Evaluating the Impacts of 4-H Participation: Development and Preliminary Validation of a Scale

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Abstract

Ensuring that the experiences provided by Extension, including those associated with the 4-H program, are impactful to participants is of paramount importance. To ensure the continued success and relevance of the 4-H program, it is crucial for practitioners to measure the impact of 4-H involvement and use these results to develop highly impactful programs. This study proposed and validated the Impacts of 4-H scale. The scale was developed based on previous research and literature review. Based on content, response process, and internal structure validation, a single factor consisting of eight items was proposed. The results of the study indicate the proposed scale may provide a valid and reliable measure to capture, quantify, and report the impacts associated with participating in the 4-H program. Additional recommendations for future research and practice are provided.

Keywords: 4-H; youth development program; program impact; evaluation

Introduction

Serving over six million youth annually, 4-H is the Cooperative Extension Service's flagship program for youth development (4-H, 2021). Initially created to engage youth with agriculture, the contemporary 4-H organization offers programming related to agriculture, environmental awareness, nutrition, health, and leadership development (4-H, 2021). Since its inception, 4-H has encouraged learning and skill development through competitive events and clubs at the local, regional, state, and national levels (Ladewig & Thomas, 1987; Boyd et al., 1992). The opportunities provided by 4-H are intended to enhance youth well-being (Arnold, 2018) and promote positive youth development outcomes (Bikos et al., 2014).

Program development within 4-H is guided by four concepts from the positive youth development literature: belonging, independence, mastery, and generosity (Bikos et al., 2014; Lerner et al., 2011). These concepts subdivided into eight elements (Lerner et al., 2011) and are essential to creating programmatic environments that "assist youth in acquiring knowledge, developing life skills, and

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forming attitudes that will enable them to become self-directing, productive, and contributing members of society" (Georgia 4-H, n.d., para. 2). In addition to the principles of positive youth development, 4-H programming also incorporates elements of experiential learning and differentiation (Meyer & Jones, 2015; Bikos et al., 2014). This curriculum development approach is utilized because it enables 4-H practitioners to offer programming tailored to individual needs (Bikos et al., 2014).

Positive outcomes resulting from youth involvement in 4-H have been well-documented (see Rusk et al., 2003; Anderson et al., 2010; Moran et al., 2019). Some of the notable impacts include the development of leadership skills (Kelsey & Furhman, 2020; Moran et al., 2019), development of relationships with peers and adults (Moran et al., 2019; Snider & Farmer, 2016; Worker, 2014), and development of life skills (Anderson et al., 2015; Maass et al., 2006). Additionally, youth involvement in 4-H has been linked to increased self-confidence (Snider & Farmer, 2016; Anderson et al., 2010; Phelps & Kotrlik, 2007) and a positive self-concept (Bird & Subramaniam, 2018; Leff et al., 2015).

Ensuring that the experiences provided by Extension, including those associated with the 4-H program, are impactful to participants is of paramount importance (Lamm et al., 2020). For this study, impact of 4-H was defined as a metric of the effect that 4-H involvement has on members during and after program participation. To ensure the continued success and relevance of the 4-H program, it is crucial for practitioners to measure the impact of 4-H involvement and use these results to develop highly impactful programs (Cohen, 2006; Elias, 2009). Edgar et al. (2016) confirm the necessity of meaningful and engaged learning in the most recent American Association for Agricultural Education National Research Agenda. The researchers assert the importance of program evaluation and encourage educators to design instruction based on how students learn best (Edgar et al., 2016). The present study addresses this challenge by developing and evaluating an empirical instrument that measures the impact of youth involvement in 4-H programs.

Conceptual Framework

The proposed Impacts of 4-H scale was guided by two main theories: positive youth development and experiential learning.

Positive Youth Development

As youth mature, their beliefs are likely to change and evolve (Gottlieb, 1997), most often as a result of the activities and social interactions in which they partake (Bronfenbrenner, 2005). In general, youth are resilient and do not become risk averse in their choices as they learn and experience new situations (Tymula et al., 2012). Lerner (2002) found that the developmental system in adolescents can be influenced to promote desired outcomes. Therefore, the relative plasticity of human development in adolescence may be attributed to the novelty of different experiences (Lerner, 2002). These experiences may impact behavior and cognitive processes as individuals mature into adulthood (Lerner, 2002).

Positive youth development (PYD) can be conceptualized using the 5 C's model: 1) competence, 2) confidence, 3) connection, 4) character, and 5) caring (Lerner et al., 2000). Competence describes an individual's positive view of their actions in relation to social, cognitive, and health (Roth & Brooks-Gunn, 2003). Lerner et al. (2011) describe confidence, as a facet of PYD, as an individual's sense of internal self-worth. Connection refers to positive bonds formed within the social context(s) youth are involved (Roth & Brooks-Gunn, 2003). Character denotes an individual's sense of integrity, ethics, and deference for cultural norms (Lerner et al. 2011). Caring is characterized by an individual's empathy and compassion towards others (Lerner et al., 2011). When the five C's are present in youth development programs, participants are more likely to foster beneficial relations and make positive contributions towards themselves and their communities (Powell et al., 2021b; Bowers et al., 2010). The 4-H program seeks to promote positive youth development outcomes through learning experiences, safe environments,

meaningful relationships with youth and adults, and opportunities for positive risk taking (Lerner et al., 2011; NIFA, n.d.).

Experiential Learning

4-H programming emphasizes learning by doing through hands-on activities and opportunities for active reflection (Diem, 2001). This approach can be conceptualized through the experiential learning process. While all experiences may not be educational, all learning is experiential in nature (Dewey, 1938). Adolescents construct understanding through experiences, especially experiences that are transformative or challenging in nature (Webster & Hoover, 2006). When evaluating youth development programs, practitioners must consider not only how youth members cognitively construct meaning and understanding but also how their learning and understanding occurs within a shared social system (Webster & Hoover, 2006). Dewey (1938) argued the existence of an "organic connection between education and personal experience" (p.25). Dewey (1938) defined education (i.e., intelligent activity) as an individual's observations which result from experience. Following the development of these observations, individuals reflect on the experience and use pre-existing knowledge to organize and conceptualize these ideas (Dewey, 1938).

Expanding on Dewey's (1938) initial theories, Kolb (1984) developed a model to conceptualize this process of knowledge creation, i.e., experiential learning. In Kolb's model, two dimensions are differentiated, consisting of grasping and transforming information (experiences). These two dimensions consist of four stages: concrete experience, reflective observation, abstract conceptualization, and active experimentation. The concrete experience is the activity, or learning, in which the individual is involved. Reflective observation describes the process where an individual reflects on the learning experience that occurred. During abstract conceptualization, the individual will utilize the experience as well as past understandings to determine new comprehension(s) and understanding(s) related to the experience. The final stage, active experimentation, refers to the process by which individuals test their new comprehensions and understandings through application and experimentation.

Although the stages of the experiential learning model are cyclical in nature, the learner can enter the model at any stage (Kolb, 1994). An experience connects the action (what is experienced) and the thinking about an action together. Often referred to as active learning, or learning by doing, experiential learning requires the learner to actively pursue the acquisition of knowledge. A longitudinal study of graduating seniors at Elon university found participation in experiential learning opportunities was related to higher level thinking, deeper relationships with others, and an overall positive college experience (Coker et al., 2017). Furthermore, Burch et al. (2019) found that students who participated in experiential learning experiences had greater learning outcomes related to cognitive and social issue measures.

Experiential Learning and Positive Youth Development

The primary goal of youth development programs is to create an environment where members can develop positive attributes and increase their success in adulthood (Lerner et al., 2011). To facilitate the development of positive youth development characteristics, youth development programs may consider using an experiential learning approach (Chung & McBride, 2015). For example, immersion in area of interest combined with character and caring, leads to greater social awareness. Designing a service project encourages students to develop competence, which may lead to an increase in responsible decision making and relationship management. Participating in a service project fosters connections with others and results in a tangible contribution, which may enhance interpersonal skills and self-awareness. Finally, reflecting on the service project offers individuals the time to celebrate, which can increase confidence and affirm the importance of responsible decision-making. Using an experiential learning approach to develop the 5 C's of positive youth development represents a valuable method to developing youth programs that promote positive social, emotional, and learning outcomes.

Purpose and Research Objectives

The purpose of this study was to develop and perform preliminary validation on an Impacts of 4-H scale. The objective of the study was to establish content validity, response process validity, and internal structure validity of the proposed instrument.

Methods

For the purposes of the study, an online survey of a sample within the population of interest was conducted. Specifically, data were collected from a convenience sample of 4-H alumni from a single southern state. These data were collected as part of a larger project evaluating several aspects of the 4-H program. These disclosures are included to provide clarity regarding multiple publications from a common dataset (Kirkman & Chen, 2011). A database of 4-H program alumni was obtained from the state 4-H office. A total of 1,261 viable email addresses were provided. A total of 481 responses, representing a 38% response rate, were obtained. The survey process was administered based on the Dillman et al. (2014) Tailored Design Method. Specifically, a pre-notice message was sent to all potential respondents from the state 4-H program leader. An invitation was then sent to all potential respondents within two days of the pre-notice. A series of five reminders were sent over a three-week period. The obtained responses rate was considered acceptable based on established social science thresholds (see Baruch & Holtom, 2008). All subsequent analyses were completed using SPSS version 27.

Validity

Instrument validity was established following recommendations in the scale development literature (see Crocker & Algina, 1986; Lamm et al., 2020; Messick, 1995). Specific procedures used to establish instrument validity are outlined below.

Content validity

Content validity was established in two stages. First a Delphi was conducted to identify perceived strengths of the 4-H program in a specific state (see Powell et al., 2021b). The results of the Delphi process were then analyzed and revised based on the second stage, specifically, conducting a thorough examination of the literature (Lamm et al., 2020; Messick, 1989). The following topics were reviewed within the literature: 4-H, 4-H youth participation, positive youth development, and positive youth development outcomes. Common characteristics and themes were identified and used to review the results of the Delphi. The synthesis of the Delphi process and the literature review were then used to develop preliminary scale items intended to measure the impact of 4-H participation. The result of the content validation process was the development of a hypothesized, singular factor scale comprised of 12 items.

Response process validity

Responses process validity was established by inviting an expert panel to review the scale items (Lamm et al., 2020). The reviewers were familiar with the contextual domain but were not involved in the scale development directly. Primarily, the reviewers evaluated face validity and interpretability of the scale (Lamm et al., 2020). Follow-up interviews were conducted to gain insight about revisions that should be made prior to additional data collection (Lamm et al., 2020; Crocker & Algina, 1986). Recommended changes included: minor phrasing modifications to specific scale items as well as clarifying scale directions to improve readability.

Internal structure validity

Internal structure validity was established through a three-step process, following recommendations outlined by Lamm et al. (2020). First, individual item response distributions were analyzed for normality. Descriptive statistics, including skewness and kurtosis, were calculated. According to established thresholds (see West et al., 1995; Fabrigar et al., 1999), skewness values less than two and kurtosis values less than seven were deemed acceptable. Items which did not achieve the established thresholds were removed from subsequent analysis. Next, internal consistency of remaining scale items was evaluated by calculating a Cronbach's alpha value for the overall scale. Cronbach's alpha values of 0.70 or higher indicate acceptable internal consistency (see Cortina, 1993; Schmitt, 1996; Streiner, 2003).

Finally, an exploratory factor analysis was conducted to examine the hypothesized factor structure of scale items. To determine whether factor analysis was appropriate for the hypothesized Impact of 4-H scale, a Kaiser-Meyer-Olkin Measure of Sampling Adequacy (KMO) and Bartlett's test of sphericity were conducted. Kaiser's (1960) criterion was used to evaluate the exploratory factor analysis results. Specifically, factors with an eigenvalue of 1 or greater were retained (Kaiser, 1960).

Results

Descriptive statistics were computed for the 12 proposed scale items. Four of the 12 items (1, 5, 6, 11) violated normality thresholds (West et al., 1995; Fabrigar et al., 1999). Therefore, these items were removed from the scale and subsequent analysis. Item 4 was identified as borderline but was retained for further analysis. Table 1 provides the descriptive statistics associated with each scale item.

Table 1

Impacts of 4-H Scale Item Descriptive Statistics

Items	Frequency Counts					*N*	*M*	*SD*	Skewness	Kurtosis
	1	2	3	4	5					
1. I was able to develop personally based on my 4-H experience	5	1	8	65	337	416	4.75	0.62	-3.53	15.78
2. My county 4-H program had the resources and support necessary to be successful	9	32	25	138	210	414	4.23	1.01	-1.43	1.42
3. I gained an appreciation for citizenship and service through 4-H	2	2	19	91	298	412	4.65	0.64	-2.20	6.18
4. I felt a sense of belonging in 4-H	7	5	23	65	314	414	4.63	0.79	-2.60	7.34
5. 4-H provided me appropriate opportunities to develop as an individual	5	1	11	71	323	411	4.72	0.65	-3.19	12.96
6. The projects and programs in 4-H are beneficial	5	0	6	66	336	413	4.76	0.60	-3.72	18.01
7. 4-H volunteers had a positive impact on me	5	7	27	90	284	413	4.55	0.79	-2.12	4.94
8. Alumni from the 4-H program remained engaged	10	23	90	134	157	414	3.98	1.02	-0.83	0.15

Table 1

Impacts of 4-H Scale Item Descriptive Statistics, continued…

Item							M	SD		
9. My 4-H experience prepared me to be successful in the workforce	6	8	26	91	281	412	4.54	0.82	-2.13	4.92
10. I learned about the environment through 4-H	5	19	45	142	201	412	4.25	0.91	-1.27	1.34
11. I improved my communication skills based on my 4-H experience	5	1	12	56	340	414	4.75	0.64	-3.47	14.62
12. I had the opportunity to interact with individuals from diverse backgrounds through 4-H	5	6	30	90	284	415	4.55	0.79	-2.07	4.73

Following the descriptive analysis, eight scale items were retained. The Cronbach's alpha value associated with the remaining scale items was 0.87, which indicated a high level of internal consistency among the eight items (Cortina, 1993; Schmitt, 1996; Streiner, 2003). Descriptive statistics were computed on the eight-item scale. Observed values had a range of observed values from 1.00 to 5.00 (M = 4.43, SD = 0.61). Additionally, skewness (-2.01) and kurtosis (6.39) values were computed for the scale and determined to be within acceptable ranges (West et al., 1995; Fabrigar et al., 1999).

Next, the suitability of the remaining items were analyzed for factor analysis. A Kaiser-Meyer-Olkin value of 0.91 was observed, indicating factor analysis was warranted. Additionally, the results of the Bartlett's test were significant (X^2 = 1417.64, p < .001), further supporting the justification for factor analysis. Accordingly, an exploratory factor analysis (EFA) was conducted. Following the EFA, a single unidimensional factor was extracted, accounting for 54.66% of the variance. The EFA results are displayed in Table 2.

Table 2

Factor Loadings for Impacts of 4-H Scale

Items	Loading
My county 4-H program had the resources and support necessary to be successful	0.60
I gained an appreciation for citizenship and service through 4-H	0.80
I felt a sense of belonging in 4-H	0.82
4-H volunteers had a positive impact on me	0.79
Alumni from the 4-H program remained engaged	0.65
My 4-H experience prepared me to be successful in the workforce	0.84
I learned about the environment through 4-H	0.71
I had the opportunity to interact with individuals from diverse backgrounds through 4-H	0.67

Conclusion, Discussion, and Recommendations

This purpose of this study was to develop and validate an instrument to empirically measure the impact of 4-H youth involvement, the Impacts of 4-H scale. Following a preliminary Delphi analysis, and thorough literature review, an initial instrument consisting of 12 scale items was proposed. However, four items were removed due to violation of normality. The exploratory factor analysis revealed that the eight remaining scale items loaded onto a single factor. The items that comprised the resulting instrument were: (1) My county 4-H program had the resources and support necessary to be successful; (2) I gained an appreciation for citizenship and service through 4-H; (3) I felt a sense of belonging in 4-H; (4) 4-H

volunteers had a positive impact on me; (5) Alumni from the 4-H program remained engaged; (6) My 4-H experience prepared me to be successful in the workforce; (7) I learned about the environment through 4-H; (8) I had the opportunity to interact with individuals from diverse backgrounds through 4-H.

When developing or evaluating programs intended for youth development, practitioners should align programmatic aspects with positive youth development themes to increase the positive impacts acquired during program participation and beyond (Lerner et al., 2005). The resulting instrument indicated clear relations between the impacts of 4-H involvement and positive youth development themes. For example, scale items 3 (I felt a sense of belonging in 4-H), 4 (4-H volunteers had a positive impact on me), and 5 (Alumni from the 4-H program remained engaged) indicate the importance of connection within 4-H. Wahle et al. (2016) found when 4-H campers reported feelings of belonging, they felt empowered and were able to connect with others. Furthermore, Kelsey (2020) found that adult volunteers enabled youth participants to cultivate and sharpen positive life and leadership skills within 4-H. Powell et al. (2021a) found that one of the most influential 4-H experiences according to alumni was the ability to hear from alumni about the achievements they accomplished as a result of their involvement in 4-H.

Related to caring, the scale item, "I had the opportunity to interact with individuals from diverse backgrounds through 4-H" demonstrates how this outcome may be developed through 4-H participation. Interaction with individuals from diverse backgrounds was regarded as one of the most influential experiences in 4-H according to alumni surveyed by Powell et al. (2021a). Additionally, experiential learning opportunities, such as counseling at a 4-H summer camp, give participants the opportunities to be role models and have a positive impact on others (Leff et al., 2015). Furthermore, the scale item, "I gained an appreciation for citizenship and service through 4-H" indicates the influence of 4-H involvement on an individual's character. Stafford et al. (2003) found that utilizing service-learning projects within 4-H helps youth members to see the importance of community service and civic engagement. Opportunities for reflection following service-learning activities increased youth perception of their personal leadership development and contributions to their community (Stafford et al., 2003).

Finally, scale items 6 (My 4-H experience prepared me to be successful in the workforce) and 7 (I learned about the environment through 4-H) reflect the impact of 4-H programming on competence. Worker et al. (2019) found that teenagers participating in a 4-H tutoring program gained competencies in public speaking, lesson planning, organization and logistics, and teaching. Additionally, Meighan and Fuhrman (2018) found that youth involved in a 4-H environmental education program reported increased self-efficacy in science and a deeper connection to the environment as a result of this program.

Thoron et al. (2016) identified the importance of effective methods to evaluate the impacts of agricultural and natural resources educational programs as well as the importance of measuring the short-, medium-, and long-term outcomes and impacts for participants in these programs. Therefore, it is paramount that 4-H program stakeholders have a valid and reliable method for determining the impact of 4-H on members, specifically related to positive youth development outcomes. The present study, and the proposed Impacts of 4-H scale, represents the initial validation of an empirical instrument that evaluates the effect of 4-H involvement on members and alumni. Analysis of individual scale items reveals how the 4-H program, through experiential learning activities, contributes to positive youth development outcomes in youth members. An associated recommendation would be to use the Impacts of 4-H scale as a tool to evaluate the effectiveness of traditional 4-H project participation as well as other novel 4-H related programs such as school enrichment. The results of such evaluations may be used to increase effectiveness of 4-H programs and ensure all participants have the opportunity to engage in meaningful learning experiences.

Although the results of the present study appear to support the validity of the Impacts of 4-H scale, there are a number of limitations which must also be addressed. First, the data for the study were collected from a single state 4-H alumni group. Therefore, the results should not be interpreted beyond the

current sample. However, an associated recommendation would be to replicate the study with a larger more comprehensive representation of past 4-H program participants. Expanding the scope of the sample may help to ensure the results are consistent across past participants and not only applicable to those individuals who opted to participate in the study. An additional recommendation is the consider including the removed items (I was able to develop personally based on my 4-H experience, 4-H provided me appropriate opportunities to develop as an individual, The projects and programs in 4-H are beneficial, I improved my communication skills based on my 4-H experience) in future administrations of the scale. An additional limitation is the items which were included in the proposed scale. Although efforts were made to include a variety of items which related to the potential impacts of 4-H on participants, there may be additional items, or modifications to items which may improve subsequent utility of the results. A recommendation would be to consider replicating the study using variations of items to further investigate the nature of the instrument and results.

One of the purposes in developing an empirical scale is to detect differences within a target population (Crocker & Algina, 1986). Within the current sample, there was overwhelming agreement with the subsequently removed items, thus causing the observed violations of normality. Although these results are positive and provide strong evidence of the impact 4-H has had in the lives of past participants, these items are not necessarily productive in a scale intended to detect differences. A recommendation is to continue to examine whether the observed results from the present study are replicated elsewhere and to continue to refine the proposed Impacts of 4-H scale accordingly. An associated limitation is the overall scale properties from an empirical perspective. Although the observed mean, standard deviation, skewness, and kurtosis values were within acceptable limits, the result of the study indicate the respondents tended to have strong agreement with the majority of items, skewing the mean accordingly. Replication with larger samples may help to further establish the structural validity of the scale.

An additional limitation was the limited statistical power associated with the study. Specifically, as stated previously, a recommendation for future research is to replicate the study across a larger sample of 4-H programs to obtain the statistical power necessary to conduct a confirmatory factor analysis (CFA) on the proposed scale. The CFA analysis would help to establish internal validity of the scale and improve the potential utility of the scale. In addition to the CFA, an associated recommendation would be to establish consequential validity of the instrument analyzing scale results in the context of a variable of interest. Evaluating consequential validity aids in determining the utility of the instrument and clarifying its usefulness to 4-H, and other youth development program practitioners.

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