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Farm and rural adolescents' perspective on hearing conservation: Reports from a focus group study

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Abstract

This study explored the attitudes, beliefs, and behaviors of rural and farm adolescents regarding hearing conservation strategies. This qualitative study took place at two high schools in rural Michigan. Twenty-five adolescents living and working on farms or living in rural areas participated in one of two focus groups. Interviews were audio-recorded and transcribed verbatim. Transcripts were coded and analyzed by two researchers and checked by an additional researcher to ensure reliability. Noise exposure was ubiquitous among participants, both in farm-related (e.g., equipment, livestock) and non-farm-related (e.g., music, firearms) activities. Perceived barriers to use of hearing protection devices outweighed perceived benefits, resulting in uncommon use of protection. When hearing protection was used, it was usually earmuffs or earplugs. Participants indicated a lack of training in noise hazards and protective strategies. Despite their acknowledged risk of hearing loss, participants did not associate their use of hearing protection today with their hearing ability later in life. Categories emerging that relate to hearing protector use included: Barriers, benefits, self-efficacy, situational influences, impersonal influences, cues to action, susceptibility, and severity. Farm and rural adolescents are at risk for noise exposure and hearing loss. The findings stress the significance of work environment and adult modeling in facilitating hearing conservation behaviors. As indicated by the youths' recommendations, school-based interventions may be an effective approach to address this health concern. Intervention studies are needed to test various approaches that can effectively promote use of hearing conservation strategies among rural and farm adolescents.

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Full Text

Introduction

Close to 2 million children (under 20 years of age) live and/or work on farms. [1] Because of the nature of farm work, these individuals are exposed to various work-related hazards such as noise. [2],[3],[4],[5] As a group, farmers are among the highest risk occupational groups for hearing loss. [6] Similarly, adolescents working or living on farms are at risk for noise-induced hearing loss (NIHL). [7],[8],[9] NIHL is a sensorineural hearing deficit. [10] This deficit, which begins with high frequencies (3,000-6,000 Hz), results from chronic exposure to high intensity sound levels (in decibels), is permanent, irreversible, and is often accompanied by tinnitus.

Sources of noise vary for rural and farm adolescents. They include but are not limited to tractors, blowers, chain saws, skid-steer loaders, grain dryers, and squealing animals. [5] In addition, farm adolescents are exposed to recreational noises such as firearms and personal listening devices. [11],[12],[13] When exposed to these various noise sources, if farm adolescents are not using hearing conservation strategies (i.e., turn it down, walk away, use protection) properly, they can experience permanent damage to their hearing. [14] Unfortunately, because NIHL is insidious, unlike other forms of farm-related injuries such as machine entanglement, less attention is paid to this risk.

Very few researchers have explored NIHL among farm adolescents. [9],[15] These studies have shown that farm adolescents have higher prevalence of hearing loss compared to their urban counterparts. [9],[15],[16],[17] However due to the exception of most farms to Occupational Safety and Health Administration (OSHA) regulations, farmers and farm youth are rarely served by an OSHA-mandated hearing conservation program. [18],[19] Tests of educational programs to promote hearing protector use among small groups of farm [16] and non-farm youth have demonstrated short-term [7] and long-term increases in hearing protector use or intention. [20],[21],[22],[23]

Despite the acknowledged risk for NIHL among farm adolescents, studies have yet to explore farm adolescents' attitudes, beliefs and behaviors towards hearing conservation. Such exploration is necessary, as it can inform interventions targeting NIHL in this at-risk group. The purpose of this study was to explore the attitudes, beliefs, and behaviors of rural and farm adolescents regarding hearing conservation.

Theoretical framework

The Health Promotion Model (HPM) developed by Pender in 1996 guided this study. [24] This model is used as an exploratory tool to understand the underlying aspects of individuals' behaviors, but also as a guiding framework for interventions geared towards behavior change. The major constructs of the HPM fall under three major categories:

Individual characteristics; Attitudes and beliefs about the behavior; and Behavior outcome.

For the purpose of this study we mainly focus on the attitudes and beliefs about the behavior and the behavior outcome, with consideration for the individual characteristics.

HPM attitudes and beliefs include: Perceived benefits, perceived barriers, perceived self-efficacy, activity-related affect, and interpersonal and situational influences. [24] These constructs are interrelated and play a major role in predicting whether someone will change their behaviors. Perceived benefits relate to the individual determining how beneficial the behavior will be (remedial of the threat) for them if they change their behavior. Perceived barriers relate to the cost-benefit analysis in which the individual is questioning how much the individual has to give up, and what would prevent him/her from engaging in the behavior. Perceived self-efficacy relates to the person's confidence in his/her ability to perform the behavior. Activity-related affect relates to the person's feelings and attitudes towards the behavior. Interpersonal influences account for individual (i.e., friends and family members) and community-based interactions that impact the person's decisions to change his/her behavior. Situational influences refer to any context or context that can hinder or facilitate the behavior change. These constructs determine whether the person decides to engage in the behavior. Cues to action are any event or individuals that would prompt the individual to engage in the behavior. Behavior change and these influential constructs occur within the context of the individual's characteristics such as age, gender, ethnicity, personality, socioeconomics, and knowledge. The HPM has been used to explore hearing protective behaviors among adult farmers. [25] In this study, we used the Health Belief Model to explore the attitudes and behaviors of youth farmers regarding hearing protection.

Methods

Recruitment

The study protocol was reviewed and approved by the authors' university Institutional Review Board. Selected Michigan high schools that were associated with the FFA (formerly Future Farmers of America) chapters were contacted to explore interest in the study and invited to participate. FFA advisors (teachers) distributed and collected parental consent and rural and farm adolescents' assent documents and mutually established a date and time for the focus group with the study team.

Settings and data collection

One focus group was conducted at each of two high schools in rural Michigan. A moderator, who was trained and experienced in qualitative research, led discussions. Three other research team members were observers and note-takers. Live observation of the focus group discussion and immediate debriefing sessions helped ensure that the transcripts accurately reflected the discussion that took place. Each focus group lasted approximately 90 minutes and was audio-recorded. Participants were served refreshments.

Focus group questions were designed to promote discussion about participants' attitudes and beliefs about their hearing exposure and hearing protective behaviors [Table 1]. The questions were derived from the HPM, which guided this study. Questions focused on hearing conservation strategies, specifically:

Perceived benefits of hearing protector use; {Table 1} Perceived barriers to use of hearing protectors; Self-efficacy for use of hearing protectors; Interpersonal influences on hearing protector use; Situational influences on hearing protector use; and Cues to using hearing protectors.

Data analysis

The focus group discussions were audiotaped and transcribed verbatim. The analysis was guided by the directed content analysis approach of Hsieh and Shannon. [26] Two of the authors (MAR and MN) individually read each of the transcripts. As they read the transcripts, the authors highlighted paragraphs, segments, and specific words and assigned codes. Codes were categories specifically exploring adolescents' perceived benefits, perceived barriers, self-efficacy, interpersonal influences, situational influences, and cues to use. Data that did not fall under any of these categories were revisited to determine if they represented a new category or a subcategory. A third researcher (MMC) reviewed the codes. All the coders then met to compare codes within and across transcripts.

Results

A total of 25 adolescents participated in the study. Participants in the first focus group included 9 students (2 girls and 7 boys). The second focus group included 10 girls and 6 boys ($n = 16$). Their high school levels ranged from 10th to 11th grade. Noise exposure resulted from both farm-related (equipment, livestock) and non-farm-related (personal listening devices, firearms, fire alarm) activities. The most common types of hearing protector device (HPD) used were earmuffs and ear plugs. Preference for earmuffs over the other reported hearing protection devices related to comfort and ease of use. [Figure 1] summarizes the themes that are described in detail below. {Figure 1}

Perceived susceptibility and severity: Adolescents' beliefs in their risk for noise-induced hearing loss and the extent to which noise can damage their ears

Noise may cause hearing loss, but not until I'm older

Participants were aware that noise can be harmful to their hearing. Most of the participants thought that noise could hurt them if they are exposed to it for a long period of time. Some participants reported that their ears can get used to the noise. For example, one participant stated: "Because like when you are working [in a] tractor, if you work for a long period of time as time goes on, it doesn't seem as loud. You get used to it." This participant believed that her risk for hearing loss decreases with increased exposure to the same hazard. Although they noted that noise can affect their hearing, participants remained skeptical about the extent of the effect. This was reportedly due to lack of knowledge. For example one participant noted.

"I'm not really sure because I don't know how much the sound is hurting my ears in the first place. I don't think that, at this point, I don't think I would use [hearing protection] any more or less than I already do, just because I don't really know how much it affects me."

None of the participants attributed immediate negative outcomes to their noise exposure. One participant stated "on the other side of things, none of us are expecting to go deaf by the time we go to college." By this statement, this participant indicated he did not believe that he would be at risk for losing his hearing before he went off to college. Participants reported that long exposure to noise can prevent them from hearing when they are older. Another participant stated "later in life [we can get] hearing loss." Thus although hearing loss is seen as a threat, farm and rural adolescents see the outcomes of this treatment as being latent which would manifest later in life.

NIHL will negatively affect my quality of life

All the participants reported that noise induced hearing loss would negatively influence their quality of life. They discussed not being able to communicate with their family and friends. Participants also noted issues of safety. They would not be able to hear someone in case of an emergency if they lose their hearing. One of the participants noted: "[You will] lose out on jobs to people who have hearing or can hear better than you. You would have to learn how to live your life." This participant believed that hearing loss would require major adjustments including jobs and learning how to live a new lifestyle.

Perceived benefits: Adolescents' beliefs in the efficacy of wearing hearing protection in preventing hearing loss

Wearing hearing protection has both temporal and protective/preservation benefits

Overall, participants identified several benefits associated with wearing hearing protection devices. These benefits related both to immediate preservation of one's hearing, but also to the prevention of hearing loss in the long term. Participants discussed the importance of being able to hear later in life and future goals that would require being able to hear (e.g. college classes, working). Short-term and immediate benefits were also discussed and agreed upon as important influences in wearing hearing protection devices. One participant indicated the following benefit of using hearing protectors: "Not having your ears hurt [after exposure to loud noise]."

Perceived barriers: Adolescents' beliefs about how inconvenient it would be if they were to wear effective hearing protective devices and what they would lose if they do

Using hearing protectors interferes with communicating with my coworkers and is a safety concern

Participants stated multiple barriers to wearing hearing protection, including devices being uncomfortable, inconvenient, and annoying. One participant stated, "Sometimes I don't want to wear any ear protection because you are trying to listen for anything moving around and you try to look around. If you've got stuff in your ears you can hear nothing moving." The theme of safety as a barrier to wearing hearing protection devices was very prominent across both groups. Another participant responded, "But isn't it dangerous, like to be wearing those? Like say something [dangerous] around you is happening." Participants were concerned that wearing hearing protection would prevent them from hearing a co-worker who may be in trouble and calling for help. One participant described this by saying, "If something happens to another worker or something, you can't hear them yelling for you or anything; you wouldn't know about it." Participants expressed ideas that hearing protectors may be harmful to youth because hearing protectors can prevent them from being able to hear their surroundings. One male participant shared that he did not like wearing the devices because he enjoyed the sound of the machines rumbling and would prefer to hear the noise than wear protection.

Wearing HPDs is very uncomfortable and inconvenient

In addition to the issue of safety, another major theme that arose in the focus group discussions was that of comfort. Almost all the study participants reported that wearing hearing protectors was a nuisance for them. One participant noted, "The ones that go over your head are so suction-y. They bother me so bad. It like hurts my ears, they like suction so much." Another one stated, "[Earplugs] are kind of painful for my ear, they usually fall out." Because of the perceived lack of comfort, some adolescents opt not to wear any hearing protectors while on the farm. Study

participants also noted that having to remember to wear hearing protectors is burdensome and inconvenient. For example one participant stated,

"It's annoying. It's just another thing you have to pay attention to. You are already paying attention to what clothes you are wearing so it doesn't get caught up in your machinery, and you are paying attention to like what you are doing, what you are doing with your hands and that's like another thing to pay attention to, that you have something covering your ears."

Self-efficacy: Adolescents' confidence in their ability to take action and effectively protect their hearing

I am highly confident in my ability to use hearing protectors

Although participants indicated that they did not wear hearing protection devices often during farm-related work, all but one participant felt very confident in their ability to use and insert hearing protectors correctly and effectively. One participant said that she was not confident in her ability to use hearing protectors. Her reasoning was that she had not been formally taught how to use hearing protectors. All the other participants also reported that they were not taught how to use hearing protectors, yet they still felt confident. Over-the-head earmuffs were frequently mentioned as an easy and effective way to prevent hearing loss because they did not require a large amount of time to put on, compared to ear plugs, and did not require much skill to use.

Interpersonal influences

Family and media messages are helpful influences in wearing my hearing protectors

Family members and older adults were the primary sources of influence for adolescents wearing their hearing protectors. Some participants were told by older family members to wear protection, while others saw the effects of hearing loss on family members, which prompted their wearing of hearing protection. Many of the interpersonal influences were also consistent with the cues to action that promoted youth to wear hearing protection devices on the farm. Participants discussed the influence family members had on them to use hearing protectors for non-farm-related activities such as shooting guns. One female participant stated that whenever she worked with her father, he was insistent on her wearing hearing protection. She reported he would hand them to her before starting the job and tell her to wear them. She explained that she had no problem wearing them when her father prompted her to, but when working without him, she did not think to wear earmuffs or find them a necessity. Thus, having someone around to remind them and hand them hearing protectors is perceived as being helpful. A male participant also said,

"It's just not something you think of really, you know, I guess it's just not part of the routine that we are used to, but like sometimes I work for someone who always hands me ear plug before we start working and so I always wear ear protection when I'm working with that person."

Participants specifically expressed the importance of youth lacking the education and awareness regarding NIHL prevention. Besides being told by family members, some participants believed that media influence and being taught more about the specific type of hearing damage caused would promote them to use hearing protection more often. Direct references to cigarette smoking were made as seen by the following statement "So, it's just like cigarettes used to be, a lot more people used to smoke cigarettes when they [kind of] knew that there would be a down side to it but there wasn't that much awareness about it." Another participant responded,

"If there was more awareness... I know all our trucks and so I know the first thing to think of is cover your hands and eyes. I think that if there was more awareness [about NIHL], I would be like oh, that is dangerous, I should do something about that."

Situational influences

I wear my hearing protectors when engaging in harmful activities such as shooting guns, but not during farm work

The use of hearing protectors when shooting guns was repeatedly mentioned. Participants discussed that hearing protector use is encouraged when taught to safely handle and use a gun during hunter safety courses.

"[Shooting] is not an ongoing thing that your ears get adjusted to. Well, yeah, and it depends on what you are doing on the farm because when you are shooting, you know it's going to be loud noises the entire time you are shooting, but when you are on the farm it might be loud noises for like an hour and then the rest of the day it's quieter noise."

Shooting was believed to be more harmful to hearing than farm work-related activities. One participant mentioned that she didn't realize it was an important issue because "it was never taught or mentioned in the media or school." They felt strongly that if they had more facts and media stating the negative effects of noise, they would wear their hearing protectors more often. Participants felt that situations in which hearing protectors are easily accessible or required would promote hearing protectors use among youth. When asked further about non-related farm work influencing protection, such as wearing hearing protectors at a concert, all participants expressed strong dissatisfaction with this idea and one male stated, "Why would I wear ear plugs at a concert? Doesn't that defeat the point of going?"

Cues to action: Strategies, family members, and events that activate adolescents' action to protect their hearing while on the farm

If my employer mandates use or someone prompts me, I will use HPDs

Participants discussed various factors that influenced youth to wear their hearing protectors during farm-related work. Youth mentioned factors such as the type of task being done and the length of noise exposure as influencing whether hearing protection would be worn. The majority of youth spoke about how an increase awareness of the benefits of hearing protectors is needed and expressed promoting this through methods of education and job requirements and well as media sources. One male participant said that, "If it was a requirement for a job, I would always wear it because it has some kind of incentive." Another male youth made the comment, "It's part of the job and you are getting paid for it." These statements show the potential influence of employers being able to increase the use of hearing protectors in farm-related work. On the other hand, some participants voiced dissatisfaction in having an employer or law mandate hearing protector use.

Access was also another important factor that was reported to prompt action. For example a study participant responded, "If the farms had ear protection more available, because usually it is just, you don't think of it because it's not there." Thus, participants believed that if employers made hearing protectors more readily accessible to them, they would be more likely to use them.

Discussion

This paper reports findings from a study that explored the attitudes, beliefs, and behaviors of rural and farm adolescents regarding hearing conservation. Little has been done to explore this health concern among this population. Through the use of focus groups, this study provides a unique perspective of rural and farm adolescents' attitudes and behaviors related to NIHL and hearing protection. This study results brought forth these major issues:

Farm adolescents feel NIHL would not have any effects until they are older; Farm adolescents are aware that NIHL negatively affects their quality of life; Farm adolescents acknowledge that hearing protection is a safety concern in certain activities, but also is uncomfortable and inconvenient; Some farm adolescents have confidence in their ability to use hearing protectors and use hearing protection selectively for certain activities (i.e. shooting guns); and Model adult behavior and employee mandates may increase use of hearing protection among farm adolescents.

Findings from this study support previous study findings on farm adolescents and their exposure to noise and use of hearing protectors. Reed et al. [27] found that only 18.5% (n = 5) of their farm youth participants wore hearing protectors. In another report, Reed and colleagues [28] also noted that although 90.0% of the males and 86.8% of the female participants used noisy equipment on the farm, only 29% and 28.8% used hearing protectors, respectively.

Low use of hearing protectors among farm youth was consistent with their attitude toward this behavior. Participants indicated the perceived barriers to hearing protector use outweighed the perceived benefits. Compounding this problem was the fact that although youth indicated their risk for NIHL, they lacked a perceived association between their use of hearing protection today and their hearing ability later in life. The study findings indicate the need for effective interventions to promote hearing protector use among rural and farm adolescents. Interventions targeting

hearing protector use among this at-risk group have shown potential to improve attitudes and behaviors. [21],[29]

Limitations

A major limitation in this study is the sample size. Findings from this convenience sample of 25 participants may not be generalizable to other populations. However, the goal of the study was to explore the attitudes, beliefs, and behaviors of rural and farm adolescents regarding hearing conservation. In addition the fact that two focus groups were conducted for this study, we had the opportunity to use the second focus group as a mode of member checking.

Implications

Farm and rural adolescents expressed attitudes and beliefs that put them at risk for noise exposure and hearing loss. Adolescents' behaviors towards hearing protection were influenced by the perceived barriers, benefits, their confidence in their ability in wearing HPDs properly (self-efficacy), and the environmental and interpersonal interactions around hearing protection. The findings indicate a need for both behavioral and educational interventions, in addition to systemic (i.e. policy and workplace based) interventions to promote use of hearing conservation strategies among rural and farm adolescents. Previous studies have shown that education alone may not suffice to foster hearing conservation behavior change among adolescents, [30] hence the need for the consideration for other factors including policy and workplace based changes. For example, the study findings stress the significance of the work environment and adult modeling in facilitating hearing conservation strategies. Interventions are needed to test various approaches to effectively promote hearing conservation strategies among this population.

Conclusion

To our knowledge this study is among the very few studies to qualitatively explore rural and farm adolescents' attitudes and behaviors about hearing protection. Farm and rural adolescents expressed attitudes and beliefs that put them at risk for noise exposure and hearing loss. Understanding rural and farm adolescents' attitudes and behaviors towards hearing protection will inform future intervention studies targeting NIHL among this population. The subjective accounts of the rural and farm adolescents can be used to enhance the uptake and effectiveness of hearing conservation interventions. Individuals providing pediatric care and/or conducting research with this population may benefit from considering:

Farm youth lack basic knowledge about the hazards of noise exposure and self-protective strategies, particularly as it relates to farm-related work; Social media and schools may be ideal avenues through which this population can be reached to promote hearing conservation behavior change; Strong interpersonal influences of adults on farm adolescents' hearing protection use behavior indicate the potential effectiveness of encouragement and reinforcement of this behavior; When teaching farm youth about firearm safety, the use of hearing protection with firearms as well as noisy farm tasks may also be acknowledged and reinforced; and Reported poor comfort and fit among farm youth indicated a need for instruction in fitting HPDs.

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