

Identifying hearing-related shortcomings in [State] School-Based Agricultural Education

Introduction/need for research

Safety concerns within School-Based Agricultural Education (SBAE) classrooms and laboratories have been well documented ([Blinded]; Chumbley et al., 2018; Dyer & Andreasen, 1999; Langley et al., 2018; Saucier et al., 2014). While some concerns established by Dyer & Andreasen (1999) have been addressed, hearing-related concerns have not ([Blinded]; Langley et al., 2018). With many of the activities in SBAE exposing students to decibel (dB) levels well above the 85dB recommended exposure limit (NIOSH, 2018a; NIOSH, 2018b) by the National Institute for Occupational Safety and Health (NIOSH), further studies and interventions are needed to determine how large the gap is in hearing-related concerns. [Blinded] determined that there is still a perceived gap in post-secondary agricultural education, and further exploration at the secondary level was recommended. Extending the work of the [Blinded] project, this study aims to determine a need for SBAE hearing-related interventions in [State].

Conceptual or theoretical framework

The theory of planned behavior (Ajzen, 1991) was used as the conceptual frame for this study as it aims to address components within an individual's behavioral control. Ajzen established this theory by focusing on an individual's attitude toward a behavior, subjective norms, and perceived behavioral control. Through the combination of these three aspects, Ajzen aimed to show how an individual's intention can affect their subsequent behavior. In the context of this study, student attitude toward a behavior is being examined in an attempt to establish the connection of their intention to use hearing protection as it should enlighten their subsequent behavior to follow through with that intention.

Methodology

Three SBAE programs were selected to participate in the three-month study. Students enrolled in AFNR courses in these programs participated in a pre-exposure ($n = 104$) and post-exposure ($n = 94$) assessment. Between the assessments, informational posters focusing on decibel outputs of six different tools in addition to a NIOSH use of hearing protection recommendation statement (NIOSH, 2018a; NIOSH, 2018b) were posted in high trafficked areas within the classroom and laboratory. SBAE instructors were told not to adapt their instruction nor to directly address the posters during their lessons while participating in this study. Among the two assessments was a section focusing on hearing protection use. Students were first asked binary question about future hearing protection use relating to six different tools. Then, given a scale from 60dB to 120dB with Always and Never bookending the scale, students indicated their decibel threshold for hearing protection use. Taking the respondent's identified threshold, their future use of hearing protection was coded for correctness across each of the different tools.

Results/findings

For each of the tools, future use of hearing protection showed no significant changes for five of the six tools. While the Powered Hand Drill had the lowest response for future use during the pre-exposure ($f = 9$, 8.65%) and the post-exposure ($f = 13$, 13.83%) assessment, it showed

the highest percentage increase at 59.81%. All other tools had a use response between 24.04% ($f = 25$) and 50.00% ($f = 52$) for the pre-exposure assessment and 22.34% ($f = 21$) and 51.06% ($f = 48$) for the post-exposure assessment. When reviewing the thresholds for both assessments, the approximated threshold for both was within 10 dB of the NIOSH recommendation. While there was an increase of the approximate threshold from 92.08dB to 94.04dB, the identified thresholds between 80dB and 90dB remained near 32.69% ($f = 34$) as it increased slightly to 32.98% ($f = 31$) for the post-exposure assessment. When using the participant's threshold as the standard for correct identification of future hearing protection use per each tool, the overall correct responses showed an 11.99% percent increase from 47.44% ($f = 296$) to 53.90% ($f = 304$). When looking at each individual tool the Handheld Circular Saw was the most correctly identified across both assessments ($f = 64$, 61.54%; $f = 64$, 68.09%), and Pneumatic Nail Gun was the least correctly identified ($f = 31$, 29.81%; $f = 30$, 31.91%). The correct identification of use of hearing protection at a given decibel threshold when using a Powered Hand Drill had the highest increase at 38.30% between the two assessments. All remaining correct identification of wearing hearing protection use increased between 1.86% and 18.73%.

Conclusions

While the poster intervention did not have significant impacts on the perceived threshold of future use of hearing protection, the overall increase on the correct identification of use to identified threshold is a positive. The low future use of hearing protection for the Powered Hand Drill is concerning as the decibel output has been identified above the NIOSH recommendation. This combined with the variation of future use of hearing protection may point toward a gap in safety instruction that has been identified throughout SBAE research. With the shortcomings starting to be identified, positives from this group must be discussed. A third of the students during the pre-exposure and post-exposure assessments identified a threshold within 5dB of the NIOSH recommendation. This combined with the increase of correct identification of hearing protection use when compared to the participant's identified threshold does show that there is benefit to the exposure as students were better able to perceive the "loudness" of a tool and apply that to their threshold for using hearing protection.

Implications/recommendations/impact

Mere exposure via visual aids proved to have some positive impact; however, the minimal increase in proper indicated future hearing protection use may indicate a need for further exploration of in-depth hearing safety instruction. There is a shown need for exposing SBAE students to the realities of improper hearing protection use and the actual sound levels in an agricultural setting alongside the decibel output of the tools being used by the students. While SBAE and others in the agricultural sector have been successful in implementing other safety related practices, hearing is falling short of the standard. While an argument can be made that students taking these classes are not exposed at a level or length of time to warrant hearing protection, the question that SBAE needs to ask is related to the foundation of instruction: What is the purpose of SBAE? If the answer approaches the topic of preparing students to be the future stewards of agriculture, which many would agree is true, then proper use of all safety related equipment should be paramount regardless of exposure level or length.

References

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