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All-Terrain Vehicle Safety Knowledge and Behaviors Among 4-H'ers

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Youth in rural areas are exposed to all-terrain vehicles, but little is known about their knowledge of all-terrain vehicle safety and their likelihood to apply such knowledge. The purpose of this needs assessment was to determine what rural 4-H youth in Georgia knew about all-terrain vehicle safety and operating procedures. A total of 287 rural 4-H youth in fourth through sixth grade completed a previously validated all-terrain vehicle safety knowledge and behavior test administered during a regularly scheduled afterschool club meeting. Only 13.6% (n = 39) of respondents passed the safety test, while 13.9% (n = 15) of those who had taken an all-terrain vehicle safety course (n = 108) passed. Of youth who passed the test, 36% had at least three years of riding experience. Participation in an all-terrain vehicle safety course could save a child's life. Still, this study revealed that retention of safety information from these courses is limited, and riding experience does not necessarily imply adequate safety knowledge. Youth development professionals should consider partnering with local all-terrain vehicle dealerships to provide hands-on safety training experiences on properly equipped machines where youth can demonstrate their safety knowledge and behaviors and be evaluated by trained adults.

Keywords: ATV, helmet use, outdoor recreation, personal protective equipment, youth-based needs assessment

Introduction and Literature Review

Regardless of age, safety is paramount when operating any motor vehicle. Safety can be especially important for all-terrain vehicles (ATVs) since some ATVs lack a roll-protection device and seatbelts. Youth operating ATVs are particularly prone to accidents. Recent research suggests that safety training is needed among school-age users of ATVs. During an eleven-year study of ATV-related pediatric injuries in Pennsylvania, 55.4% of the over 1,900 ATV-related injuries involved at least one bone fracture. The median age of those injured in an ATV accident was 14, with a median hospital stay of three days (Garay et al., 2017).

Youth also have a disproportionately higher risk of injury when using an ATV. Doud et al. (2017) found that “although children account for only 14–18% of ATV riders, they comprise 37–57% of those injured in ATV-related accidents” and often lack appropriate safety equipment (p. 222). Additionally, the Johns Hopkins Bloomberg School of Public Health reported a 150% increase in hospitalizations for ATV injuries by riders under 18 years of age from 1997 to 2006 (ATV, 2010).

Youth may be more prone to injuries on ATVs due to a lack of safety knowledge and safe operating behaviors. In one study, over 90% of young riders were operating ATVs that were larger or more powerful than what was recommended by the manufacturer, and most children who were injured or killed in an ATV-related accident were operating ATVs that were larger or more powerful than what was recommended for their age (Doud et al., 2017). In a more recent study, Wymore et al. (2020) found that although supervising adults had positive attitudes toward youth helmet use when riding ATVs and bicycles, those adults often did not ensure that youth would actually wear a helmet when riding.

Although riding an ATV that is an inappropriate size for youth is an issue, this kind of unsafe behavior is what contributes to injury and even death. A study conducted by Iowa State University found that nearly 75% of students surveyed had access or exposure to an ATV. Most of the ATV riders participated in risky behaviors, “including riding with passengers (92%), riding on public roads (81%), or riding without a helmet (64%). Almost 60% reported engaging in all three behaviors; only 2% engaged in none” (Jennissen et al., 2014, p. 310).

Wearing a helmet is a simple behavior that can reduce the risk of serious injury on an ATV. While studying the specific risky behaviors of ATV usage without a helmet, Bethea et al. (2016) discovered that “drug and alcohol use may predispose riders to be less likely to wear helmets and significantly increase the risk of a poor clinical outcome following an ATV accident” (p. 61). Their finding emphasized that the lack of helmet usage resulted in a nearly 400% increase in significant traumatic injury or death (Bethea et al., 2016). Other studies have put a financial figure on the cost-effectiveness of helmet use when operating an ATV. Myers et al. (2009) estimated that the cost of treatment, plus the estimated burden to society, is between \$150,000 and \$500,000 per ATV-related head injury. While school-aged youth are significantly more likely to become injured due to ATV accidents, little is known about the knowledge and self-reported behaviors of youth in Georgia regarding ATV safety.

Some experts suggest that focusing on educational programs that increase safety practices and reduce risky behavior can be beneficial to reducing ATV-related injuries. Research supports the positive relationship between ATV safety training course participation and the reduced instance of risky behavior. Burgus et al. (2009) reported that those who attended ATV safety training were more likely to wear a helmet, not allow passengers on an ATV, and not ride on paved roads. Collaborative, community-based safety training for youth ATV riders and their

supervising adults/parents has been recommended (Aitken et al., 2013; Novak et al., 2013). For example, in Oklahoma, the 4-H ATV Safety Program provides in-school, community-based trainings taught by Extension professionals and volunteers using the National 4-H ATV Safety Leader's Guide as a foundation (Rosson, 2018). However, in Georgia, no such curriculum is in use, and little is known about the current behaviors of Georgia youth when riding ATVs, which could be used to inform the development of a similar ATV safety training. In addition, little is known about the potential relationship between youth demographic characteristics (e.g., sex, previous riding experience, previous participation in safety courses, etc.) and ATV safety knowledge and behaviors. Bandura's (1986) triadic reciprocity model suggests that characteristics of the individual learner and how they interact with a safety instructor are important to examine when intended to influence ATV safety knowledge and behaviors.

Safety courses have effectively strengthened ATV knowledge and the likelihood of responsible operating behaviors. In a post-program evaluation, Jennissen et al. (2015) found that participants had "increased short-term ATV safety knowledge, and almost half reported they would use the safety information presented" (p. 166). When using a brief ATV safety video during hunter safety courses in Arkansas, Williams et al. (2011) reported that participants' knowledge of ATV safety increased. Department of Natural Resources officials purport a direct connection between ATV-related fatalities and a lack of safety training in Minnesota. Cook (2010) found that when Minnesota was experiencing a higher than normal rate of ATV-related fatalities, none of the deceased had completed Minnesota's free ATV safety course.

While ATV safety trainings offer promise for reducing the occurrence of ATV-related injuries and fatalities among adults and youth, little is known about the current ATV safety knowledge and behaviors among Georgia youth. Georgia Cooperative Extension 4-H programming engages youth in grades 4, 5, and 6 through in-school club meetings where education about a variety of agricultural topics can be delivered. Prior to the COVID-19 pandemic, 4-H'ers from a rural Georgia county participated in a needs assessment related to their ATV safety knowledge and behaviors. The purpose of this study was to engage youth who have been involved in ATV recreational behaviors (safe and unsafe) and determine their safety knowledge and behaviors. The following objectives guided data collection:

1. Describe the demographic characteristics of respondents.
2. Identify the potential relationship between respondent demographics and ATV safety knowledge and behaviors.

Methods

Data Collection

A variety of state Extension organizations have launched training efforts targeting 4-H'ers. Little was known about 4-H'er safety knowledge and behaviors regarding ATVs in Georgia, which

prompted this study. A needs assessment was conducted using data collected from 4th, 5th, and 6th grade Pulaski County, Georgia 4-H'ers to properly address ATV safety training areas during a regularly scheduled 4-H club meeting. The target audience of 4th, 5th, and 6th grade 4-H'ers was selected primarily as a convenience sample. Still, the decision to target the youngest convenient audience of ATV users may have an increased impact since Jinnah and Stoneman (2016) found that “the sooner a child started driving an ATV, the more likely he/she was to practice ATV risky behaviors when he/she became older” (p. 165). Additionally, Burgus et al. (2009) reported that two-thirds of pediatric ATV-related injuries involved children who were 14 or younger. Targeting this audience demographic was important to inform Extension programming in Georgia towards addressing perceived youth ATV safety knowledge deficiencies.

A primarily quantitative instrument was used to collect data from 4-H'ers who agreed to participate in this study. The instrument was modified from an instrument used by Bocksnick (2016) and inquired about the 4-H'ers' knowledge and use of safety equipment and safe riding techniques on ATVs. While Bocksnick (2016) surveyed individuals who had participated in an Arkansas 4-H ATV safety course, this study sought to discover whether a need existed for such a course among Pulaski County, Georgia 4-H'ers, and if so, what ATV safety knowledge areas were most lacking. Due to the differing nature of these two studies, some of Bocksnick's (2016) questions were reworded, while others were not included. Nine of the questions in the needs assessment were designed to inquire specifically about the individual's knowledge of various areas of ATV safety, including proper helmet usage, safe riding behaviors, and age-appropriate ATV use. These nine questions were multiple choice questions that had one correct answer and three incorrect answers. Eight additional questions collected demographic information and the participants' personal experiences and behaviors. Demographic questions inquired about participants' age and gender, as well as behavioral habits as they relate to operating ATVs. The final question, “If there was an ATV safety class offered in Pulaski County, would you attend it?” sought to gauge interest in participating in a local ATV safety course if offered. A panel of experts reviewed items with training in instrument development and ATV safety for face and content validity. The original answer key used in the Bocksnick (2016) study was used to score responses as correct or incorrect and added to the consistency with which the instrument was administered and scored.

Item inclusion was justified using the aforementioned literature review findings and enhanced the instrument's content validity. For example, Jennissen et al. (2014) and Grummon et al. (2014) both identified helmet usage and participating in risky behaviors, such as driving at high speeds, driving on paved roads, and carrying a passenger, as behaviors associated with ATV safety, while Doud et al. (2017) found that most children who were injured or killed in an ATV-related accident were operating ATVs that were larger or more powerful than what was recommended for their age. The instrument also focused on proper ATV size, helmet usage, riding with or as a passenger, on-road usage, and safe riding techniques.

Data Analysis

After all data were collected, questions pertaining specifically to knowledge of ATV safety were assigned a score of 1 point for a correct answer and a score of 0 for an incorrect answer, rating the participants' knowledge of ATV safety on a scale of zero to nine. As six out of nine points would be 67% correct, or a high "D" as an academic grade, participants who scored 7 or above were identified as "passing," a similar scoring system as was used in the Bocksnick (2016) study. Simple frequencies and percentages were used to summarize the data, and crosstabs helped associate specific demographic items with safety knowledge items. SPSS version 25 was used to analyze all data.

Results

Objective 1: Describe the demographic characteristics of respondents

The survey was presented to 4th, 5th, and 6th grade Pulaski County 4-H'ers during their regularly scheduled in-school 4-H club meetings in August 2019. The instrument was presented to 4-H'ers in person, and a 98% response rate was achieved. Of the 301 total participants, 287 responded to the question, "What grade are you in?" Of those respondents, there were 83 (29%) 4th graders, 106 (37%) 5th graders, and 98 (34%) 6th graders. There were 145 (50.5%) who responded as male, 135 (47.1%) responded as female, and 7 (2.4%) preferred not to answer.

Objective 2: Identify the potential relationship between respondent demographics and ATV safety knowledge and behaviors

Based on the scoring system assigned for this study and the definition of a passing score, only 13.6% of participants had a passing score for knowledge of ATV safety. Of those with a passing score, 19 were male, and 19 were female, demonstrating through a crosstabs analysis that there was no gender bias related to participant knowledge of ATV safety. A total of 137 participants scored at least 50% (5 or above), demonstrating that 45.5% of participants were at least somewhat knowledgeable about ATV safety.

When asked, "Have you ever taken an ATV rider or safety course," 108 (37.8%) participants replied yes, while 178 (62.2%) replied no. Only 15 participants (13.9%) of those who had taken a safety course scored a 7 or above on the knowledge assessment, while 26 participants (14.6%) of those who had not taken a safety course had an overall score of 7 or above. These results suggest that, for this population, prior participation in an ATV rider or safety course had very little impact on the participants' overall knowledge of ATV safety, assuming that the instrument is an accurate indicator of safety knowledge and was sensitive enough to detect safety competencies. It should be noted that the type of ATV safety course that the participants may have taken, as well as what group or organization provided the training was unknown. The researchers were

unable to locate any information on formal ATV safety trainings provided locally and/or nearby Pulaski County in the previous five years.

Participants were also queried about their ATV riding experience. Of the 287 respondents, 56 (19.5%) had no riding experience, 59 (20.6%) had been riding for less than a year, 65 (22.6%) had been riding for 1-2 years, 57 (19.9%) had been riding for 3-5 years, and 50 (17.4%) had been riding ATVs for 6 or more years. Of those respondents with an overall passing score, six participants (10.7%) had no riding experience, four (6.7%) had less than one year of experience, 12 (18.5%) had 1-2 years of experience, nine (15.8%) had 3-5 years of experience, and 10 participants (20%) had 6 or more years of riding experience.

Doud et al. (2017), Jennissen et al. (2014), and Grummon et al. (2014) all emphasized the importance of helmet usage as a key factor in improving rider safety. Additionally, Bethea et al. (2016) found that the lack of helmet usage produced a nearly 400% increase in significant traumatic injury or death. With the importance of helmet use playing a major role in ATV safety, several questions were included on the instrument pertaining to the participant's knowledge and usage of helmets when riding ATVs.

When asked, "When should you wear a helmet," 237 (78.7%) respondents answered correctly, "when riding your ATV." However, of those answering correctly, only 39 (16.4%) scored a 7 or above on the assessment (passing score). This result suggests that while those surveyed realized that helmet usage was important, there was an overall lack of basic understanding of ATV safety as a whole, regardless of their self-reported knowledge of the importance of wearing a helmet. It should be noted that participants who answered this question correctly had an overall average score of 51.5% on the knowledge assessment, while participants who answered incorrectly had an overall average score of 35.2%, both failing scores. This difference in overall safety knowledge suggested that those participants who understand the importance of helmet usage also possessed a slightly greater knowledge of ATV safety.

Participants were also asked about their own helmet usage. When asked, "How often do you wear your helmet?", 161 (54.2%) participants responded, "every time I ride my ATV," 29 (9.8%) responded "more than half of the time I ride my ATV," 36 (12.1%) responded, "less than half the time I ride my ATV," and 71 (23.9%) responded "never." Regardless of the participants' personal helmet usage habits, the majority of participants answered the question "When should you wear your helmet" correctly (see Table 1). Over three-quarters of participants (82%) who always wear their helmet responded that you should wear a helmet when riding your ATV, but 75% of participants who never wear their helmet also knew that you should wear a helmet when riding your ATV. This suggests that participants acknowledge the importance of helmet usage, even if they choose not to wear a helmet themselves.

Table 1. Youth All-terrain Vehicle Self-Reported Helmet Use Knowledge vs. Helmet Wearing Behavior

		How often do you wear your helmet?				Total
		Every time I ride an ATV	More than half the time I ride	Less than half the time I ride	Never	
When should you wear a helmet?	When trail riding	5	2	2	7	16
	When riding competitively	19	4	4	8	35
	When riding in your yard	5	4	1	3	13
	When riding your ATV	132	19	29	53	233
Total		161	29	36	71	297

Discussion and Conclusions

The overall purpose of this study was to assess the level of ATV safety knowledge held by Pulaski County, Georgia rural 4-H'ers and to discover whether a need existed for ATV safety training. A total of 137 (47.7%) participants scored at least 50% on the safety knowledge assessment, and of those, only 38 demonstrated a passing knowledge of ATV safety. This result demonstrated a low level of ATV safety knowledge among Pulaski County 4-H'ers. Because only 108 (37.6%) participants responded that they had previously taken an ATV safety course, and of those, only 15 passed the safety knowledge assessment, there is an obvious need for ATV safety training among participants. Additionally, when asked, "If there was an ATV safety class offered in Pulaski County would you attend it?" only 47 (16.4%) respondents replied that they would not be interested in attending. Therefore, the need demonstrated by the participant's knowledge assessment scores, as well as their indicated willingness to participate in a locally offered ATV safety course, demonstrates an opportunity for an ATV safety course to be offered by Pulaski County Extension. Much can be learned from states like Arkansas and Oklahoma currently offering ATV safety trainings for youth through community partnerships, including those with Extension. Marketing to parents/guardians of these youth to encourage their attendance should begin immediately. A partnership with the local all-terrain vehicle dealerships may be one way to provide youth exposure to properly equipped machines. Targeting youth with trainings offered in a learning environment to match their experience level is one way to ensure relevance in the information being delivered and increase the likelihood of safety behavior adoption (Bandura, 1986).

Proper helmet use plays a key role in preventing severe ATV-related injuries. For example, Bethea et al. (2016) found that the lack of helmet usage could lead to a nearly 400% increase in significant traumatic injury or death. That emphasis on proper helmet usage, combined with the 45.8% of respondents in this study admitting to not wearing their helmet every time they

operated an ATV, points to helmet usage being the area of ATV safety training that requires the most attention among Pulaski County 4-H'ers.

In addition to proper helmet use, there also exists a need for Pulaski County 4-H'ers to understand the importance of operating the correct ATV for their age and size. Doud et al. (2017) found that over 90% of young riders were operating ATVs that were larger or more powerful than what was recommended and that most children who were injured or killed in an ATV-related accident were operating ATVs that were larger or more powerful than what was recommended for their age. When asked, "What is the largest ATV you should ride?" only 37.3% of respondents replied correctly. Concurrently, when asked, "If you ride ATVs, what size machine do you most often ride?" the answers were varied, ranging from the most common "I don't know" to "grown-up size." The lack of knowledge about proper ATV size coupled with the participants being relatively unaware of what size machines they currently operate reveals an area in which proper safety training could provide meaningful impact based on the findings of Doud et al. (2017).

An ATV safety training course for Pulaski County 4-H'ers should also focus on building awareness of other risky behaviors when riding ATVs. Jennissen et al. (2014) found that most ATV riders participated in risky behaviors, "including riding with passengers (92%), on public roads (81%), or without a helmet (64%)" (p. 310). Grummon et al. (2014) emphasized the importance of reducing the frequency and severity of ATV-related injuries by curtailing risky behavior among youth-age ATV operators. Among Pulaski County 4-H'ers, 71.6% of participants admitted to having ridden with a passenger on an ATV, while 78.5% admitted to having ridden as a passenger on an ATV. Additionally, 82.6% of respondents replied that it was safe to ride on public roads (an incorrect response). This prevalence of risky behavior when operating ATVs among Pulaski County 4-H'ers demonstrates another area of rider safety that could greatly benefit from increased training and education.

Recommendations for Research and Practice

To properly address this issue among Pulaski County 4-H'ers, further research is needed to determine why participants choose not to wear a helmet despite knowing they should. A qualitative, interview-based study may be most appropriate for identifying reasons for not complying with safe behaviors. This study also found that over one-third of participants claimed to have previously taken an ATV safety course; however, no information on formal ATV safety training provided locally within the past five years was found. Future research should be conducted to discover what, if any, ATV safety training has been provided to Pulaski County 4-H'ers and by whom. Additionally, identifying elements of safety trainings that are most effective at building ATV safety knowledge and behaviors among youth is needed. If safety training protocols exist, a partnership with the Extension agent or other youth development professional is recommended.

While the results of this study cannot be applied to a population beyond that sampled, the data obtained do lend credence to the need for an ATV safety program to be offered to Pulaski County 4-H'ers. Since Grummon et al. (2014) suggest reducing the frequency and severity of ATV-related injuries by focusing on proper helmet usage and refraining from engaging in risky driving behaviors, these should be the areas that a locally offered ATV safety course addresses.

In Pulaski County, Georgia, an ATV safety field day will be modeled after the University of Arkansas 4-H ATV safety training course and will offer a hands-on opportunity for youth-age ATV operators to learn and experience proper safety measures and techniques when operating their ATVs. Bocksnick (2016) espoused the benefits of experiential learning for this type of educational program, and those recommendations will be applied. Participants of the proposed Pulaski County 4-H ATV safety field day will be exposed to applicable ATV safety knowledge either through a classroom-style environment with instruction provided by a certified safety instructor or through an online learning module (as is the case with the University of Arkansas 4-H ATV safety training course). Once the knowledge portion of the safety course is completed, participants will engage in a hands-on portion, including demonstrations of appropriate riding attire and safety equipment, as well as safe riding practices and techniques provided by a certified safety instructor. Finally, in line with Bandura's (1986) recommendations, participants will be trained based on their individual safety knowledge levels. They will engage in demonstrating skills and knowledge learned into practice (experiential learning) while being observed and receiving feedback (formal evaluation) from certified instructors. Partnerships such as these (between youth development professionals and local businesses) may reduce the likelihood of ATV-related injuries or deaths among youth.

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