



HHS Public Access

Author manuscript

Health Promot Pract. Author manuscript; available in PMC 2022 December 20.

Published in final edited form as:

Health Promot Pract. 2011 May ; 12(3): 396–405. doi:10.1177/1524839910362034.

Using Protection Motivation Theory and Formative Research to Guide an Injury Prevention Intervention: Increasing Adherence to the North American Guidelines for Children's Agricultural Tasks

Sato Ashida¹, Catherine A. Heaney², Jennifer M. Kmet¹, J. R. Wilkins III¹

¹College of Public Health, The Ohio State University

²Stanford Prevention Research Center, Stanford University

Abstract

The North American Guidelines for Children's Agricultural Tasks (NAGCAT) were developed to reduce childhood agricultural injuries by assisting adults in assigning appropriate chores and providing needed supervision and training. In order to develop an effective intervention to increase adherence to NAGCAT among farm parents, formative research (focus groups and pilot-testing) was conducted. Protection Motivation Theory (PMT) was used to guide this research and inform intervention development. Focus group results suggested how PMT constructs might be addressed in order to increase adherence. A home visit intervention, utilizing a standardized presentation in PowerPoint™ format, was developed to (1) introduce NAGCAT, (2) increase motivation to use NAGCAT and enhance safe work behaviors, and (3) ultimately reduce agricultural work-related injuries among youth. Process evaluation data suggests that the intervention was well-received by farm parents. Conducting theory-guided formative research identified motivational barriers and strategies for overcoming these barriers that might not have been otherwise apparent.

Keywords

youth agricultural safety; formative research; NAGCAT; community-based intervention; Protection Motivation Theory

Background

In 2006, approximately 1.4 million youth under the age of 20 lived or worked on U.S. farms (National Institute for Occupational Safety and Health: NIOSH, 2009). In the same year, an estimated 23,100 of these youth were injured on farms, with 5,800 injuries occurring while they were performing farm work (NIOSH, 2009). Furthermore, over 900 youth died on farms between 1995 and 2002 (NIOSH, 2007). There are few regulations to protect the health and safety of children and young adults who live and/or work on farms (Runyan,

Corresponding Author: Sato Ashida, PhD, Social and Behavioral Research Branch, National Human Genome Research Institute, National Institutes of Health, 31 Center Drive, B1B37C, Bethesda, MD 20892-2073, Tel: 301-443-1610; Fax: 301-480-3108, ashidas@mail.nih.gov.

2000). Thus, it is important that (1) adults assign farm chores that are appropriate to the child's age and developmental stage and (2) adults provide proper training and supervision to the children in order to reduce injury risk.

In 1999, the North American Guidelines for Children's Agricultural Tasks (NAGCAT) were developed by the National Children's Center for Rural and Agricultural Health and Safety (Lee & Marlenga, 1999). The guidelines were designed to assist parents in assigning chores and providing appropriate supervision and training to children between the ages of 7 and 18 who perform farm work. These guidelines were developed using a consensus-development methodology involving experts from various fields (e.g., agricultural safety, child development, pediatrics) as well as farm parents, and address 61 farm chores frequently performed by youth. They set forth the responsibilities of the supervising adult, including how to ensure that the work environment is safe, proper equipment is provided, the child has the ability to perform the assigned chore, proper training is provided, and the child is adequately supervised.

Health education interventions can only have an impact if the priority population is exposed to the relevant health education messages, finds the recommended behavior changes acceptable and feasible, and is motivated to adopt the new behaviors (Glasgow, Klesges, Dzewaltowski, Bull, & Estabrooks, 2004). In order for NAGCAT to effectively reduce the risk of childhood agricultural injuries, parents and other adults who supervise children on farms need to comply with the guidelines. Thus, they need to be introduced to the NAGCAT in a way that optimizes their understanding and acceptance of the content.

While there has been extensive interest in addressing parental behaviors in order to influence youth health behaviors (see e.g., Jackson & Dickinson, 2009), little work has explored how best to disseminate the NAGCAT. Gadomski, et al. (2006), using home visits to introduce parents to the NAGCAT, showed modest effectiveness in reducing violations of the NAGCAT's age guidelines for when children are ready to perform certain tasks. Improvements in other behaviors were not noted.

Health education intervention planning models such as PRECEDE/PROCEED (Green & Kreuter, 1999) and intervention mapping (Bartholomew, Parcel, Kok, & Gottlieb, 2006) emphasize the use of social science theory and formative research for intervention development. However, the process of using theory to guide formative research activities and then using the formative research findings to inform intervention development is not always transparent to program developers. This paper will describe the use of Protection Motivation Theory (PMT) and formative research activities in the development of a strategy for disseminating NAGCAT in a way that would be acceptable to farm parents and would bolster motivation to utilize the guidelines.

Protection Motivation Theory

Psychological theories about how people respond to potential hazards or threats contain some common elements. According to these theories, in order for people to take protective action, they must perceive the situation as threatening and appraise the recommended actions for reducing the threat as realistic and effective (Witte, Meyer, & Martell, 2001).

Author Manuscript

Author Manuscript

Author Manuscript

Author Manuscript

Protection Motivation Theory (Rogers, 1975; 1983) posits that the intention to respond to information about potential hazards in a manner that reduces them is influenced by the extent to which motivation to protect oneself or others is aroused. Protection motivation is a reflection of attitude change and is traditionally thought of as the internalized acceptance of a recommended action. Parental adherence to the NAGCAT is a voluntary behavior that elicits few short-term observable benefits. While general attitude change theories are likely relevant to enhancing parental adherence to the NAGCAT, Protection Motivation Theory is particularly well-suited for use in situations where there are few benefits to taking action other than reducing the risk of ill health or injury.

The theory proposes that protection motivation is dependent on how one appraises the threat (in this case, the risk of injury) and how one perceives the possible responses for coping with that threat (for example, performing safe tractor operation behaviors). The threat appraisal process includes the following concepts: (i) PERCEIVED SEVERITY, defined as one's perception of how serious the consequences of injury would be; (ii) PERCEIVED VULNERABILITY, or one's subjective assessment of the child's risk of injury; and (iii) MALADAPTIVE RESPONSE REWARDS, defined as the intrinsic and extrinsic rewards of not performing the prescribed safety behaviors. The coping appraisal process focuses on the recommended behaviors and includes the following concepts: (i) RESPONSE EFFICACY, defined as one's perception of the efficacy of the recommended responses in terms of avoiding the threat; (ii) SELF-EFFICACY, or one's confidence in one's ability to perform the recommended behaviors; and (iii) RESPONSE COSTS, or the perceived costs associated with performing the recommended safety behaviors (for example, inconvenience, financial costs, need for close attention) (Rogers, 1983).

Protection motivation is maximized when people perceive that: (i) the threat is severe; (ii) they (or in this case, their children) are personally vulnerable to the threat; (iii) the recommended coping response (for example, performing safe working practices) will effectively reduce the threat; (iv) they are able to perform the coping response; (v) the rewards associated with not performing the recommended response are small; and (vi) the costs of enacting the recommended response are small.

In order to motivate parents or other adults who supervise youth agricultural workers to follow the NAGCAT, PMT suggests that they need to be aware of the extent to which performing farm chores carries a risk of serious injury. Furthermore, these adults need to feel that they can follow these guidelines without too much difficulty (self-efficacy) and that following these guidelines would reduce the risk of the youth getting injured (response efficacy). Lastly, PMT suggests that adults who perceive little reward for **not** following the guidelines, as well as little cost associated with following the guidelines, are more likely to adhere to the NAGCAT.

Formative Research Methods

In order to obtain formative information from the priority population of farm parents, two focus groups with a total of eleven adults who assign chores and supervise children in performing farm chores were conducted (including ten parents and one man who supervises

his brother's children). This type of qualitative data collection provides an opportunity to explore topics in depth through elicitation of individual perceptions and experiences in the participants' own words. While consensus within the group is not the goal, focus groups stimulate personal reflection based on the comments of others, allowing key issues or common themes to emerge (Morgan, 1998; Patton, 2002). Written informed consent was obtained from each participant at the beginning of each focus group. Focus group discussions were led by an experienced facilitator, while two assistants took careful field notes, noting non-verbal communication and speaker order. Each of the audio-taped focus groups lasted approximately 60 minutes and was professionally transcribed.

Participants were identified through The Ohio State University Extension Office. Individuals who regularly participated in the parents' meetings of a local 4-H club were invited. The first group included 3 men and 4 women, including one married couple. The second group included 2 women and 2 men, including one married couple. Participants had between two to six children, ages ranging from 8 to 22, and had at least one child who was 18 years of age or younger. Farm-related chores performed by the participants' children included: feeding and watering cattle and horses, breaking/tagging calves, cleaning stalls and pens, baling hay, fixing fences, assisting adults with vaccinating animals, working with hay feeders, and driving tractors.

The focus group interview protocol was developed based on the PMT constructs described above. Our research team, with input from farm parents with extensive farming experience, reviewed the protocol. Sample questions that reflect each of the PMT constructs are provided in Table 1. The protocol remained flexible and participants were encouraged to respond freely to each other. Other questions included: the types of farm chores the children performed, history of their children's injuries, safety precautions that parents utilized, other safety precautions that parents were not utilizing and reasons for not taking such precautions, the sources of safety information that they trusted most (e.g., media, research institutions, safety specialists, educators, fellow farmers), as well as the preferred mode of information transmission (e.g., printed materials, internet, video, presentations). All participants were given copies of the NAGCAT and provided time to review them before the facilitator asked for their reactions to the guidelines.

Transcripts were coded to identify data patterns within and between categories or codes. Coding was conducted both inductively and deductively. Some codes were predetermined based on the PMT constructs and others emerged through careful reading of the transcripts. Coding was conducted by two project staff, and the reliability of the coding was enhanced through discussion of the coding processes with other project team members. ATLAS/ti, software for conducting qualitative analysis was used to code the transcripts and retrieve text for analysis (Muhr, 1997). A template organizing style (Crabtree & Miller, 1999) was used to guide data analysis by identifying patterns among the retrieved texts.

The results of the focus groups were used to guide the development of intervention strategies and materials. Once intervention materials were developed, the next stage of formative research involved a rigorous pilot test of the materials with 4 farm families. Participants were asked to comment on their general reactions to the intervention materials and provide

suggestions for improvement. The results of the pilot tests were then used to further modify the intervention.

Results of Formative Research and Intervention

General approach for delivery of the intervention

Based on the focus group findings, general strategies for delivering intervention messages to farm parents were developed. First, it was decided that the intervention would be delivered through home visits. This decision was made because of a concern raised by many of the focus group participants that most farm safety programs do not consider the uniqueness of each child and his/her family (i.e., age, gender, types of chores performed, previous farming experience). Home visits allow the presentation of information to be tailored to the needs of the household. Home visits would also be maximally convenient for busy parents who were juggling the demands of farm production, off-farm jobs, and parenting.

Second, because the focus group participants strongly recommended the use of visual materials and stories of actual injury events, it was decided that a presentation in Microsoft PowerPoint™ format would be developed for the home visits. This presentation could be delivered using a laptop computer and could introduce the NAGCAT in engaging ways and initiate discussion about important topics and themes.

Third, several focus group participants stated that information provided by an academic institution might not be relevant to their own situations. They indicated that they would trust information and would be more open to suggestions if they were provided by a parent who had a farming background. Based on these comments, it was decided that the intervention visits would be conducted by individuals who were similar to members of the priority population in terms of having experience assigning chores and supervising children in the performance of farm chores. All three home visitors hired for this project were mothers of middle school and high school-age children residing in the Central Ohio area with no prior affiliation with the University.

Message Content

Orientation to NAGCAT—The home visit needed to orient the parents to the general structure of NAGCAT and how to use the guidelines. Five ways to keep children safe while they are performing farm chores were introduced: 1) find out if the child is ready to perform the chore, 2) identify possible hazards in the work area, 3) reduce the hazards by modifying the work environment, 4) ensure safe work practices through training and use of appropriate gear, and 5) provide appropriate supervision (Lee & Marlenga, 1999). Detailed descriptions of what parents can do in each of these five steps are provided in the presentation, and participants received an intervention booklet, which contains detailed information on 31 frequently performed chores. By walking through the guidelines for a chore currently performed by the child in the household, the home visitor tried to ensure that parents understand the guidelines and feel comfortable with them before they are asked to follow them.

Motivating Use of the NAGCAT—Table 1 presents the recurring themes found in the focus group data in terms of the PMT constructs, along with examples of how they informed the intervention. The presentation, in its entirety, is available online at <http://www.cph.osu.edu/divisions/epidemiology/epiresearch/>.

Perceived Severity: In general, parents perceived that farm-related injuries could be very serious. Many of the participants related stories about people who had died or been permanently disabled by a farm-related injury. Thus, increasing the level of perceived severity was not made a central component of the intervention.

Perceived Vulnerability: In terms of perceived vulnerability, parents generally acknowledged that there was a risk associated with children performing farm-related chores, but they did not necessarily believe that these injuries could happen to their own children. Low perceived vulnerability was expressed through three recurring themes. Several of the participants stated that they “had never thought about” their own children being at risk:

“It sounds so terrible, but I never thought about it.”

“I’ve never thought about this until now, but sometimes it can be slick in there and they could very easily slip and fall and hit their head.”

The second vulnerability theme that emerged from the data focused on how parents predicted future low risk from a lack of injuries in the family to date:

“We’ve been very fortunate to not have any major awful accidents or anything.”

“I wouldn’t be [concerned about an injury occurring], because we haven’t had any accidents to this point in time.”

To address these two themes, we included a video clip in the PowerPointTM presentation of a father and son who had been involved in a serious farm injury incident. In the video clip, they talk about the incident and appeal to other families to be aware that this could happen to anyone. To introduce the video, the home visitor was instructed to say, “We know that people do not want to consider the possibility that their children could get seriously hurt. Unfortunately, injuries do happen. It happened to the family in this video, and this could happen to your family, too.” We also presented several newspaper articles that described farm-related injuries involving children in the Central Ohio area.

The last theme associated with low perceived vulnerability was prevalent among parents who had an extensive farming background. These parents expressed the belief that only children who were new to farming were at high risk for injuries. To make such parents aware that even children who grew up on farms could get seriously injured, we showed a video clip of Marilyn Adams, a strong activist for childhood agricultural safety, talking about how she lost her son in a grain auger accident (University of Florida/IFAS). In the video, she emphasizes that he was very experienced with farm work and that he “was always careful.” The home visitor then emphasizes that “any child can benefit from safety reminders.”

Response Efficacy: In the focus group, we asked parents “If you were to follow the NAGCAT guidelines, how effective would it be in preventing your children from getting hurt?” Several parents responded with a fatalistic view of farm-related injuries:

“It’s pretty much living on a farm. I mean you are going to have accidents. I mean there’s no getting around it.”

“No matter how much you try to teach and watch, anything can happen at any time.”

Fatalistic attitudes have been cited as a major barrier in several agricultural injury prevention programs (Wadud, Kreuter & Clarkson, 1998). To address this sense of low response efficacy (i.e., the belief that injuries will happen no matter what you do), the home visitor was instructed to acknowledge that injuries could not be prevented 100% of the time, but then to focus on three important benefits of adhering to the NAGCAT: (1) reducing the risk of injuries, (2) reducing the severity of an injury if one does occur, and (3) knowing that they did everything they could, as parents, to prevent injuries from happening. This last potential benefit was expressed by some of the focus group parents and parent’s comments from the focus groups were incorporated into the intervention (see figure 1).

Another factor that diminishes response efficacy among parents was the belief that their children would not engage in safer work practices even if the parents asked them to. To address this, the home visitor was instructed to draw on evidence that illustrates that parents do make a difference in their children’s behavior (Jackson & Dickinson, 2009). The home visitor would acknowledge that children do not always listen to their parents, but that in the long run, they are influenced by what their parents tell them. Thus, parents should persist even in the face of non-compliance from their children, and they should believe more positively in the ultimate success of their efforts.

Self-Efficacy: The parents stated that they were not very confident in their ability to provide the levels of training and supervision recommended by NAGCAT. Two reasons emerged for these low self-efficacy levels. First, several parents appeared to be overwhelmed by the large number of issues they need to address with their children on a daily basis. Second, parents perceived that a scarcity of time and money limited their ability to provide all the recommended safety messages and proper equipment. To enhance self-efficacy, the home visitor reminded participants that farm parents played a central role in the development of the NAGCAT, so that the guidelines are more likely to be feasible for farm parents to carry out. In terms of the concerns about money, the home visitor showed the parents examples of the protective gear recommended by NAGCAT and provided the current prices of the items. The home visitor also emphasized that many of the safe work practices suggested in NAGCAT do not take a lot of time to implement.

Response Costs—To a question, “What keeps you from taking safety precautions to make sure your children won’t get hurt?,” parents responded that talking about safety issues would just increase the number of things to argue about with their children. One parent said, “The interaction is not fun because they hate the job so much. It’s just sort of like drudgery for everybody.” To address this, the home visitor reiterated that a little inconvenience or an

unpleasant interaction with their children is likely to pay off in the long run if it prevents children from getting hurt.

Parents were also asked, “What are some of the reasons for not doing things that you think you should do to enhance your child’s safety on the farm?” Unexpectedly, parents appeared to equate taking safety measures with constraining their children’s participation in the farming enterprise. Furthermore, many of the parents were committed to not constraining their children’s participation in farm work because of the many benefits (for both the farm and the child) that accrue from performing farm chores. While the NAGCAT does suggest that children should not be involved in certain farm tasks if they are not developmentally ready for the complexity or intensity of the task, in general, the NAGCAT is oriented toward making children’s participation in farm work safer, but not diminishing that participation. It became clear that it was important for the home visitor to emphasize this point, and to underscore that the NAGCAT greatly values the benefits that performing farm work provides to children. Thus, one of the very first slides in the PowerPoint™ presentation lists eight benefits of children performing farm-related work (see figure 2)(Neufeld, Wright & Gaut, 2002). One parent in our focus group stated that she would have to “put them [her children] in a glass bubble” to really ensure that the children were safe. During the presentation, the home visitor tells the parents, “NAGCAT is not about making your child a bubble kid. It’s about making his/her farm work experiences more successful.”

Pilot testing—Participants in the pilot test were asked to provide their general reactions to the presentation and printed booklet, including suggestions for improvement. The participants expressed positive reactions to the presented materials, stating that they would be motivated to study and follow the NAGCAT. Participants also indicated that the length and contents of the presentation were appropriate. Based on the questions raised by the pilot test participants, a script containing anticipated questions or concerns and standard responses was developed for use by the home visitors.

Process Evaluation of the Intervention

A rigorous quasi-experimental evaluation of the impact of this injury prevention intervention is currently being conducted with approximately 300 farm families, the results of which will be reported elsewhere. Briefly, a total of 201 visits were conducted by 3 home visitors. At least one child was present during nearly half (49%) of the visits, and multiple adults were present during 20% of the visits. On average, visits lasted 41.41 minutes (SD = 11.63), ranging between 20 and 90 minutes. In addition to the descriptive information provided here, there are three sources of qualitative process evaluation data that shed light on the feasibility and acceptability of the intervention.

Intervention visit logs.

The home visitors kept logs of each home visit where they noted (1) the types of interactions that occurred during the visits and (2) questions, concerns, and comments raised by the parents. The logs indicated that some parents raised questions about the contents of the guidelines (e.g., what is the difference between a respirator and a dust mask, why are steel-toed shoes recommended rather than work boots) and concerns (e.g., reducing the

ability to hear instructions or warnings if the children use ear plugs, middle-size animals not addressed in the guidelines). However, the home visitors described most parents as “receptive,” “interested,” “friendly,” and “interactive.” Many parents expressed positive feelings about the visits by thanking the home visitors for providing “excellent reminders” and information and for the opportunity to be involved in the project. Home visitors reported only two cases where parents did not show much interest during the presentation.

Home visitor perceptions.

Home visitors expressed their views about the project at staff meetings. They reported that they enjoyed conducting the visits and interacting with the parents. One stated “I would say about 50 to 75% of them, you could tell that they were going to read the guidelines carefully and try to make changes. The other 25% were like ‘I’m on my own.’” The home visitors also noted that several parents became emotional when video and audio footage about injury incidents was played, and they felt that using them helped to keep the attention and engagement of the parents throughout the visits. When children participated during the visits, the home visitors perceived that children of all ages were interested in the content of the presentation. Parent-child interaction during the visits often occurred, giving them a chance to talk about safety in the presence of the home visitor, who could answer questions and clarify any confusion.

Post-Intervention focus group.

After the first year of implementation, a focus group was conducted with five parents who had participated in the intervention. The aim was to obtain information on the parents’ general reactions to and experiences with the project as well as to assess their perceptions of the impact of the visits on their feelings and behaviors associated with their children’s farm safety. In general, the participants indicated that they had very positive experiences with the project. One mother stated that she was nervous about the visit at the beginning: “Initially, I was apprehensive, because all I needed was, no offense, but some college person coming in here and telling me I did everything wrong raising my kid. But that wasn’t the case when she came in.”

Parents especially liked the use of the laptop computer and PowerPoint™ because “it looked a lot more professional.” All participants indicated that they were pleasantly surprised by how little time the visit took. One stated, “She made a point without hounding us about it. It was straight to the point and boom! It was done.” Parents especially liked the way the home visitors approached the parents during the presentation: “I don’t think there was anything that she didn’t address.” “She was very down to earth and didn’t talk down to any of us, including [treating my daughter] like she was an adult. I mean, she didn’t demean her because she was only nine years old. She talked to her, included and respected her.”

When asked about whether the visit had made an impact on their feelings or behaviors regarding childhood farm safety, all of the parents in the focus group stated that it had made an impact. Some of the common themes were that it reminded them of “things that [they] hadn’t even thought about” and that it made them realize that they “just assume that

[children] know [about the dangers]." Other comments made by the parents regarding the impact of the visits were:

- "I am more aware of the dangers now. I am afraid for her to go and do anything really major unless one of us is there...It's just that we always took it for granted."
- "Since I did this [program], the jobs that I give the girls to do, even though they've been doing them for years, I find myself checking on them more frequently."
- "Before, it was like 'they know what they are doing,' but now it's like, 'OK, they've been out there for 20 minutes. I'm going out and make sure everything is OK.'"
- "It gave a great opportunity to start talking about stuff that I had never thought of bringing up. It opened the door to conversation."
- "It made me a little bit more, want to be a little bit more attentive as to what he is doing."
- "It turned into a joke. When he would leave, jokingly, I would remind him of all the safety stuff. But deep down, I think that it brought it to the surface. It was said whether it didn't have to be melodramatic. It still gave the opportunity to say, 'Hey, be careful!'"

Conclusion

Childhood agricultural injury prevention programs have typically given little attention to the factors that motivate and/or inhibit safe work practices on the farms (Hartling, Brison, Crumley, Klassen, & Pickett, 2004). Using protection motivation theory to guide our formative research allowed us to identify five important factors and to craft intervention components to motivate parents to read and adhere to the NAGCAT. Without using this theory, our intervention might have resembled generally available childhood agricultural safety programs in which parents are informed of dangers associated with farm-related work and given recommendations for how to reduce those dangers, but the issues of response efficacy, response costs, and self-efficacy are not addressed. The intervention materials and strategies that resulted from this process have been well-received by farm parents, including those parents who were initially skeptical. While the effectiveness of the intervention in terms of changes in parents' protection motivation and safety behaviors, as well as changes in the children's behaviors, is still being investigated, qualitative data obtained from the participants and the home visitors indicate that the use of home visits, the message content, and the interactional style of the home visitors are acceptable to farm parents and have successfully engaged farm parents in re-examining their approach to preventing injuries among their children. The intervention development process described is likely to generalize to other types of injury prevention interventions, providing a strategy for developing theory-informed, context-appropriate health education programs.

Acknowledgements:

This study was supported by the National Institute for Occupational Safety and Health, the Centers for Disease Control and Prevention (R01 OH008070-03). This study was approved by the Institutional Review Board at The Ohio State University. We express our gratitude to parents who participated in the formative research and our home visitors for assisting us to develop and refine the intervention program. The completion of this manuscript was partly supported by the Division of Intramural Research Program of the National Human Genome Research Institute at the National Institutes of Health.

References

Bartholomew LK, Parcel GS, Kok G, Gottlieb NH (2006). Planning health promotion programs: An intervention mapping approach. San Francisco : Jossey-Bass.

Crabtree B, & Miller W (1999). Using codes and code manuals: A template organizing style of interpretation. In: Miller W, editor. Doing qualitative research (pp. 163–178). Thousand Oaks: CA: Sage Publications.

Gadomski A, Ackerman S, Burdick P, and Jenkins P (2006). Efficacy of the North American Guidelines for Children's Agricultural Tasks in reducing childhood agricultural injuries. *American Journal of Public Health*, 96(4), 722–727. [PubMed: 16507741]

Glasgow RE, Klesges LM, Dzewaltowski DA, Bull SS, Estabrooks P (2004). The future of health behavior change research: What is needed to improve translation of research into health promotion practice? *Annals of Behavioral Medicine*. 27:3–12. [PubMed: 14979858]

Green LW, and Kreuter MW (1999). Health promotion planning: An educational and ecological approach, 3rd edition. Mountain View, CA: Mayfield.

Hartling L, Brison RJ, Crumley ET, Klassen TP, & Pickett W (2004). A systematic review of prevention strategies for childhood farm injuries. *Pediatrics*, 114(4), 483–496.

Jackson C & Dickinson DM (2009). Developing parenting programs to prevent child health risk behaviors: A practice model. *Health Education Research* [doi: 10.1093/her/cyp039].

Lee B, & Marlenga B (1999). Professional resource manual: North American Guidelines for Children's Agricultural Tasks. Marshfield, WI: Marshfield Clinic.

Marlenga B, Brison RJ, Berg RL, Zentner J, Linneman J, & Pickett W (2004). Evaluation of the North American Guidelines for Children's Agricultural Tasks using a case series of injuries. *Injury Prevention* 10, 350–357. [PubMed: 15583256]

Morgan D (1998). The focus group guidebook. Thousand Oaks: CA: Sage Publications.

Muhr T (1997). Atlas TI User's Manual. Scientific Software Development: Berlin.

National Institute for Occupational Safety and Health (NIOSH). (2007). Injuries among youth on farm operations, (DHHS Publication No. 2007–161). Retrieved October 13, 2009, from: <http://www.cdc.gov/niosh/docs/2007-161>.

National Institute for Occupational Safety and Health (NIOSH). (2009). NIOSH Safety and health topic: Agricultural injury. Retrieved October 13, 2009 from: <http://www.cdc.gov/niosh/topics/aginjury/>.

Neufeld S, Wright SM, & Gaut J (2002). Not raising a “bubble kid”: Farm parents’ attitudes and practices regarding the employment, training and supervision of their children. *The Journal of Rural Health*, 18(1), 57–66. [PubMed: 12043756]

Patton MQ (2002). Qualitative research & evaluation methods. 3rd ed. Thousand Oaks: CA: Sage Publications.

Rogers RW (1975). A protection motivation theory of fear appeals and attitude change. *Journal of Psychology*, 91, 93–114. [PubMed: 28136248]

Rogers RW (1983). Cognitive and psychological processing in fear appeals and attitude change: A revised theory of protection motivation, In. Cacioppo JT & Petty RE, *Social Psychophysiology* (pp. 153–176). NY: Guilford.

Runyan JL (2000). Summary of Federal Laws and Regulations Affecting Agricultural Employers. Food and Rural Economics Division, Economic Research Service, USDA. (Agricultural Handbook No. 719.). <http://www.ers.usda.gov/publications/ah719/ah719fm.pdf>.

University of Florida IFAS Extension. Rhythm of the seasons: A journey beyond loss. (Video SV125). Gainesville, FL.

Wadud SE, Kreuter MW, & Clarkson S (1998). Risk perception, beliefs about prevention, and preventive behaviors of farmers. *Journal of Agricultural Safety and Health*, 4(1), 15–24.

Witte K, Meyer G, & Martell D (2001). Effective health risk messages. Thousand Oaks, CA: SAGE.

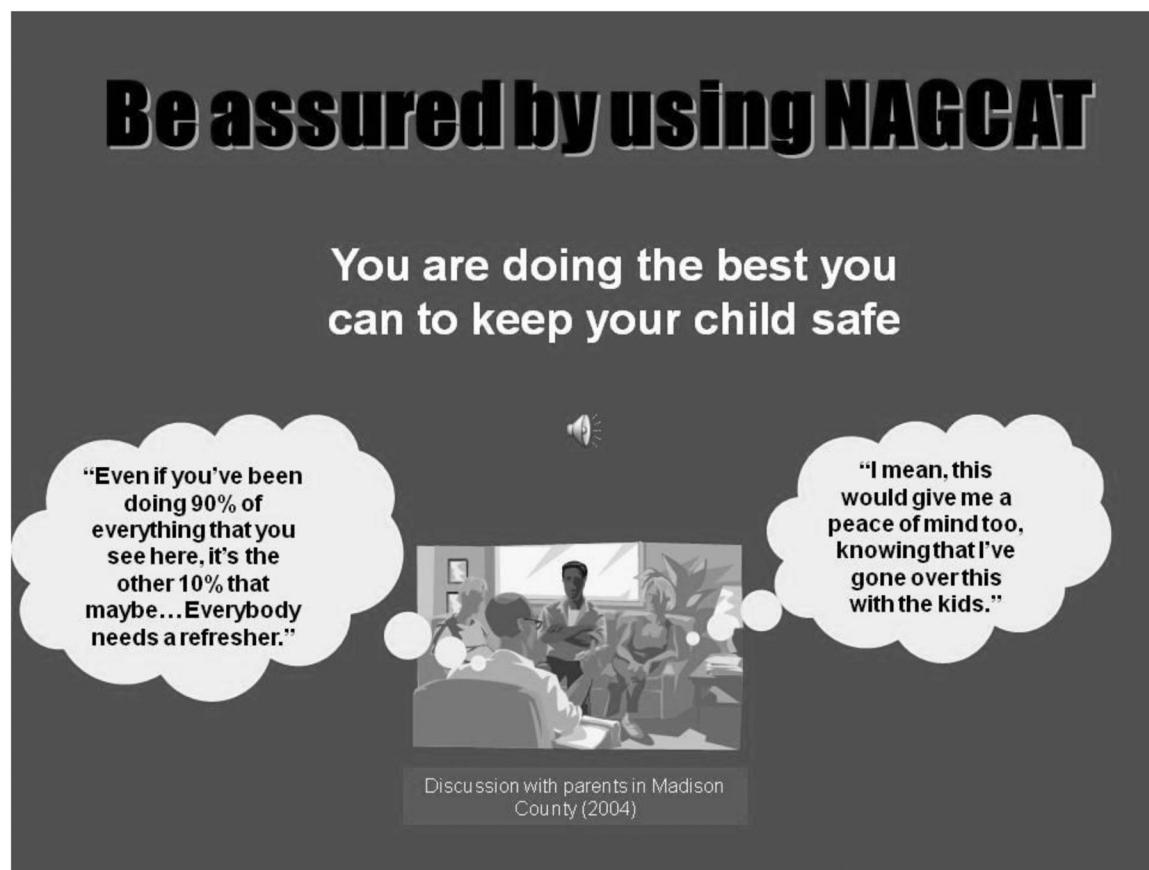


Figure 1.

Sample intervention slide that incorporated parents' comments regarding response efficacy.



Figure 2.

Introductory intervention slide listing eight benefits associated with children performing farm-related work.

Examples of how PMT constructs were used to guide focus group data collection and the development of the intervention

Table 1.

PMT constructs	Sample questions	Sample responses	Recurring themes	Intervention components
Perceived Severity	If your children were to get hurt while doing farm chores, how serious would the injury be?	<p>“It could be fatal.”</p> <p>“Death.”</p> <p>“It would be easy to loose a finger or something like that.”</p>	<i>If can be very serious</i>	No additional effort to increase perceived severity.
Perceived Vulnerability	How likely is it that your children will get hurt while... [e.g., working with large animals?]	<p>“I’ve never thought about this until now, but sometimes it can be slick in there and they could very easily slip and fall and hit their head.”</p> <p>“I wouldn’t be [concerned] because we haven’t had any accidents to this point in time.”</p> <p>“We’ve been very fortunate to not have any major awful accidents or anything.”</p> <p>“They’ve always been around it... they’ve always watched their Mom and Dad work the farm.”</p> <p>“They know the animals. They know which ones, what they are likely to do.”</p>	<i>Never thought about that</i>	Testimonial video clips about childhood farm safety. Newspaper articles about farm-related accidents involving children in the Central Ohio area.
Response Efficacy	If you were to follow these guidelines, how effective would it be in preventing your children from getting hurt?	<p>“It’s pretty much living on a farm. I mean you are going to have them [injuries/accidents]. I mean there’s no getting around it”</p> <p>“I don’t know if they are listening.”</p> <p>“You can preach, and preach, and preach about safety, but it isn’t going to soak in until they come up with short end of the stick.”</p>	<i>Fatalistic view</i>	<p>NAGCAT works! 3 benefits of using the NAGCAT. Parents do have influence on children.</p>
Self-Efficacy	How confident are you that you can influence how safely your children work with large animals?	<p>“There are so many things that we are teaching them that some of the stuff slips in cracks.”</p> <p>“We can’t think of every scenario.”</p> <p>“Time is a big enemy...and money.”</p> <p>“Life is just so busy. You’re constantly going and you don’t take the time to think of these things until something happens, an accident happens.”</p>	<i>So many things</i> <i>Time and money</i>	<p>NAGCAT helps parents “know how”.</p> <p>Most safety practices do not take a lot of time to do.</p> <p>Most safety gear is inexpensive (presentation of the samples: gloves, masks).</p>

PMT constructs	Sample questions	Sample responses	Recurring themes	Intervention components
Response Cost	What are some of the reasons for not doing things that you think you should do to enhance your child's safety on farm?	"They tell you that they are not a baby anymore and [they] can do this." "I think a lot of it is in the desire of what they want to do." "They have to move on. They are growing up. They can't be protected forever."	<i>Trusting the child</i>	NAGCAT is not about making your child a bubble kid. It's about making his/her farm work experiences more successful. "It's worth a little inconvenience." "Jobs don't get done if child is injured"
	What do you think you should do to ensure your child's safety?	"Put them in a glass bubble."	<i>Opportunity for a full experience of farming</i>	
	What keeps you from taking safety precautions to make sure your children won't get hurt?	"You can't talk about safety if you want the jobs to get done" "You can have children do the tasks quicker if parents don't talk much about safety issues." "I gripe about it and complain about it and she finishes the job."	<i>Have to get jobs done</i>	