. (2021, January). *Participation and evaluation report: Program year 2019-20.* University of California, Agriculture and Natural Resources. [Internal report].

Nayak, R. (2022, January). *Participation and evaluation report: Program year 2020–21.* University of California, Agriculture and Natural Resources. [Internal report].

O'Connor, M., Sanson, A., Hawkins, M. T., Letcher, P., Toumbourou, J. W., Smart, D., Vassallo, S., & Olsson, C. A. (2011). Predictors of positive development in emerging adulthood. *Journal of Youth Adolescence, 40*, 860-874. https://doi.org/10.1007/s10964-010-9593-7

Pennington, P., & Edwards, M. (2006). Former 4-H key club members' perceptions of the impact of "giving" life skills preparation on their civic engagement. *Journal of Extension, 44*(1). https://tigerprints.clemson.edu/joe/vol44/iss1/9

Pew Research Center. (2012). *1987-2012 values survey combined dataset.* https://www.pewresearch.org/politics/dataset/1987-2012-values-survey-combined-dataset/

Radhakrishna, R., & Doamekpor, P. (2009). Teaching leadership and communications skills and responsibilities: A comparison of 4-H and other youth organizations. *Journal of Extension, 47*(2). https://tigerprints.clemson.edu/joe/vol47/iss2/6

Radhakrishna, R. B., & Sinasky, M. (2005). 4-H experiences contributing to leadership and personal development of 4-H alumni. *Journal of Extension, 43*(6). https://tigerprints.clemson.edu/joe/vol43/iss6/10

Radhakrishna, R., Foley, C., Ingam, P., & Ewing, J. C. (2013). Effectiveness of the 4-H program as perceived by parents of 4-H participants. *Journal of Extension, 51*(4). https://doi.org/10.34068/joe.51.04.35

Ramey, H. L., Lawford, H. L., Rose–Krasnor, L., Freeman, J., & Lanctot, J. (2018). Engaging diverse Canadian youth in youth development programs: Program quality and community engagement. *Children and Youth Services Review, 94*, 20–26. https://doi.org/10.1016/j.childyouth.2018.09.023

Rea, L. M., & Parker, R. A. (2014). *Designing and conducting survey research: A comprehensive guide* (4th ed.). John Wiley & Sons, Inc.

Reifman, A., Arnett, J. J., & Colwell, M. J. (2007). Emerging adulthood: Theory, assessment, and application. *Journal of Youth Development, 2*(1). https://doi.org/10.5195/jyd.2007.359

Roth, J. L., & Brooks-Gunn, J. (2016). Evaluating youth development programs: Progress and promise. *Applied Developmental Science, 20*, 188-202. https://doi.org/10.1080/10888691.2015.1113879

Scales, P. C., Benson, P. L., Oesterle, S., Hill, K. G., Hawkins, J. D., Pashak, T. J. (2016). The dimensions of successful young adult development: A conceptual and measurement framework. *Applied Developmental Science, 20*(3), 150-174. https://doi.org/10.1080/10888691.2015.1082429

Schoor, L. B., & Marchand, V. (2007). Pathway to the prevention of childhood abuse and neglect. *Project on Effective Interventions & Pathways Mapping Initiative*. https://matrixoutcomesmodel.com/images/Pathway.pdf

Seevers, B. S., Hodnett, F., & Van Leeuwen, D. (2011). Findings of 4-H impact studies in six western states. *Journal of Extension, 49*(4). https://doi.org/10.34068/joe.49.04.05

Smischney, T. M., Roberts, M. A., Gliske, K., Borden, L. M., & Perkins, D. F. (2018). Developing youth competencies: The impact of program quality. *Journal of Youth Development, 13*(4). https://doi.org/10.5195/jyd.2018.587

Smith, M. H., Meehan, C. L., & Borba, J. A. (2014). Bio-security proficiencies project for beginning producers in 4-H. *Journal of Extension, 52*(6). https://doi.org/10.34068/joe.52.06.02

Stuart E. A. (2010). Matching methods for causal inference: A review and a look forward. Statistical science : a review journal of the Institute of Mathematical Statistics, 25(1), 1–21. https://doi.org/10.1214/09-STS313

Swanson, D. (2018). *4-H civic engagement: Connecting, learning, engaging, leading and impacting.* 4-H National Headquarters. https://4h.ucanr.edu/files/292067.pdf

Tayfur, S. N., Prior, S., Roy, A. S., Fitzpatrick, L. I., & Forsyth, K. (2021). Adolescent psychosocial factors and participation in education and employment in young adulthood: A systematic review and meta-analysis. *Educational Research Review, 34*. https://doi.org/10.1016/j.edurev.2021.100404

Temescal Associates. (2018). *Youth development guide 2.0: Engaging young people in after-school programming.* https://www.dropbox.com/s/2n0suaofc4nsp7r/YD%20GUIDE%202.0%20Final.pdf?dl=0

U.S. Census Bureau. (2021). *Current population survey, September 2021 volunteering and civic life supplement.* https://www.census.gov/data/datasets/time-series/demo/cps/cps-supp_cps-repwgt/cps-volunteer.html

White, A. A., Colby, S. E., Franzen-Castle, L., Kattelmann, K. K., Olfert, M. D., Gould, T. A., Hagedorn, R. L., Mathews, D. R., Moyer, J., Wilson, K., & Yerxa, K. (2019). The iCook 4-H study: An intervention and dissemination test of a youth/adult out-of-school program. *Journal of nutrition education and behavior*, *51*(3S), S2–S20. https://doi.org/10.1016/j.jneb.2018.11.012

Worker, S. M., Miner, G. M. & Horrillo, S. J. (2021) *iChampion: Leadership, science, and me.* University of California, Agriculture and Natural Resources. https://shop4-h.org/products/ithrive-ichampion-facilitators-kit

Zhao, Q. Y., Luo, J. C., Su, Y., Zhang, Y. J., Tu, G. W., & Luo, Z. (2021). Propensity score matching with R: conventional methods and new features. *Annals of translational medicine*, *9*(9), 812. https://doi.org/10.21037/atm-20-3998

Appendix A

Distribution of Variables used in Propensity Score Matching and Pre- and Post-Matching Charts

Section 1. California 4-H Alumni and US Census Samples

California 4-H and US Census Data for California, 2021 (Matched N=575)

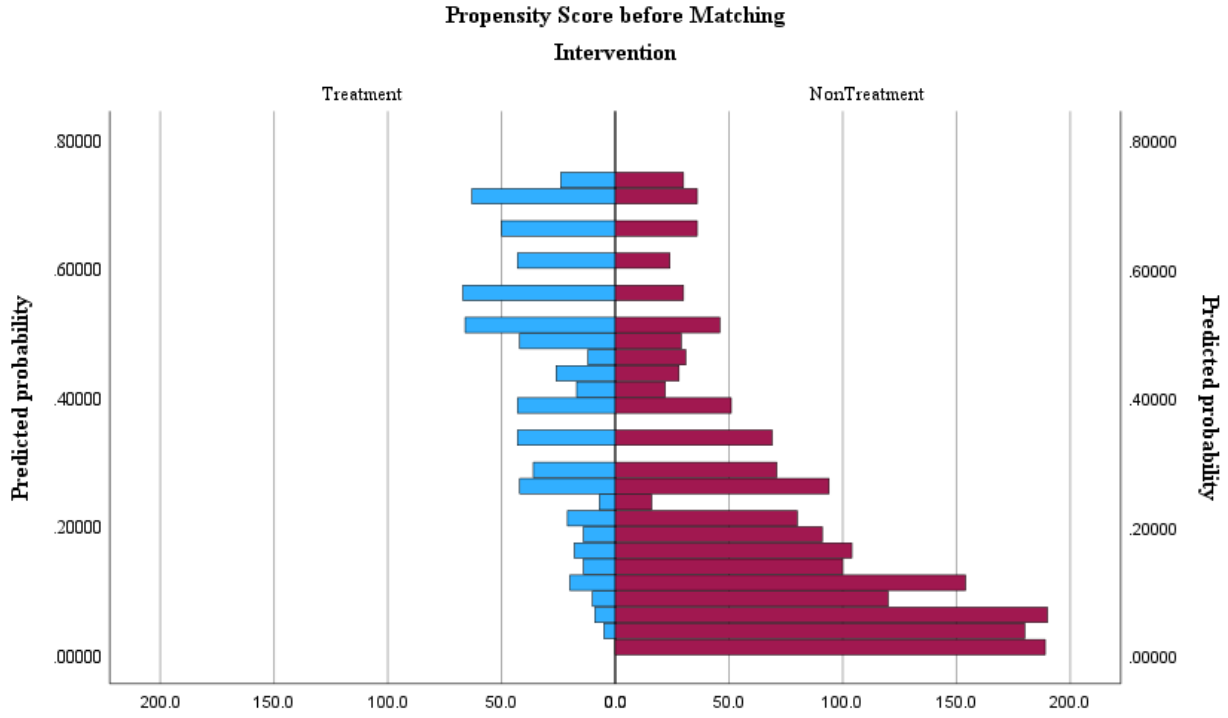
Variables used for PSM	California 4-H		US Census Data for California	
Gender	***n***	***%***	***n***	***%***
Male	175	30.4	205	35.7
Female	400	69.6	370	64.3
Ethnicity	***n***	***%***	***n***	***%***
Hispanic	67	11.7	67	11.7
Non-Hispanic	508	88.3	508	88.3
Age	Mean=24; *Sd*=3.4	Median=23	Mean=23.7; *Sd*=3.5	Median=23

SMD Table

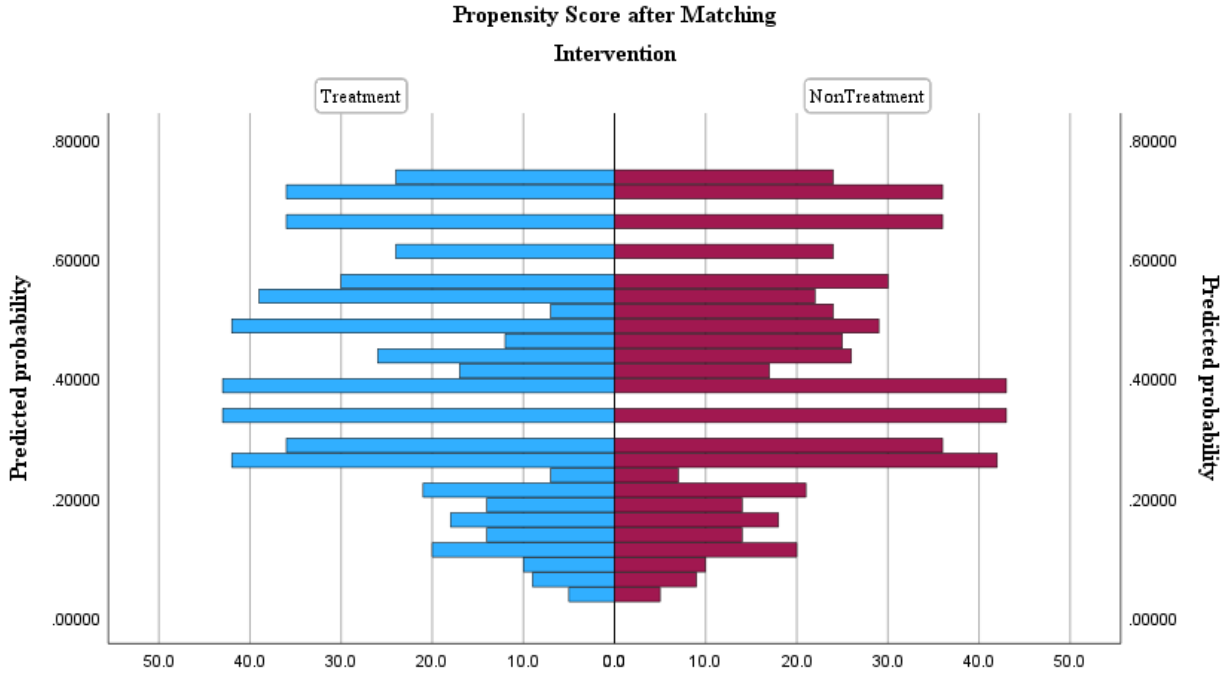
	SMD before Matching	**SMD^ after Matching**
Age*	.753	.075
Ethnicity**	.798	0.0
Gender**	.499	.113

*Continuous variable, **Dichotomous variable, ^The accepted absolute value of SMD is less than 0.25, acceptable as per Stuart (2010).

Predicted Probability Chart for all Cases before PSM



Predicted Probability Chart for Matched Cases after PSM

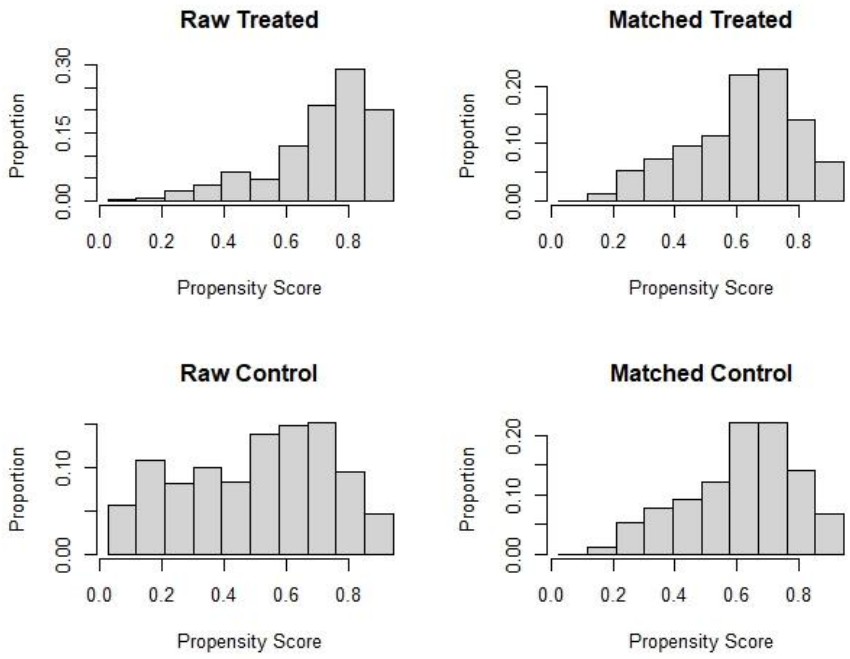


Section 2: California 4-H Alumni and Edge Research California Samples

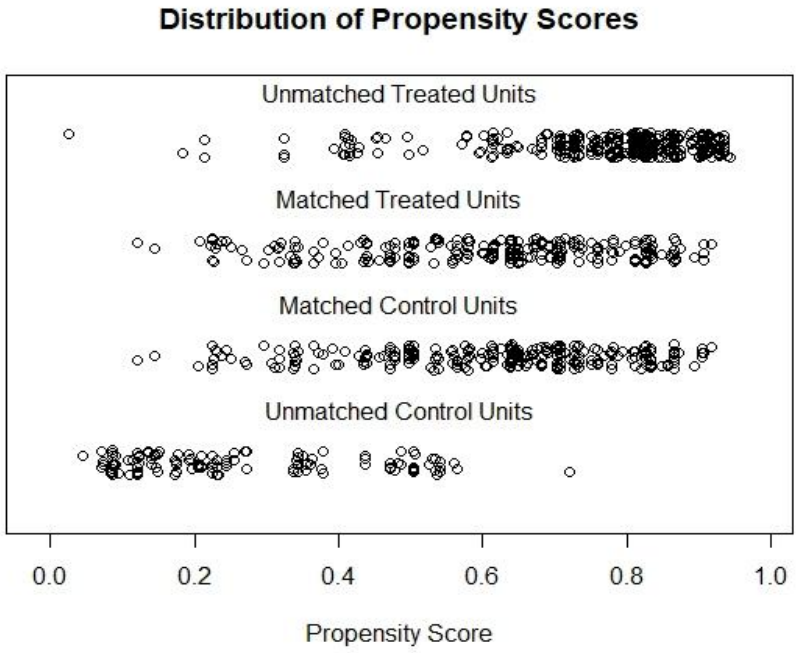
California 4-H and Edge Research California Sample (Matched N=250)

Variables used for PSM	California 4-H		Edge Research Data for California	
Gender	***n***	***%***	***n***	***%***
Male	118	47.2	110	44.0
Female	132	52.8	140	56.0
Ethnicity	***n***	***%***	***n***	***%***
Hispanic	29	11.6	28	11.2
Non-Hispanic	221	88.4	222	88.8
Family Income	***n***	***%***	***n***	***%***
Less than $25,000	30	12.0	43	17.2
$25,000-$49,999	66	26.4	67	26.8
$50,000 to $74,999	58	23.2	54	21.6
$75,000 to $99,999	41	16.4	30	12.0
$100,000 or more	55	22.0	56	22.4
Employment Status	***n***	***%***	***n***	***%***
Self-employed	10	4.0	11	4.4
Employed full-time	144	57.6	155	62.0
Employed part-time	30	12.0	35	14.0
Homemaker	14	5.6	12	4.8
Retired	2	0.8	1	0.4
Temporarily unemployed	6	2.4	6	2.4
A student	39	15.6	26	10.4
Disabled	1	0.4	0	0
Not employed	4	1.6	4	1.6
Educational Level	***n***	***%***	***n***	***%***
Highschool or less	32	12.8	40	16.0
Some College or Associate Degree	97	38.8	86	34.4
Bachelor's Degree	86	34.4	90	36.0
Advanced Degree	35	14.0	34	13.6

APS Histograms Before and After Matching



PS Jitter Plot for Matched and Unmatched Cases



Summary of Balance for Matched Data

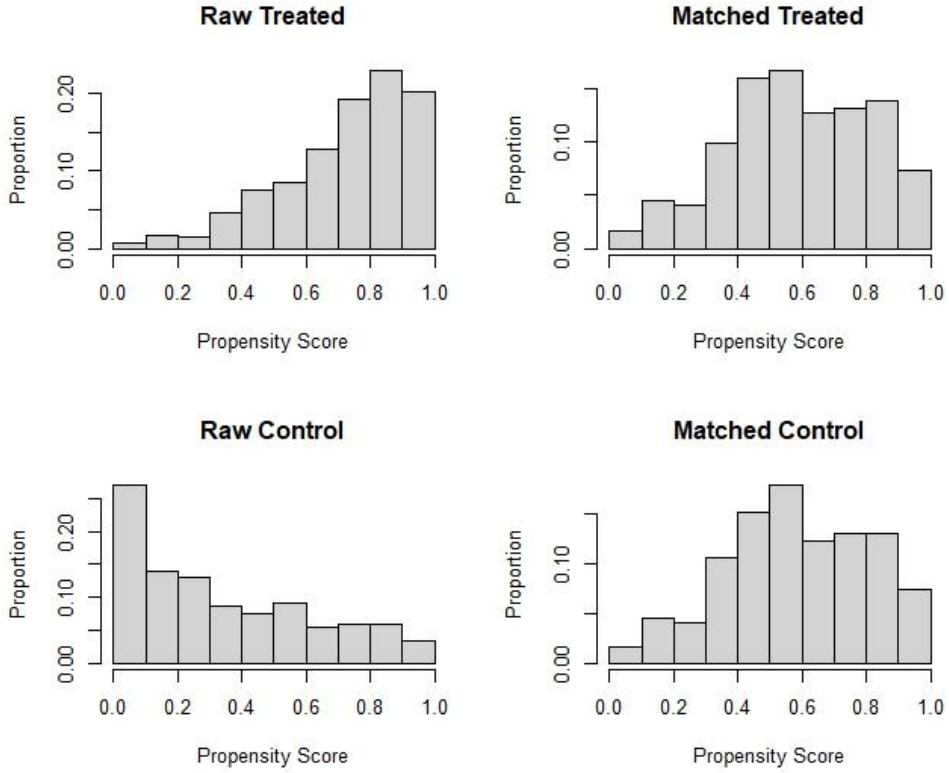
	Treated Means	Control Std.	Mean Diff. Var.	Ratio eCDF	Mean eCDF	Max Std.	Pair Dist.
distance	0.615	0.614	0.004	1.004	0.002	0.032	0.005
Hispanic	0.116	0.112	0.014	.	0.004	0.004	0.260
Non-Hispanic	0.884	0.888	-0.014	.	0.004	0.004	0.260
Male	0.472	0.440	0.072	.	0.032	0.032	0.415
Female	0.528	0.560	-0.072	.	0.032	0.032	0.414
Highschool or less	0.000	0.000	0.000	.	0.000	0.000	0.000
Some College or Associate Degree	0.128	0.160	-0.122	.	0.032	0.032	0.396
Bachelor's Degree	0.388	0.344	0.090	.	0.044	0.044	0.370
Advanced Degree	0.344	0.360	-0.033	.	0.016	0.016	0.310
Less than $25,000	0.140	0.136	0.012	.	0.004	0.004	0.246
$25,000-$49,999	0.120	0.172	-0.133	.	0.052	0.052	0.419
$50,000 to $74,999	0.264	0.268	-0.010	.	0.004	0.004	0.260
$75,000 to $99,999	0.232	0.216	0.038	.	0.016	0.016	0.497
$100,000 or more	0.164	0.120	0.140	.	0.044	0.044	0.268
Self-employed	0.220	0.224	-0.009	.	0.004	0.004	0.237
Employed full-time	0.040	0.044	-0.016	.	0.004	0.004	0.245
Employed part-time	0.576	0.620	-0.088	.	0.044	0.044	0.329
Homemaker	0.120	0.140	-0.062	.	0.020	0.020	0.309
Retired	0.056	0.048	0.052	.	0.008	0.008	0.156
Temporarily unemployed	0.008	0.004	0.046	.	0.004	0.004	0.138
A student	0.024	0.024	0.000	.	0.000	0.000	0.024
Disabled	0.156	0.104	0.127	.	0.052	0.052	0.322
Not employed	0.004	0.000	0.059	.	0.004	0.004	0.059

Section 3: California 4-H Alumni and Pew Research Center's Sample

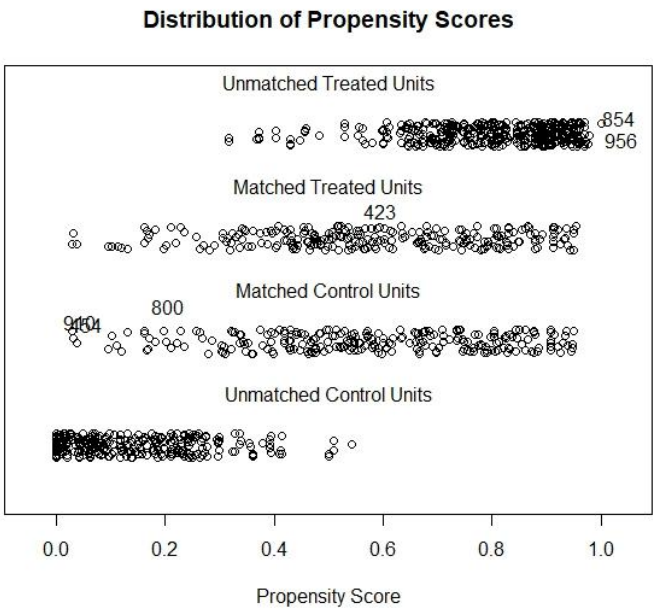
California 4-H and Pew Research Center's Sample (Matched N=244)

Variables used for PSM	California 4-H Alumni Sample		Pew Research Center Data 2012	
Gender	***n***	***%***	***n***	***%***
Male	106	43.4	99	40.6
Female	138	56.6	145	59.4
Ethnicity	***n***	***%***	***n***	***%***
Hispanic	33	13.5	28	11.5
Non-Hispanic	211	86.5	216	88.5
Age	Mean=24.5; Sd=3.7	Median=24	Mean=24.8; Sd=4.5	Median=24
Family Income	***n***	***%***	***n***	***%***
Less than $10,000	16	6.6	18	7.4
10 to under $20,000	18	7.4	19	7.8
20 to under $30,000	29	11.9	23	9.4
30 to under $40,000	20	8.2	16	6.6
40 to under $50,000	18	7.4	21	8.6
50 to under $75,000	51	20.9	55	22.5
75 to under $100,000	32	13.1	34	13.9
100 to under $150,000	32	13.1	32	13.1
$150,000 or more	28	11.5	26	10.7
Educational Level	***n***	***%***	***n***	***%***
High school	37	15.2	37	15.2
Some College no Degree	68	27.9	70	28.7
Associate Degree	33	13.5	26	10.7
Bachelor's Degree	68	27.9	76	31.1
Higher education/ Advanced Degree	38	15.6	35	14.4

Histograms Before and After Matching



PS Jitter Plot for Matched and Unmatched Cases



Summary of Balance for Matched Data

	Means Treated	Means Control	Std. Mean Diff.	Var. Ratio	eCDF Mean	eCDF Max Std.	Pair Dist.
Distance	0.584	0.581	0.014	1.013	0.004	0.029	0.016
Age	24.496	24.799	-0.092	0.684	0.048	0.082	1.168
Hispanic	0.135	0.115	0.070	.	0.021	0.021	0.687
Non-Hispanic	0.865	0.885	-0.070	.	0.021	0.021	0.687
Male	0.434	0.406	0.065	.	0.029	0.029	0.841
Female	0.566	0.594	-0.065	.	0.029	0.029	0.840
High school	0.152	0.152	0.000	.	0.000	0.000	0.148
Some College no Degree	0.279	0.287	-0.019	.	0.008	0.008	0.907
Associate Degree	0.135	0.107	0.089	.	0.029	0.029	0.697
Bachelor's Degree	0.279	0.312	-0.067	.	0.033	0.033	0.752
Higher education	0.131	0.119	0.040	.	0.012	0.012	0.727
Advanced Degree	0.025	0.025	0.000	.	0.000	0.000	0.049
Less than $10,000	0.066	0.074	-0.030	.	0.008	0.008	0.331
10 to under $20,000	0.074	0.078	-0.018	.	0.004	0.004	0.445
20 to under $30,000	0.119	0.094	0.086	.	0.025	0.025	0.660
30 to under $40,000	0.082	0.066	0.069	.	0.016	0.016	0.590
40 to under $50,000	0.074	0.086	-0.046	.	0.012	0.012	0.567
50 to under $75,000	0.209	0.225	-0.038	.	0.016	0.016	0.651
75 to under $100,000	0.131	0.139	-0.026	.	0.008	0.008	0.701
100 to under $150,000	0.131	0.131	0.000	.	0.000	0.000	0.221
$150,000 or more	0.115	0.107	0.024	.	0.008	0.008	0.581

Appendix B

Comparisons between 4-H alumni and secondary data survey items and response options categorized by outcome and hypothesis.

Long Term Outcomes	Hypothesis Metric	4-H Alumni Survey Item	Secondary Data Source Survey Item		
Economic Stability	1. Highest level of education	**Highest Level of Education Completed:**	**Highest level of school completed or degree received**		
		Elementary or middle school	Less than 1st grade 1st, 2nd, 3rd or 4th grade 5th or 6th grade		
		Some high school	7th or 8th grade 9th grade 10th grade 11th grade		
		High school graduation	12th grade no diploma		
		Some college but no degree	High school grad-Diploma or Equiv (GED)		
		Associate degree	Some college but no degree Associate degree-Occupational/Vocational		
		Bachelor's degree (BA, AB, BS)	Associate degree-Academic program		
		Master's degree (MA, MS, MEng, MEd, MSW)	Bachelor's degree (EX: BA, AB, BS)		
		Professional school degree (MD, DDS, DVM)	Master's degree (EX: MA, MS, MEng, MEd, MSW)		
		Doctorate degree (PhD, EdD)	Professional school deg (EX: MD, DDS, DVM) Doctorate degree (EX: PhD, EdD)		
	2. Employment status	**Employment status:**	**EXPERIENCED LABOR FORCE EMPLOYMENT**	**FULL TIME LABOR FORCE**	**ARE YOU ENROLLED IN SCHOOL FULL-TIME OR PART-TIME STUDENT?**
		Self-employed	EMPLOYED		
		Employed full-time	UNEMPLOYED		
		Employed part-time			
		Homemaker			
		Retired			
		Temporarily unemployed			
		A student			
		Disabled			

		Not employed	PART TIME LABOR FORCE FULL-TIME PART-TIME
	3. Family income	**Family Income:** LESS THAN $5,000 5,000 TO 7,499 7,500 TO 9,999 10,000 TO 12,499 12,500 TO 14,999 15,000 TO 19,999 20,000 TO 24,999 25,000 TO 29,999 30,000 TO 34,999 35,000 TO 39,999 40,000 TO 49,999 50,000 TO 59,999 60,000 TO 74,999 75,000 TO 99,999 100,000 TO 149,999 150,000 OR MORE	**Family Income (Combined income of all family members during the last 12 months.)** LESS THAN $5,000 5,000 TO 7,499 7,500 TO 9,999 10,000 TO 12,499 12,500 TO 14,999 15,000 TO 19,999 20,000 TO 24,999 25,000 TO 29,999 30,000 TO 34,999 35,000 TO 39,999 40,000 TO 49,999 50,000 TO 59,999 60,000 TO 74,999 75,000 TO 99,999 100,000 TO 149,999 150,000 OR MORE
		Thinking about your own life and experiences, how satisfied are you with each of the following aspects in your life?	**Thinking about your own life and experiences, how satisfied are you with each of the following aspects in your life?**
Health and well-being	4. Physical and mental health	Your physical health Your mental and emotional health Your family situation	Your physical health Your mental and emotional health Your family situation
	5. Social health	Connections with others in the community	Connections with others in the community

		Opportunities for recreation, hobbies, sports or leisure Your personal network of family and friends Safety and security in your community	Opportunities for recreation, hobbies, sports or leisure Your personal network of family and friends Safety and security in your community
	6. Economic satisfaction	Your job or work Your future career or job prospects Your current level of education and training Your ability to secure a good-paying job	Your job or work Your future career or job prospects Your current level of education and training Your ability to secure a good-paying job
Community Involvement	7. Community involvement	**Everyone has a duty to be involved in community activities to address local issues.** Completely Agree Mostly Agree Mostly Disagree Completely Disagree	**Everyone has a duty to be involved in community activities to address local issues.** Completely Agree Mostly Agree Mostly Disagree Completely Disagree
	8. Voting frequency	**How often would you say you vote?** Always Nearly always Part of the time Seldom Never vote	**How often would you say you vote...** Always Nearly always Part of the time Seldom Never vote Other response Don't know/Refused
	9. Volunteering	**How many hours per week (on average) do you volunteer?** Open box accepted numbers 0 to 10,000	**In the past 12 months, approximately how many hours did [you/[NAME]] volunteer?** Responses between 1 and 500 -9 No answer -3 Refused -2 Don't know -1 Not in universe

Appendix C

Involvement in 4-H and Years in 4-H

	Years in 4-H											
	1 to 2 years		3 to 4 years		5 to 7 years		7 to 10 years		More than 10 years		Total	
Involvement in 4-H	N	%	N	%	N	%	N	%	N	%	N	%
Minimally	13	14.8	9	9.7	2	1.00	2	0.9	0	0.0	26	3.8
Moderately	40	45.5	46	49.5	41	20.50	19	9.0	6	6.1	152	22.0
Very	18	20.5	26	28.0	103	51.50	71	33.5	28	28.3	246	35.5
Extremely	17	19.3	12	12.9	54	27.00	120	56.6	65	65.7	268	38.7
	88	100.0	93	100.0	200	100.00	212	100.0	99	100.0	692	100.0

Pearson Chi-Square= 222.25, $p<.001$; Ordinal by Ordinal Relationship using Kendall's tau-b =.419

From the standardized residual values, we observed that alumni who spent 1 to 2 years in 4-H were more likely minimally involved, who spent 3 to 4 years were moderately involved. Also, who spent more than 10 years in 4-H were more likely to extremely involved in 4-H.

Association/Correlation between the Level of Involvement in 4-H vs. Outcome Variables.

1. **Education.** We performed chi-square test of association between 4-H involvement and the education level. The chi-square value of 26.09 (df=18) was significant at the level of .10 and the ordinal-to-ordinal association Kendall's tau-b value was only .099. Minimally involved individuals were less likely to have a bachelor's degree and extremely involved individuals were more likely to report having a master's degree.
2. **Employment.** We performed chi-square test of association between 4-H involvement and the employment level. The chi-square value of 12.94 (df=6) was significant at the level of .05 and the nominal-by-nominal association Cramer's V value was only .099. Minimally involved individuals were more likely to have part-time employed. There was a likeliness that individuals extremely engaged in 4-H were more likely to be full-time employed, however, the standardized residual values didn't provide any significant association with regards to the study objectives.
3. **Family Income.** The chi-square test of association between 4-H involvement and the family income was not statistically significant (Chi-square=12.41, df=12, p=.41).
4. **Relationship between Level of Involvement and Health and Wellbeing Outcomes.** We calculated Pearson correlation values between the level of individual's involvement in 4-H and their reported wellbeing outcome scores treating as continuous variables. The result showed positive and signification relationship between them and indicating more involved individuals are more satisfied with their health and wellbeing measures listed in the following table.

	Physical and mental health	Economic satisfaction	Social Health
Pearson Correlation	.176	.221	.233
p value	<.001	<.001	<.001
N	647	647	646

5. **Community Involvement Attitude.** The chi-square test of association between 4-H involvement and the attitude towards involvement in community activities was statistically significant (Chi-square=33.33, *df*=9, *p*<.001). The ordinal-to-ordinal association Kendall's tau-b value was found to be .163. The review of standardized residual values showed that individuals who extremely involved in 4-H were in complete agreement with the statement stating everyone has a duty to be involved in community activities to address local issues.
6. **Voting Practice.** The chi-square test of association between 4-H involvement and the voting practice was statistically significant (Chi-square=23.23, *df*=12, *p*<.05). The ordinal-to-ordinal association Kendall's tau-b value was found to be .081. The review of standardized residual values showed that individuals who minimally involved in 4-H were most likely never vote or seldom vote.
7. **Volunteering Hours.** We calculated Pearson correlation values between the level of individual's involvement in 4-H and number of estimated hours volunteering per week, treating them as continuous variables. The result showed a positive and signification relationship (Pearson Correlation=.118, *p*=.007) between them, and indicated that more involved individuals were more likely to volunteer relatively higher number of hours.

Association/Correlation between the Years in 4-H vs. Outcome Variables.

1. **Education.** We performed chi-square test of association between years in 4-H and the education level. The chi-square value of 39.32 (*df*=24) was significant at the level of .05 and the ordinal-to-ordinal association Kendall's tau-b value was only .117. Individuals who spent 7 to 10 years in 4-H were more likely to have bachelor's degree. Those spent more than 10 years were more likely to have either master's degree or professional school degree.
2. **Employment.** We performed chi-square test of association between 4-H involvement and the employment level. The chi-square value of 10.25 (*df*=8) was not significant at the level of .05 and the nominal-by-nominal association Cramer's V value was only .088. Minimally involved individuals were more likely to have a part-time employed. There was some likeliness that individuals extremely engaged in 4-H were more likely to be full-time employed, however, the standardized residual values didn't provide any significant association with regards to the study objectives.
3. **Family Income.** The chi-square test of association between years in 4-H and the family income was found to be not statistically significant (Chi-square=10.0, *df*=16, *p*=.87).

4. **Relationship between Level of Involvement and Health and Wellbeing Outcomes.** We calculated nominal (years in 4-H) by interval (health and wellbeing) association measure using Eta value. The health and wellbeing outcomes used as dependent variable. The Eta values showed weak associations between the variables as listed in the following table.

	Physical and mental health	**Economic satisfaction**	**Social Health**
Eta value	.118	.173	.099

5. **Community Involvement Attitude.** The chi-square test of association between years in 4-H and the attitude towards involvement in community activities was found to be not statistically significant (Chi-square=10.9, *df*=12, *p*=.537). with a Kendall's tau-b value of .061.
6. **Voting Practice.** The chi-square test of association between years in 4-H and the voting practice was statistically significant (Chi-square=25.91, *df*=16) but at a significant level of .10. The ordinal-to-ordinal association Kendall's tau-b value was found to be .042. The review of standardized residual values showed that individuals who spent 5 to 7 years in 4-H nearly always voted.
7. **Volunteering Hours.** We calculated nominal by interval association by calculating the Eta between years in 4-H and average number of estimated hours volunteering per week. Using average number of volunteer hours as dependent variable, we found a weak association (Eta=.136) between the variables.