AN EVALUATION OF THE NORTH AMERICAN GUIDELINES FOR CHILDREN'S AGRICULTURAL TASKS

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ABSTRACT

This technical report summarizes a three year project to evaluate the North American Guidelines for Children's Agricultural Tasks (NAGCAT), a safety intervention designed to reduce childhood agricultural injuries by helping farm parents assign age-appropriate farm work to their children. Based on 69 qualitative interviews with farm parents with children living at home from three regional sites and a national telephone survey with farm adults with children living at home, the report presents findings in terms of six major project aims. Overall, the report highlights significant disagreement with NAGCAT recommendations and skepticism about their usefulness. While willingness to follow the recommendations is relatively high, it largely reflects agreement with the guidelines, suggesting that changes in behavior may be low. The report suggests that much of the disagreement with and skepticism towards the NAGCAT is influenced by different beliefs and attitudes that farm parents have regarding the importance of children's labor, the role of farm experience in affecting readiness to perform farm work, the risk of childhood farm injuries, and the validity of safety expert knowledge. Various ways to address these differences in beliefs and attitudes so as to enhance the effectiveness of the NAGCAT are suggested.

Significant Findings

This section discusses significant project findings in terms of the specific aims of the project. Specific aims are identified, with significant findings discussed below each aim.

Specific Aim 1: To provide data about the decision-making process of farm parents with respect to the age-appropriateness of farm tasks for their children .

One of the major aims of the project was to collect data regarding farm parents' decision-making process with respect to age-appropriate farm work for their children. One aspect of the decision-making process regarding when children begin farm work involves how farm parents judge when their children are capable of performing farm tasks, and specifically what criteria other than age they focus on in judging their children's capabilities. This has been explored in previous research (Kidd, et al, 1997; Neufeld, et al, 2002).

This issue was addressed in both the qualitative and quantitative phases of the research project. In the qualitative interviews, farm parents were asked how they judged when their children were ready to perform farm work. Among the important developmental abilities mentioned were physical characteristics such as size and strength (n=110); emotional characteristics, such as responsibility and maturity (n=123); and cognitive characteristics such as coordination, attention span, memory, and aptitude (n=66). Interest in farm work was frequently mentioned as well (n=109), as was the idea that children with farm backgrounds or farm experience are capable of performing farm work at earlier ages (n=111). The latter point will be discussed more below.

Because of the limited amount of time in the telephone interviews, it was impossible to address all of the characteristics mentioned in the qualitative interviews.

Instead, a decision was made to focus on physical characteristics, emotional and psychological characteristics, farm experience, age, and sex. Specifically, respondents in the telephone interviews were asked to rank their use of seven factors in their decision-making process: age, size, strength, maturity, experience, interest, and sex. Each factor was ranked on a four-point scale, with 1 representing "a lot" and 4 representing "not at all". Table 3 presents the results for men and women.

Table 3: Readiness Variables by Sex

Variable	All**	Men	Women	Sig.*
Age	1.56 (5^{th})	1.68 (4^{th})	1.48 (6^{th})	.005**
Size	1.49 (4^{th})	1.68 (4^{th})	1.37 (4^{th})	.000***
Strength	1.60 (6^{th})	1.81 (6^{th})	1.46 (5^{th})	.000***
Maturity	1.06 (1^{st})	1.09 (1^{st})	1.03 (1^{st})	.007**
Experience	1.29 (2^{nd})	1.35 (2^{nd})	1.25 (2^{nd})	.247
Interest	1.37 (3^{rd})	1.42 (3^{rd})	1.34 (3^{rd})	.277
Sex	3.02 (7^{th})	3.05 (7^{th})	3.00 (7^{th})	.723

* Using Mann-Whitney U non-parametric test for differences in distributions.
** Friedman's non-parametric test for differences in ranks = .000***

The results show that except for sex, all of the factors were fairly important. However, for both men and women, maturity clearly ranked highest, followed by experience. These were followed by size, strength, and age for women and age, size, and strength for men. Sex was relatively unimportant for both, with the overall ranked differences being highly significant. Women used all of the criteria more than men did, with the difference between women and men being significant in terms of age, size, strength, and maturity. The importance of experience suggests that farm parents believe that children who grow up around farm work are capable of starting sooner than children without farm experience. This was a theme mentioned frequently in the qualitative interviews, which led some parents to question the validity of the guidelines for failing to take experience into account.

In order to identify patterns in the decision-making process, an exploratory factor analysis was conducted using the seven criteria for men and women separately. For both men and women, three factors with eigen values greater than 1 were identified using principle components extraction. The rotated solutions are shown in the table below.[6]

Table 4: Principal Components Factor Analysis of Readiness Variables for Men and Women*

	Factor 1		Factor 2		Factor 3	
	Men	Women	Men	Women	Men	Women
Age	.249	.676	-.241	-.151	.258	.176
Size	.831	.737	.040	.166	.051	-.156
Strength	.827	.756	-.137	.140	-.020	.084
Maturity	.165	.016	.344	.823	.787	-.186
Experience	-.139	.157	.710	.630	.110	.381
Interest	.043	-.113	.710	.171	-.050	.735
Sex	.388	.172	.338	-.163	-.590	.591
Variance Explained*	23.4%	25.0%	19.0%	16.3%	14.9%	15.5%

*Total Variance Explained is 57.3% for men and 56.7% for women.

As the table shows, somewhat different decision-making patterns exist for men and women. For factor one, size and strength have extremely high positive correlations for men, while age, size, and strength have high correlations for women. For factor two, experience and interest have high positive correlations for men, while maturity and experience have high positive correlations for women. For factor three, maturity has a high positive correlation and sex has a high negative correlation for men, while interest and sex have high positive correlations for women. This latter factor suggests that men who focus on maturity ignore the sex of the child (and vice versa), while women who consider interest also consider the child's sex, although it is not clear whether they consider boys or girls who are interested.

[6] Varimax rotation is designed to maximize the distinctiveness of the factors by concentrating the loadings of the different variables on particular factors to the greatest extent possible. This helps to make the factor solution more interpretable.

Specific Aim 2: To determine what additional variables besides age enter into the decision-making process of farm parents to first involve their children in farm tasks, and the relationship among these variables

While assessments about children's capabilities are undoubtedly important determinants of decisions regarding age-appropriate farm work, these decisions likely involve other factors as well. In addition to judgments about children's abilities, decisions about age-appropriate farm work may also depend on judgments regarding the skills and abilities required to perform different jobs and tasks. Decisions about age-appropriate farm work are also likely to be influenced by judgments about the outcomes of children's farm work, both positive and negative, as well as the evaluation of those outcomes. Specifically, decisions about children's farm work are likely to be influenced by beliefs that farm work will produce positive outcomes, such as developing a "work ethic" in children (Neufeld, et al. 2002; Elder & Conger, 2000) or promoting the economic viability of the farm (Kidd, et al. 1997), or negative outcomes, such as an injury. They will also depend on how these outcomes are valued by farm parents, such as their belief in the importance of children developing a "work ethic" or contributing economically to the farm (Neufeld, et al. 2002; Elder & Conger, 2000), or their tolerance for farm injuries. This suggests that decisions about children's farm work will not merely involve technical judgments about children's abilities and job requirements. They will have a subjective and/or cultural component regarding beliefs about the outcomes of farm work and especially how those outcomes are valued, especially regarding the importance and/or benefits of farm work, attitudes towards safety, and perceptions of risk.

In order to look at the effect of various factors on parents' decisions regarding their children's farm work, data was collected regarding farm parents' decisions about

when to start their children's involvement in farm work. Respondents were asked to select a child between the age of 8 and 17 who had most recently celebrated a birthday. This was done to randomize the children selected in terms of sex and age. A total of 346 children were selected within this age range, although considerably more boys than girls. Respondents were then asked about the age at which that child started helping with farm tasks and started using farm machinery. The responses are indicated in Table 5, which shows mean ages for all children, boys, and girls, as well as the mean ages for boys and girls who had not yet started helping or started using machinery.

Table 5: Mean Age Started Helping and Mean Age Started Machinery for Randomly Selected Children

	Age Started Helping			Age Started Machinery		
	N	% of Total	Mean Age Started	N	% of Total	Mean Age Started
All	299	86.9	8.16	196	57.0	10.95
Boys	177	94.1	7.86	126	67.0	10.72
Girls	122	78.2	8.59	70	44.9	11.37
Sig.		.000***	.033*		.002**	.053

Mean Age of Those Not Helping:
Boys=10.82 (n=11) Girls=12.41 (n=34) Sig.=.151
Mean Age of Those Not Using Machinery:
Boys=10.84 (n=62) Girls=12.28 (n=86) Sig.=.002
*Total N=344

As the results indicate, boys were significantly more likely to have started helping and started farm work than girls, and they also started at earlier ages. The mean age for starting helping was 7.86 for boys and 8.59 for girls, and the mean age for starting machinery is 10.72 for boys and 11.37 for girls. The first difference is significant at the .05 level, while the second difference is just above significance (p=.053).[7]

[7] One noteworthy difference is in the reports of men versus women, especially in terms of the age children started helping. The mean age started helping according to men was 8.82 years, compared to a mean of 7.74 years for women. Thus, men reported that their random child started helping over a year later than women did, and this difference was significant at the .001 level. For the age starting machinery, the difference was much smaller and not significant, with men reporting an age of 11.07, compared to 10.87 for

One important question is how decisions about farm work compare to the NAGCAT. Although data was not systematically collected on when children began various types of farm tasks, respondents were asked to identify the type of farm machinery used where a child had started using farm machinery. The two most frequently identified types of machinery were a lawn or garden tractor (n=101) or just a small or general tractor (n=52).[8] The following table shows the mean age started for boys and girls for each task.

Table 6: Age Started Using Lawn/Garden Tractor and General Tractor for Boys and Girls

	Lawn/Garden Tractor			Small or General Tractor		
	Male	Female	Sig.	Male	Female	Sig.
Mean	10.91	11.73	.043*	10.89	11.53	.367
N	65	33		35	17	
%	52.0	51.4		28.0	24.3	
Overall Mean	11.18			11.10		

As the table shows, while boys and girls who had started using machinery were about equally likely to start on lawn or garden tractor of just a general or small tractor, boys started considerably earlier in both cases. The difference was not significant in the case of small tractors and general tractors, but this is due in part to the smaller number of cases. Overall, the mean age that children started using a lawn or garden tractor was 11.18, with 47 of 98 children starting at age 11 or sooner, compared to the NAGCAT

women. This suggests that women are likely to recognize children's contributions earlier than men do, and that "starting helping" is more ambiguous than starting machinery.

[8] In response to this question, most respondents simply used the term tractor, although some respondents specified small, medium, or large tractors, or tractors with implements attached. In order to make the comparison with the NAGCAT more valid, only respondents who used the term "small tractor" or "tractor" were included in the analysis. Medium, large, and more complex tractors with implements were excluded because the recommendations for these types of machinery are generally for older ages. Even excluding these responses, the including responses using the general term "tractor" probably includes some larger and more complex tractors, thus biasing the results towards a higher age.

recommendation of 12-13 years. The mean age children started using a small tractor or general tractor was slightly earlier at 11.10, with 23 of 52 children starting at age 11 or sooner, compared to the NAGCAT recommendation of 12-13 years for a small (20 to 70 horsepower) tractor. This is out of a total of 364 respondents who selected a random child eight years and older, and 198 respondents where the child was using farm machinery.

In order to understand how parents arrive at these decisions, Univariate ANOVAs of age started helping and age started machinery were estimated using a number of random factors and covariates. The focus of these analyses was to determine the relative importance of beliefs about age-appropriate farm work and other factors on the age at which children start farm work. In order to collect data on age-appropriateness, respondents were asked to specify the age at which most farm children were capable of performing 5 different farm machinery tasks identified in the NAGCAT, with means across these variables being subsequently computed.[9] As a result, this variable encompasses both judgments regarding children's capabilities as well as skills and abilities required to perform farm work.

One interesting analysis is to compare farm parents' level of agreement with the NAGCAT recommendations for these tasks. These data are presented in Table 7 for male and female respondents, along with their overall means. Table 7 also shows the NAGCAT recommendation as well as the percent of male and female respondents who specified an age below the NAGCAT recommendation.

[9] In some cases, only 4 of 5 valid responses were available. In these cases means were constructed taking into account variation in the means across the different variables.

Table 7: Appropriate Age to use Farm Machinery by Sex

SEX		Lawn or garden tractor	20-70 HP tractor w/trailing equipment	20-70 HP tractor with front-end loader	70+ HP tractor w/o equipment	70+ HP tractor with hydraulics	Overall mean to use machinery
MALE	Mean	11.00	13.69	14.96	14.57	14.91	13.83
	N	166	168	165	165	165	167
FEMALE	Mean	11.18	13.93	15.05	14.85	15.34	14.07
	N	241	240	232	232	230	237
Total	Mean	11.11	13.83	15.02	14.74	15.16	13.97
	N	407	408	397	397	395	404
Sig.*		.378	.212	.600	.093	.007	.114
NAGCAT AGE		12-13	12-13	16+	14-15	14-15	N/A
% Male below NAGAT		47.0	7.1	53.3	19.4	13.3	N/A
% Female below NAGCAT		49.4	9.6	50.4	16.4	12.2	N/A

*Equal Variances not assumed

As Table 7 shows, agreement with the NAGCAT recommendations varies considerably by farm task. For lawn and garden tractors and 20-70 hp tractors with front-end loaders, approximately 50% of both men and women specified an appropriate age lower than the NAGCAT recommendation. For the other tasks, less than 20% did. This variability suggests that farm parents' disagreements with the NAGCAT may reflect disagreements over the necessary skills and requirements for each task, rather than disagreements over children's abilities. It also suggests that parents may focus more on the size and cost of machinery more than the necessary abilities and the actual risk of injury, something suggested in previous literature (Kidd, et al, 1997). Although husbands specified younger ages than wives for all of the tasks, only the difference for using 70+ hp tractors with hydraulics was significant at the .05 level (p=.007).

In the Univariate ANOVAs, a single variable for beliefs about age-appropriate farm work was created by computing a mean for the five individual variables. A reliability analysis showed that the five individual variables had an alpha of .9048. Where data were available on only four of the variables, a mean was computed adjusting

for the mean of the missing variable. This variable was entered as a covariate in the analysis.

In addition to beliefs about age-appropriateness, a number of other random factors and covariates were included in the Univariate ANOVAs. In terms of safety attitudes and risk perceptions, two questions on the survey asked about respondents' safety practices. One asked respondents how frequently they let children ride on machinery without a cab, while the other asked about their use of PPE. These questions are in part measures of safety attitudes and averseness to risk. The survey also asked respondents whether they had heard of a childhood farm accident in their area in the past 3 years. This question was developed in part out of the qualitative interviews as an indicator of respondents' perception of childhood injuries as a serious problem. The survey also contained questions about trust in safety expert advice, the use of safety expert advice, the importance of children helping with farm work, years raised on a farm, off-farm employment (full-time, part-time, or none), age, and education. Age and years raised on a farm were entered as covariates, while the other variables were entered as random factors.

The results of the analyses suggest that different characteristics of men and women affect the age at which children begin farm work.[10] In terms of the age at which children start helping with farm work, the between-subjects analysis of the effects of the independent variables for men (not shown) found that the importance of children helping was significant at the .05 level (.021), with a partial Eta squared of .089. Age appropriateness was significant at the .10 (.092), with a partial Eta squared of .034.

[10] Because of the relatively small number of cases involved in these analyses and the greater margin for error, significance levels will be reported at the .10 level.

For women, the importance of children helping was significant at the .10 level (.071), with a partial Eta squared of .047, while not letting children ride as passengers was significant at the .01 level (.009), with a partial Eta squared of .100. The fact that the reported frequency of children riding as passengers is significant for women but not men may reflect sampling error or differences in the perceptions of men and women regarding children riding on machinery and the age at which they start farm work. As discussed earlier, perceptions of what constitutes early farm work may vary considerably between men and women. The fact that age appropriateness is not significant for women and only marginally significant for men is probably to be expected, since the measures of age appropriate farm work are based on machinery tasks rather than early farm tasks.

Table 8 shows the coefficients for the individual parameters estimated, along with their standard errors and significance levels. For men, the belief that children helping is somewhat important has a significant positive effect at the .01 level (p=.008) compared to children helping being very important. Trusting experts either little/not at all or some has significant negative effects at the .10 level (p=.091 and p=.089) compared to trusting experts a lot. Age appropriateness has a significant positive effect at the .10 level.

For women, children never riding as passengers, rarely riding as passengers, and sometimes riding as passengers all have significant negative effects compared to children riding most or all of the time, although the effect is strongest and most significant for children who ride sometimes. The belief that children helping is not at all/not very important has a significant positive effect (p=.048) compared to the belief that children helping is very important. Although wearing PPE overall is not significantly related to

Table 8: Univariate ANOVA of Age Started Helping

	Men[1]			Women[2]		
Parameter	B	Std. Error	Sig.	B	Std. Error	Sig.
Intercept	3.445	4.282	.423	9.688	3.486	.006**
Kids Never Ride	-.465	1.257	.713	-3.613	1.456	.015*
Kids Rarely Ride	-1.144	1.160	.327	-3.777	1.487	.012*
Kids Sometimes Ride	-.740	1.259	.558	-5.056	1.529	.001***
Kids Most of Time/Always Ride	0(a)	.	.	0(a)	.	.
Helping Not at All/ Not Very Important	1.865	2.245	.408	3.728	1.864	.048*
Helping Somewhat Important	1.741	.640	.008**	.879	.712	.220
Helping Very Important	0(a)	.	.	0(a)	.	.
Never Wear PPE	.434	1.330	.745	.676	.923	.466
Rarely Wear PPE	.072	1.302	.956	1.961	1.046	.064(.1)
Sometimes Wear PPE	-.050	.977	.959	.803	.891	.369
Most of Time Wear PPE	-.450	.973	.645	.799	1.004	.428
Always Wear PPE	0(a)	.	.	0(a)	.	.
Age	.012	.035	.726	.020	.033	.534
Heard of Child Accident	-1.165	.841	.170	-.639	.698	.362
Have not Heard of Child Accident	0(a)	.	.	0(a)	.	.
Use Expert Advice Little/Not at All	1.440	1.017	.161	.007	.909	.994
Use Expert Advice Some	.051	.796	.949	.289	.803	.719
Use Expert Advice A Lot	0(a)	.	.	0(a)	.	.
Trust Experts Little/ Not at All	-2.141	1.251	.091(.1)	.484	1.090	.658
Trust Experts Some	-2.011	1.169	.089(.1)	.015	1.063	.989
Trust Experts A Lot	0(a)	.	.	0(a)	.	.
Less than H.S.	1.180	1.772	.507	-.862	1.525	.573
H.S. or GED	1.284	1.217	.294	-.744	1.196	.535
Some College	1.699	1.244	.176	-.535	1.166	.647
Associates Degree	2.342	1.416	.102	-.671	1.318	.612
Bachelors Degree	.398	1.293	.759	-.073	1.169	.951
Grad Degree	0(a)	.	.	0(a)	.	.
Full-Time Off-Farm	.924	.681	.178	-.119	.583	.839
Part-Time Off-Farm	.299	.982	.762	-.211	.694	.762
No Off-Farm	0(a)	.	.	0(a)	.	.
Years Raised on a Farm	-.013	.074	.857	-.037	.030	.220
Appropriate Age	.407	.239	.092(.1)	.027	.160	.869

a This parameter is set to zero because it is redundant.
[1]N of cases=108
[2]N of cases=134
***=Sig. < .001
**=Sig. < .01
*=Sig. < .05
(.1)=Sig. <.10

age started helping, rarely wearing PPE has a significant positive effect at the .10 level (p=.064) compared to always wearing PPE, which is counterintuitive.

In terms of age started machinery, the equations change significantly for both men and women, although different patterns for men and women continue to exist. For both men and women, beliefs about age appropriateness are now highly significant (p=.001 for men and p=.000 for women), with the largest partial Eta squared (.183 for men and .272 for women). This is to be expected, since beliefs about age appropriateness are based on machinery tasks. Beliefs about the importance of children helping also continue to be significant at the .10 level for men (p=.087) and .05 level for women (.041). However, for men, wearing PPE and using expert advice are now significant at the .10 level (p=.064 and p=.098 respectively), with partial Etas squared of .152 and .084 respectively. For women, education is now significant at the .10 level (p=.075), with a partial Eta squared of .160.

The following table again shows the estimates for the individual parameters, along with their standard errors and significance levels. As with age started helping, the belief that children helping is somewhat important has a significant positive effect (p=.030) for men, while the belief that children helping is not very/not at all important has a significant positive effect (p=.026) for women. For men, never wearing PPE, rarely wearing PPE, and sometimes wearing PPE all have significant negative effects at the .05 level (p=.019, p=.014, and p=.036 respectively). Using expert advice has a significant positive effect at the .05 level (p=.035).

Table 9: Univariate ANOVA of Age Started Using Machinery

	Men[1]			Women[2]		
Parameter	B	Std. Error	Sig.	B	Std. Error	Sig.
Intercept	6.294	3.752	.099(.1)	-1.899	3.496	.589
Kids Never Ride	-.867	.966	.374	-.001	1.664	.999
Kids Rarely Ride	-.871	.879	.326	.084	1.713	.961
Kids Sometimes Ride	-1.359	.966	.165	-.423	1.710	.805
Kids Most of Time/Always Ride	0(a)	.	.	0(a)	.	.
Helping Not at All/ Not Very Important	.898	1.684	.596	4.173	1.822	.026*
Helping Somewhat Important	1.119	.502	.030*	.999	.706	.163
Helping Very Important	0(a)	.	.	0(a)	.	.
Never Wear PPE	-2.626	1.083	.019*	-1.217	.956	.208
Rarely Wear PPE	-2.710	1.067	.014*	-1.436	.986	.151
Sometimes Wear PPE	-1.648	.766	.036*	-1.929	.918	.040*
Most of Time Wear PPE	-.930	.796	.248	-1.641	1.030	.117
Always Wear PPE	0(a)	.	.	0(a)	.	.
Age	-.068	.028	.020*	.024	.031	.444
Heard of Child Accident	-.697	.675	.306	.398	.747	.597
Have not Heard of Child Accident	0(a)	.	.	0(a)	.	.
Use Expert Advice Little/Not at All	1.691	.783	.035*	-.948	.903	.298
Use Expert Advice Some	.718	.638	.266	.104	.796	.896
Use Expert Advice A Lot	0(a)	.	.	0(a)	.	.
Trust Experts Little/ Not at All	-.843	.950	.379	1.228	.988	.219
Trust Experts Some	-.026	.927	.978	1.244	.931	.187
Trust Experts A Lot	0(a)	.	.	0(a)	.	.
Appropriate Age	.675	.196	.001***	.725	.159	.000***
Years Raised on Farm	.039	.061	.527	.038	.030	.209
Full-Time Off-Farm	.799	.577	.172	.219	.554	.694
Part-Time Off-Farm	-.558	.847	.512	-1.223	.698	.085(.1)
No Off-Farm	0(a)	.	.	0(a)	.	.
Less than H.S.	-.675	1.925	.727	1.548	1.368	.263
H.S. or GED	-.457	1.166	.697	2.242	1.037	.035*
Some College	-.659	1.166	.574	2.380	.999	.021*
Associates Degree	-1.614	1.382	.248	2.310	1.207	.061(.1)
Bachelors Degree	-.482	1.208	.691	.966	1.032	.354
Grad Degree	0(a)	.	.	0(a)	.	.

a This parameter is set to zero because it is redundant.
[1]N of cases=78
[2]N of cases=81
***=Sig. < .001

**= Sig. < .01
*=Sig. < .05
(.1)=Sig. < .10

For women, wearing PPE sometimes now has a significant negative effect at the .05 level (p=.040). Part-time off-farm employment has a significant negative effect at the .10 level (p=.085).

Overall, the data indicate that beliefs about age-appropriateness are the primary factor in decisions regarding when children start farm work, especially regarding the use of machinery. However, they also suggest that education, safety attitudes, using expert advice, off-farm employment, and attitudes towards the importance of children's farm work influence farm parents' decisions. This suggests that decisions about children's farm work are based not just on notions of age-appropriateness, but also on beliefs about and attitudes towards risks and benefits associated with children's involvements in farm work. Understanding farm parents' decisions about children's involvement in farm work thus requires a model that takes into account perceived positive and negative outcomes of farm work as well as values attached to those outcomes.

Additionally, a separate ordinal regression analysis (not shown) found that beliefs about age-appropriateness were themselves affected by attitudes about the importance of children helping for men, and safety attitudes (not letting children ride on machinery) and the use of expert advice for women. Thus, even beliefs about age-appropriate farm work appear to be influenced to some extent by beliefs and attitudes towards the costs and benefits of farm work. Finally, it is important to keep in mind that beliefs about age-appropriateness encompass both judgments about children's abilities and judgments about job requirements. The data suggest that disagreements with NAGCAT

recommendations may reflect disagreements over requirements for farm tasks, not just disagreements over children's abilities.

Specific Aim 3: To provide information about parents' training practices and role-modeling behavior.

With a change in the project research coordinator early in the project, a decision was made to change the focus of the third aim. In order to better understand farm parents' attitudes towards the NAGCAT and their willingness to use the NAGCAT, a decision was made to focus on their perceptions of the problem of childhood agricultural injuries and their attitudes towards safety expert knowledge and advice. This decision was motivated by the belief that exploring these attitudes and perspectives would provide greater insight into farm parents' attitudes towards the NAGCAT and potentially highlight areas of discrepancies in knowledge, assumptions, and perspectives between farm parents and the NAGCAT. This would help provide insight into decisions not just regarding the adoption of NAGCAT but also regarding safety interventions more generally.

Attitudes towards Childhood Agricultural Injuries

In terms of providing information regarding farm parent's perceptions of the risk of childhood agricultural injuries, the new aim was to determine the extent to which farm parents' perceived childhood agricultural injuries to be a serious problem, and to better understand how farm parents formed their perceptions of risk. This aim was seen as important for two reasons. First, it was seen as important in order to determine whether or not a gap exists between expert and lay perceptions regarding the risk of childhood agricultural injuries. To the extent that farm parents' do not perceive childhood

agricultural injuries to be a serious concern, for example, they may be reluctant to follow expert recommendations. Second, it was seen as important to understand why differences in perceptions between experts and farm parents might exist in order to more effectively disseminate the NAGCAT.

Data on attitudes towards childhood agricultural injuries were collected mainly in the qualitative interviews. The qualitative interviews typically involved a question about whether farm parents' perceived childhood farm injuries to be a serious problem. Responses to this question were categorized and coded as yes or no, and various reasons and beliefs related to these answers were categorized and coded as well, with a "1" indicating that a reason was given and a "0" indicating that a reason was not given. A quantitative data set was then created from the coded data and analyzed using SPSS.

Although the qualitative interviews do not represent a random sample, the results nevertheless raise some interesting issues regarding farm parents' perceptions of childhood agricultural injuries. First, virtually half of all respondents did not see childhood agricultural injuries as a serious problem. Out of a total of 102 respondents who expressed views, 49.0% said they did not see childhood agricultural injuries as a serious problem, compared to 43.1% who did and 7.8% who gave unclear answers. Second, the results also show that farm parents justified their perceptions to a significant extent on their evaluations of childhood agricultural injuries in their local environment. Out of the 102 respondents who expressed views about childhood agricultural injuries as a serious problem, 65 framed or justified their responses in terms of their perceptions regarding the extent of childhood agricultural injuries in their local vicinity. A chi-square analysis showed that perceptions of local childhood agricultural injuries was highly

correlated with beliefs that childhood agricultural injuries were a serious problem (p=.000; n=55). Overall, respondents expressed little or no knowledge of aggregate childhood injury statistics. In fact, on several instances, respondents questioned or even dismissed the validity of aggregate statistical information for various reasons.

The role of local evaluations in shaping attitudes towards the risk of childhood agricultural injuries appears to be supported by regional differences in attitudes towards childhood agricultural injuries. Both the perception of childhood injuries as a serious problem and the perception of the extent of local childhood accidents were highly correlated with respondents' region (p=.019 and N=94; p=.008 and N=64 respectively). In both cases, Washington respondents were by far the least likely to see childhood agricultural injuries as a serious problem and be aware of childhood injuries, followed by respondents in Kentucky and Iowa. This pattern correlated perfectly with the mean farm size of respondents in the sample, which was 2,326.4 acres in Washington, 589.8 acres in Kentucky, and 484.9 acres in Iowa. As a result, perceptions of childhood farm injuries appear to be related to the density of farms in a given area.

Even though perceptions of childhood agricultural injuries as a serious problem were correlated with evaluations of childhood injuries in the local area, the evaluations themselves were highly subjective. In other words, whereas one respondent might interpret one child fatality in five years as low, another might interpret that to be high. Interestingly, neither the perception of childhood agricultural injuries as a serious problem (p-=.740; n=94), nor perceptions of the extent of childhood agricultural injuries (p=.107; n=64) showed a significant relationship with the actual recall of specific childhood agricultural injuries, although the relationship was much stronger in the latter

case. Thus, while knowledge of childhood farm accidents may play a role, evaluations of local childhood injuries appear to be a highly subjective processes which depend at least in part on a person's "risk sensitivity" (Sjoberg, 2000). This suggests that the effect of awareness of local childhood injuries on attitudes towards childhood agricultural injuries will depend on attitudes towards risk and how information regarding childhood injuries is recalled and interpreted, rather than just reflecting objective characteristics of the information.

For example, farm parents who did not see child agricultural injuries as a serious problem tended to evaluate the risk of injury in ways that minimized the problem. Farm parents who did not see childhood agricultural injuries as a serious problem provided a number of reasons for their views. The reasons were as follows:

- 28 claimed that childhood injuries were less of a problem because farm machinery was safer than in the past
- 26 claimed that children were more likely to be hurt doing other activities, especially in urban areas
- 23 claimed that fewer children were working at present than in the past
- 18 claimed that children did not work as hard or at as early an age as they did in the past
- 15 claimed that childhood injuries occurred more in other regions of the country or other types of farms than their own
- 13 claimed that adult injuries were as serious or common or more serious or common as childhood injuries
- 8 questioned the validity of aggregate statistics
- 7 claimed that the high cost of machinery led parents to be careful about letting their children use the machinery

While there may be some validity to some of these views, many of these reasons minimize the problem through questionable comparisons to other groups and settings. Many also minimize the problem by focusing on alleged declines in the raw number of injuries, rather than the issue of injury rates.

One other point highlighted by the interview was that farm parents' awareness of local injuries tended to focus on "major" rather than "minor" injuries. In addition to coding whether respondents claimed in general to be aware of childhood agricultural injuries, instances of specific childhood agricultural injuries that were identified were coded as well. Overall, a total of 44 respondents identified one or more specific childhood farm incidences or injuries. 15 respondents identified one or more cases involving a childhood death; 6 respondents identified cases involving the amputation of a limb or appendage; 2 respondents identified cases involving the amputation of a finger; 5 identified cases involving a significant fracture; 3 respondents identified cases involving paralysis; 8 respondents identified cases involving various other, generally more minor, outcomes; and 22 respondents identified cases involving unclear outcomes. This focus on "serious" injuries may result from the information about injuries that farm parents are exposed to, and/or biases in the recall of that information (cf. Tversky and Kahneman, 1974). However, it may also be that farm parents have a different standard for judging what constitutes a significant injury. For example, a few respondents in the qualitative interviews did not consider a broken bone to be a serious injury. In fact, broad definitions of injuries were one reason why some respondents questioned the validity and usefulness of aggregate injury statistics. In any case, focusing on "major" injuries may lead farm parents to understate the risk of injury.

Overall, the data suggest that significant discrepancies exist between the risk perceptions of safety experts and the risk perceptions of farm parents. These discrepancies appear to be related to the kinds of data each group uses and the interpretations and conclusions placed on the data. This selection and interpretation of

information may be shaped in part by farm parents' positive attitudes towards children's farm work and their desire to see their children involved in farm work.

Attitudes towards Safety Experts

Data on attitudes towards experts were available in both the qualitative interviews and surveys. The interview protocol addressed a variety of topics, including farm respondents' trust in safety experts and the legitimacy of different sources of safety information. In the survey, attitudes towards experts were measured in terms of three separate dimensions: trust in safety expert advice, the usefulness of safety expert advice, and the use of safety expert advice regarding children's abilities. Each dimension was measured by a question using a four point ordinal scale, although the categories for trust and usefulness were subsequently collapsed into three. Spearman Rho correlations between these items are all highly significant, with a correlation of .464 for trust and usefulness (n=393, sig.=.000), .438 for trust and use (n=384, sig.=.000), and .364 for usefulness and use (n=378, sig.=.000).

In addition, the survey contained an open-ended question that asked respondents to describe the first thought that came to their mind regarding farm safety experts. The open-ended answers to this question were recorded and transcribed verbatim. Open-ended responses were initially coded into 37 different categories and then recoded into 9 groupings in order to simplify the data analysis. The 9 groupings are: lack farm knowledge, experience, or common sense; knows or promotes farm safety; needs or has farm experience; Extension, FSA, or the Farm Bureau (consisting mostly of Extension); government regulation; equipment manufacturers, people who know machinery, sales,

and insurance; farmers/farm parents; scientists and academics; farm safety information and programs.

In the close-ended questions, attitudes towards safety experts appeared relatively favorable. In terms of trusting advice from farm safety experts (n=401), 47.4 percent of respondents reported having a lot of trust, with 45.4 percent reporting having some trust and only 7.2 percent reporting little or no trust. In terms of the usefulness of advice from farm safety experts (n=397), 38.8 percent said expert advice was very useful, compared to 55.4 percent who said somewhat useful and 5.8 percent who said not very or not at all useful. In terms of using expert advice regarding children's capabilities (n=386), only 30.8 percent reported doing so a lot, 53.1 percent reported doing so some, 8.8 percent reported doing so a little, and 7.3 percent reported doing so not at all.

In the qualitative data, attitudes towards safety experts appeared to be more negative. In the qualitative interviews, while a number of respondents (n=24 or 35.8% of valid responses) expressed trust in safety experts and safety expert knowledge, a considerably larger number (n=43 or 64.2% of valid responses) expressed negative attitudes towards safety experts. Most of these (n=28) criticized safety experts for possessing only "book learning" rather than actual farm experience, which rendered their knowledge invalid. 35 respondents suggested that developers of the NAGCAT were overly cautious in their recommendations. Although some respondents saw this as justified or beneficial, more were critical of safety experts for failing to take into account other important values and priorities besides safety, such as production needs or the benefits of children working on the farm. Several also felt the recommendations were overly cautious to protect against liability issues. Overall, 45 references were made

alleging that NAGCAT would hurt respondents' farms, compared to only 24 alleging NAGCAT would have no negative impact.

Many parents also questioned the benefits and usefulness of the NAGCAT and safety expert knowledge more generally. Respondents made numerous references to themselves as "lay experts" regarding their children's farm safety, based on their parental knowledge of their children (n=69) and their knowledge of farm work (n=64). These perceptions led many respondents to see the guidelines and safety information more generally as "common sense". Overall, 32 persons in 25 different couples claimed that judging children's abilities was "common sense", and another 21 persons in 17 different couples saw farm safety and farm safety information in general as "common sense".

The responses to the open-ended survey question asking respondents their first thought concerning farm safety experts are shown in Table 10.

Table 10: Images of Farm Safety Experts (open-ended)

Image of Safety Expert	Frequency	Percent of All Responses	Percent of Valid Responses
Lacks farm knowledge/experience/Is common sense	63	15.3	19.4
Knows/promotes farm safety	50	12.2	15.4
Needs or has experience	40	9.7	12.3
Extension/FSA/Farm Bureau	43	10.5	13.2
OSHA/government regulation	27	6.6	8.3
Equipment manufacturer/sales/ knows machinery	19	4.6	5.8
Farmers/farm parents	29	7.1	8.9
Scientist/engineer/researcher	15	3.6	4.6
Farm safety/farm safety programs	39	9.5	12.0
Don't know/no answer	86	20.9	---
Total	411	100.0	100.0

As Table 10 shows, these responses are similar to those in the qualitative interviews. The single largest category involves comments about safety experts lacking experience and safety being common sense, accounting for one-fifth (19.4 percent) of all responses.

Indeed, these comments, along with comments about safety experts needing or having experience, representing government regulation, and that farmers and farm parents are safety experts combined account for virtually half (48.9 percent) of all responses. Most of the remaining responses describe various types of farm safety experts or farm safety information without any clearly expressed attitudes towards safety experts. As a result, the qualitative data seem to present a more negative view of safety experts. The reason for the discrepancy with the close-ended data is unclear.

One important question is whether farm parents trust certain safety experts more than others. Table 11 shows the results of an ordinal regression of trust, usefulness, and use by respondents' images of safety expert intended to test this idea. As mentioned

Table 11: Ordinal Regressions of Trust, Usefulness, and Use by Image of Safety Experts

	Dependent Variable		
Independent Variable	**Trust**	**Usefulness**	**Use**
Lacks Knowledge/ Experience/Is Common Sense	-1.821***	-1.823***	-1.719***
Knows/Promotes Farm Safety	-.366	-.932*	-.364
Needs or Has Experience	-.863(.1)	-1.590***	-.210
Extension/FSA/Farm Bureau	-.065	-.466	-.501
Government Regulation	-1.886***	-2.295***	-1.890***
Equipment Manufacturers/ Sales/Knows Machinery	.251	-.000	-1.642**
Farmers/Farm Parents	-.916(.1)	-1.057*	-.659
Scientist/Researcher/Engineer	-.634	-.871	-1.534*
Farm Safety/Farm Safety Info and Programs[1]	0(a)	0(a)	0(a)
Cox and Snell R-square	.125	.113	.110
Nagelkerke R-square	.150	.138	.124
Sig. of Final Model[2]	.000***	.000***	.000***
N	319	316	307

[1] Parameter is set to zero because it is redundant.
[2] Difference in –2 log likelihood between model with intercept only and final model.
*** Significant at the .001 level
** Significant at the .01 level
* Significant at the .05 level
(.1) Significant at the .10 level

previously, while some of the images identify specific types of experts, others simply reflect evaluative attitudes towards safety experts in general. Additionally, respondents did not systematically identify different types of safety experts in terms of their trust, usefulness, and use. These limitations need to be kept in mind in interpreting the results.

Despite the limitations, the results are suggestive. Respondents who thought of safety experts in terms of farm safety and farm safety information and programs (which is the omitted category) are second highest in trust and highest in usefulness and use of safety information. However, images of safety experts as persons knowledgeable about farming and/or familiar with farm interests were also associated with high levels of trust and usefulness. Specifically, respondents who thought of safety experts in terms of equipment manufacturers and persons who know farm machinery were highest in trust in second in usefulness, while respondents who thought of safety experts in terms of county extension, FSA, and the Farm Bureau were third in trust and usefulness. Respondents who thought of safety experts in more neutral terms as farm safety professionals ("knows and/or promote farm safety") and scientists and academics ("engineers, scientists, and researchers") were generally in the middle, with the negative effect of "knows/promotes farm safety" on usefulness being significant at the .05 level.

In contrast, images of farm experts as lacking experience were associated with significantly lower levels of trust and usefulness. Images of safety experts as government and government regulation were associated with the lowest levels of trust, usefulness, and use, with the negative effect being highly significant in all three equations. The Nagelkerke R-squares are 15.0% for trust, 13.8% for usefulness, and 12.4% for use, with all of the equations being highly significant at the .000 level. Thus, attitudes towards the

trustworthiness, usefulness, and use of safety expert information vary significantly based on images of safety experts. While some persons appear to have favorable attitudes of safety experts, persons with negative images have more negative attitudes, and experts who are more involved with farm production appearing to enjoy more positive attitudes.

Specific Aim 4: To provide data about parents' beliefs and attitudes towards the NAGCAT.

A major focus of the evaluation was to determine if respondents' agreed with the recommendations and information in the NAGCAT, if they found the NAGCAT useful, and if they would actually use them. In the qualitative interviews, at least one parent in approximately half of the farm couples made relatively agreeable or positive comments about the age and supervision recommendations, although very few wholeheartedly endorsed or accepted them. In these cases, the guidelines were frequently described by terms such as "pretty realistic", "reasonable" or "fairly reasonable", "okay", "pretty good", "decent", "pretty close", "pretty accurate", and "in the ballpark", terms that clearly leave room for parental discretion and judgment. However, other parents were critical of the recommended ages, often suggesting that they were 1, 2, or even several years too high for some if not all of the tasks. Moreover, the desire to avoid openly contradicting safety expert recommendations and appearing to lax regarding their children's safety may have biased some responses towards greater agreement with the recommendations.

One theme expressed by many respondents was that NAGCAT ignored local child-rearing practices that affect children's developmental capabilities. Many parents suggested that children raised on a farm were capable of doing farm work earlier than non-farm children because of their early exposure to and experience with farm work.

Specifically, many farm parents suggested that the guidelines were appropriate for "city" children with no farm experience, but inappropriate for children who grew up on farms exposed to farm work. Overall, 43 respondents from 37 couples expressed the view that farm background and experience affects children's ability to do farm work, and 48 respondents from 41 couples suggested that the age guidelines depended on the children's farm experience or were appropriate for non-farm children rather than farm children.

In addition to questioning the appropriateness of the NAGCAT for farm children, many farm parents criticized the age recommendations for their lack of certainty. First, respondents believed that developmental abilities rather than age per se were important in determining appropriate work. Second, respondents saw these developmental abilities as varying considerably among children. Overall, total of 162 references were made to the fact that developmental abilities depend on the individual, making this the fourth most heavily used code in the coding scheme.

Attitudes towards the developmental tests and guidelines (e.g., the information and tests for lifting ability, hand-eye coordination, attention span, memory, etc.) were also mixed. Some parents felt that the expert knowledge complemented and enhanced their own lay decision-making processes. For example, some felt that the tests helped make explicit and conscious things they may have been doing on an implicit and less conscious basis. One wife claimed that the guidelines "puts words to your gut feelings a little bit", suggesting that scientific discourses could help explicate and articulate intuitive lay practices (cf. Flyvbjerg, 2001). Another commonly expressed view was that the information and/or the guidelines overall were useful as reminders (n=58).

However, many parents questioned the benefits and usefulness of this expert knowledge. Respondents made numerous references to themselves as "lay experts" regarding their children's farm safety, based on their parental knowledge of their children (n=69) and their knowledge of farm work (n=64). As previously mentioned, these perceptions led many respondents to see the guidelines and safety information more generally as "common sense".

In terms of using the guidelines, many respondents felt they would not use it at all, but other respondents suggested various ways in which they might use it at least to some degree:

- Reading through it once and picking out any good ideas (but then usually throwing it out)
- Using it as a "reference" to compare with and check against their own views
- Using it as a "reminder", especially regarding the safety information and tips
- Using it as a "backup" to help justify their decisions to not let their children do things to their children
- Reviewing it with their kids and use it as an educational tool

The survey instrument for the telephone interviews was designed to capture the attitudes of respondents who had seen the NAGCAT and those who had not. Out of 411 total respondents, 52 respondents (12.7%) reported having seen at least some of the NAGCAT booklets.[11] The most frequently identified sources for seeing the NAGCAT were farm magazines (n=11), a safety class or camp (n=6), an agricultural extension office (n=5), or an agricultural convention (n=5). 13 Of the 52, 11 (20.1%) had seen them within the past 6 months, 13 (25.0%) had seen them 7 to 12 months ago, and 26

[1111] This percentage was much higher than in the qualitative interviews, where only 1 person, a farm wife who worked with the local Farm Service Agency, had previously seen the NAGCAT.

(50.0%) had seen them more than one year ago. Only 17 (33.3%) owned a copy of the NAGCAT, compared to 34 (66.7%) who did not.

Respondents who claimed to have seen the NAGCAT were asked several questions regarding their attitudes towards the NAGCAT. The results are shown in the table below.

Table 12: Attitudes Towards NAGCAT Among Those Who Had Seen It

	Agree with Guidelines		Appropriate for Own Children		Use	
	Frequency	Valid Percent	Frequency	Valid Percent	Frequency	Valid Percent
A LOT	27	52.9	26	52.0	11	21.6
SOME	20	39.2	20	40.0	25	49.0
A LITTLE	4	7.8	4	8.0	8	15.7
NOT AT ALL	0	0.0	0	0.0	7	13.7
Total	51	100.0	50	100.0	51	100.0

As the table shows, a majority of respondents agreed substantially with the guidelines and felt they were appropriate for their own children. However, only 21.6% of respondents claimed to have used the NAGCAT a lot, compared to 49.0% who said they had used them some, and 29.4% who said they had used them little or not at all.

For respondents who had not seen the NAGCAT, hypothetical questions were posed about the usefulness of different types of safety information: age recommendations, supervision recommendations, developmental tests for children's abilities, and work-related safety precautions. These types were chosen to reflect the types of safety information in the NAGCAT. Frequency distributions are shown in the following table:

Table 13: Perceived Usefulness of NAGCAT Information (Percentages)

Usefulness	Age Guidelines	Supervision Recommendations	Developmental Tests	Safety Precautions
A Lot	18.6	25.0	23.9	43.4
Some	38.0	37.1	32.6	36.4
A Little	22.8	18.8	16.9	9.8
Not At All	20.6	19.1	26.7	10.4
Total N	355	356	356	357

*Friedman's test for sig.=.000; Chi-square=199.951, df=3, N=353.

As Table 13 shows, the perceived usefulness of the different types of safety information varies significantly. Information on safety precautions was seen as most useful, with 43.4% reporting it would have a lot of usefulness, compared to only 20.2% reporting only a little or no usefulness. In contrast, only 18.6% reported information on age guidelines as having a lot of usefulness, and 43.4% reporting little or no usefulness. Supervision recommendations were seen as somewhat more useful than age recommendations, while attitudes towards developmental tests were more polarized than attitudes towards age recommendations. This was reflective of the qualitative interviews, where some respondents found the developmental information valuable.

In addition to questions about the perceived usefulness of different types of safety information, the survey also asked respondents about their willingness to follow actual NAGCAT recommendations. Due to time limitations, four specific farm tasks involving the use of machinery were selected: using a lawn or garden tractor, using a less than 70 horsepower tractor, using a greater than 70 horsepower tractor, and using a feed cart. As discussed above, respondents earlier on had been asked to identify the appropriate age to start two of these tasks, using a lawn/garden tractor and a greater than 70 horsepower tractor. The percentages are shown below:

Table 14: Willingness to Follow NAGCAT Recommendations

Willingness to Follow Info	Lawn or Garden Tractor	< 70 hp Tractor	> 70 hp Tractor	Feed Cart
Very Closely	26.4	30.8	37.4	33.4
Somewhat Closely	51.7	53.7	46.7	48.1
Not Very Closely	17.7	10.5	11.0	12.2
Not At All	4.2	5.1	4.8	6.3
Total N	356	354	353	335

*Friedman's test for sig.=.000; Chi-Square=28.318; df=3; N=331.

In general, respondents in all four cases report a fairly high willingness to follow the NAGCAT age recommendation. In all four cases, the modal category is somewhat closely, followed by very closely. Indeed, over ¾ of all respondents are in these two categories for each of the tasks. Willingness to follow the age recommendation is highest for greater than 70 horsepower tractors (37.4%) and lowest for lawn and garden tractors (26.4%). This parallels the data in Table 6 about the appropriate age for the two tasks, where the percent of respondents below the NAGCAT recommendation was considerably less for 70+ horsepower tractors than for lawn or garden tractors. Using Friedman's test, differences between the tasks were found to be significant at the .000 level.

In order to explain respondents' willingness to follow age recommendations, Univariate ANOVAs were conducted using the same independent variables used in earlier analyses of the age children started farm work. In order to simplify the analysis, a single dependent variable was created reflecting the mean of the four variables about following recommendations. This decision was justified by a reliability analysis which showed the four items having an alpha of .8579. Although the original variables were ordinal, the index variable was treated as interval level to simplify the analysis. The parameter effects from the analyses are shown separately for men and women in the table below:

Table 15: Univariate ANOVAs of Willingness to Follow Age Recommendations

	Men[1]			Women[2]		
Parameter	B	Std. Error	Sig.	B	Std. Error	Sig.
Intercept	3.759	.607	.000***	5.369	.717	.000
Less than H.S.	-.169	.265	.524	-.160	.310	.607
H.S. or GED	.166	.193	.393	-.342	.266	.201
Some College	.059	.193	.759	-.165	.267	.539
Associates Degree	.004	.231	.985	-.178	.300	.553
Bachelors Degree	.086	.199	.666	-.121	.265	.649
Grad Degree	0(a)	.	.	0(a)	.	.
Trust Experts A Lot	-.338	.173	.053(.1)	-.349	.222	.120
Trust Experts Some	-.074	.170	.662	-.038	.224	.866
Trust Experts Little/Not at All	0(a)	.	.	0(a)	.	.
Children Helping Not at All/Not Very Important	-.054	.240	.824	-.317	.300	.293
Children Helping Somewhat Important	-.021	.099	.834	-.025	.123	.840
Children Helping Very Important	0(a)	.	.	0(a)	.	.
Kids Never Ride	.075	.245	.761	-.442	.326	.177
Kids Rarely Ride	.205	.229	.371	-.401	.329	.225
Kids Sometimes Ride	.307	.239	.201	-.480	.335	.155
Kids Most of Time/Always Ride	0(a)	.	.	0(a)	.	.
Never Wear PPE	.227	.197	.251	.150	.172	.382
Rarely Wear PPE	.051	.202	.800	.073	.194	.706
Sometimes Wear PPE	.214	.159	.181	.313	.160	.052(.1)
Most of Time Wear PPE	.183	.165	.271	.075	.200	.707
Always Wear PPE	0(a)	.	.	0(a)	.	.
Heard of Child Accidents	-.164	.138	.236	-.195	.131	.140
Have not Heard of Child Accidents	0(a)	.	.	0(a)	.	.
Full-Time Off-Farm	-.224	.109	.042*	.106	.112	.348
Part-Time Off-Farm	-.002	.135	.989	.210	.123	.090(.1)
No Off-Farm	0(a)	.	.	0(a)	.	.
Age	.000	.005	.930	-.007	.005	.166
Years Raised on a Farm	-.004	.009	.659	-.004	.006	.424
Appropriate Age	-.141	.030	.000***	-.187	.029	.000***

a This parameter is set to zero because it is redundant.
[1] N for men =130
[2] N for women =141

capabilities, and also because they may be less able to supervise them. Overall, the willingness to follow the age recommendations depends most importantly on agreement with the guidelines, followed by trust in experts and also perhaps confidence in one's own knowledge and decisions.

Usefulness of Findings

The usefulness of these findings can best be addressed in terms of specific aim five, concerning recommended changes to the NAGCAT that would make them more farm parent friendly:

Specific Aim 5: To suggest additions to the existing guidelines that will make them more well-rounded and farm parent friendly.

While an important attempt to reduce childhood agricultural injuries, the previous discussion suggests that the effectiveness of the NAGCAT in changing parental decisions regarding their children's farm work is likely to be limited for several reasons. The NAGCAT is a document that embodies a significant amount of scientific knowledge and expertise regarding children's abilities and farm work, but farm parents see themselves as highly knowledge about their children's abilities and farm work as well, with many even seeing themselves as the true safety experts for their children. Indeed, given the variability in children's developmental abilities and the role of experience in affecting emotional and psychological characteristics such as interest and maturity, farm parents' lay knowledge of their children's abilities is in some ways more certain than the expert knowledge embodied in the guidelines (Neufeld, 2004). Because of their certainty in their own knowledge, many farm parents will not automatically accept expert knowledge, especially to the extent they have preexisting biases against expert knowledge. This is particularly problematical because it appears that farm parents will largely be exposed to

the NAGCAT on an individualistic basis, as opposed to being exposed to the NAGCAT through a workshop or group setting. As a result, many parents are likely to be exposed to the NAGCAT without any background information or statistical information about the extent of childhood agricultural injuries, and they are also not likely to have any chance to have their questions or criticisms addressed.

Given this analysis, we suggest several changes to the existing guidelines and to their dissemination that might increase their use and impact.

1) Provide more background information and statistical data to raise awareness and concern about childhood agricultural injuries

One of the main findings of the qualitative interviews was that many parents did not see childhood agricultural injuries as a serious problem, and that most parents appeared to have little awareness of epidemiological data about the extent of childhood farm injuries. Although the Parent Resources version of the NAGCAT contains a reprint of a *Successful Farming* article from 1999 that has a few basic statistics regarding childhood agricultural injuries, more detailed information of this kind would probably be helpful. For example, the NAGCAT could contain more specific information on different types of injuries and their severity and causes, as well as the probability that a child will get hurt performing farm work. Although some farm parents were dismissive of statistical data on the few occasions when it was introduced, awareness of statistical data, especially comparative data on injury rates, might increase concerns about the extent of childhood agricultural injuries, making farm parents more receptive to interventions such as the NAGCAT. In addition, existing audio-visual materials highlighting childhood agricultural injuries and their impact on the victims and their families could be disseminated in conjunction with the NAGCAT. Providing statistical data and other

information about childhood injuries might also enhance the credibility and legitimacy of the intervention as a whole.

2) Promote dissemination to groups using workshops and classes

In addition to providing more background information and statistical data on childhood agricultural injuries, disseminating the NAGCAT to groups of farm parents using a workshop format might also increase its impact and effectiveness. First, A group format would provide an ideal setting for presenting statistical data and audio-visual information on childhood injuries. Second, and more importantly, it would also provide opportunities for presenters to discuss the science and methodology behind development of the NAGCAT recommendations, and to discuss and respond to farm parents' questions and criticisms. This is important given skeptical attitudes towards the NAGCAT. For example, numerous parents in the qualitative interviews believed the limit on weight lifting (10% to 15% of a child's body weight) was too low. A workshop setting might provide an opportunity to address this concern and increase the credibility and legitimacy of the document.

A NAGCAT Professional Resource Manual has been developed that apparently could be used to run workshops along these lines. The issue is whether efforts are being made to disseminate the NAGCAT in this manner. One approach would be to recruit persons from groups like 4-H, County Extension, and The Farm Bureau to provide workshops to farm parents using the Professional Resource Manual. As will be discussed next, this approach is also advantageous in that it would utilize more trusted sources within the farm community. The Marshfield Clinic could even develop a workshop and provide "train the trainer" sessions as part of the recruitment, so that learning how to

conduct a workshop was not left up to the individuals themselves. Alternatively, the Marshfield Clinic could hire its own outreach staff to develop and conduct workshops at places like 4-H meetings, County Extension, Farm Bureau meetings, and safety day camps. Overall, this avenue of dissemination should be promoted more aggressively and evaluated vis-à-vis other modes of dissemination.

3) Work through trusted "Change Agents"

In discussing the adoption and diffusion of innovations, Rogers (1995) and Rogers and Shoemaker (1971) highlight the important role of "change agents." Change agents serve as intermediaries in the adoption and diffusion process by helping to bridge gaps in technical knowledge, language, socioeconomic status, and beliefs and attitudes between the developers of an innovation and the targeted clients. They are able to accomplish this because they share cultural and socio-economic characteristics with targeted clients.

Although attitudes towards experts seemed to be considerably different in the closed-ended survey data as compared to the open-ended survey question and the qualitative interview data, the qualitative data indicate that many people hold skeptical attitudes towards safety experts and safety expert recommendations. In particular, farm parents tended to distrust farm experts for lacking farm experience and not sharing farm values, especially production values. One consequence of this appears to be that farm parents tend to trust the advice of persons who are more involved in farm production, such as County Extension, The Farm Bureau, and agricultural businesses and agricultural-related businesses such as insurance representatives, feed stores, equipment dealers salespersons, and persons who in general know farm machinery.

The third recommendation is that these more trusted local agents be more closely incorporated into the dissemination process. This could be through sponsoring or even conducting NAGCAT workshops, as discussed in the previous item, or simply as sources for disseminating the NAGCAT.

4) *Emphasize "Value Similarity" with farm parents and address concerns about negative economic and social impacts*

In addition to incorporating trusted agents, attempts to disseminate the NAGCAT should also emphasize to the greatest extent possible the idea that the NAGCAT and the authors of the NAGCAT share farm parents' values about the importance of production and children's involvement in farm work. As suggested previously, many farm parents question farm safety experts in general and the NAGCAT specifically as inconsistent with farm productivity and their desire to involve their children in farm work. The dissemination of the NAGCAT needs to convince farm parents that following NAGCAT recommendations would not undermine these values. Specifically, it needs to show far parents that following the NAGCAT recommendations would not necessarily decrease children's involvement in farm work, even if it might delay the beginning of certain tasks. It could also help farmers plan how to utilize their children's labor and their overall labor supply in a manner that is consistent with the guidelines but without negative economic impacts. According to the Salient Values Similarity perspective (Cvetkovich and Lofstedt 1999; Cvetkovich 1999; Earle and Cvetkovich, 1999; Earle and Cvetkovich, 1995), experts are trusted who share values deemed appropriate in a particular risk management domain. Thus, emphasizing value similarity could also help promote the legitimacy of the NAGCAT.

5) *Disseminating the NAGCAT directly to children*

One interesting finding in the qualitative interviews was the number of persons who suggested disseminating the NAGCAT directly to children through the school system, rather than to the parents. While in general these parents did not feel the NAGCAT was useful for them, they felt it was beneficial for their children to be exposed to it. They could share the information with their parents, and the parents could then discuss and validate the information as they saw fit. This appeared to be a way for parents to assert their authority and deflect the NAGCAT as a potential challenge to their expertise. Even parents who were quite critical and dismissive of the NAGCAT at times recommended this dissemination strategy.

In order to test these ideas, the survey asked several questions about attitudes towards dissemination. First, the survey asked respondents to identify the best way for their children to receive farm safety information. 69.3% said themselves, 5.4% said school, 8.3% said 4-H, 10.0% said safety day camps, and 6.8% said some other source. As a result, most parents identified themselves as the best source of information, while very few identified schools or other sources for that matter. However, this is not necessarily incompatible with the idea of children receiving the NAGCAT outside of the home, with the parents being the ultimate arbiter or source of valid information.

The survey then sought to determine if parents would read information brought home by their children. Respondents were first asked if their children had ever brought home farm safety information, with 41.6% saying yes, 56.5% saying no, and 2.0% being unsure. Of those who said yes, 38.0 % said they reviewed the information carefully, 52.6% said they reviewed the information somewhat carefully, and 9.4% said they reviewed the information not very carefully. Respondents whose children had not

brought home safety information were asked how carefully they would review information if it were brought home. Not surprisingly, these percentages were higher, with 56.3% saying very carefully, 39.2% saying somewhat carefully, 2.1% saying not carefully, and 2.5% saying it depends.

Thus, while the survey data did not identify schools in particular as a valued source of information, they did suggest that disseminating safety information to children might be a viable way to reach farm parents. The comparative effectiveness of this approach would clearly need to be evaluated. However, farm parents may be more receptive to the NAGCAT if it is disseminated in a manner that less directly challenges their knowledge and authority. Moreover, the potential influence of children on safety practices should not be overlooked. A few parents even described instances where their children had acted as catalysts for change, such as the use of seat belts or other personal protective equipment.

6) Design Issues

As far as the design of the NAGCAT, no significant changes are recommended. Although a few persons in the qualitative interviews found the design to be childlike and even insulting, the vast majority of persons who commented on the design found the pictures and images to be highly credible and realistic. A few respondents from the Bowling Green region found the images of people doing tobacco chores in full-length clothes unrealistic given the hot weather, although this was mostly after the images had been pointed out to them. Probably the most frequent complaint was the length of time necessary to read through the guidelines, with several respondents suggesting a condensed version (or perhaps a calendar version, as has been done). Since it was

anticipated that few persons would have seen the NAGCAT, no questions about the design were included in the telephone survey.

Conclusion

Judging the effectiveness of NAGCAT in reducing childhood agricultural injuries is difficult given the research design employed here. Rather than using an experimental or quasi-experimental design to measure behavior change, this project used a cross-sectional design in both the qualitative and quantitative phases that focused largely on attitudes towards the NAGCAT and self-reports about the anticipated use of the NAGCAT. The quantitative data were even more limited by the fact that most persons had not even been exposed to the NAGCAT. As a result, the surveys only provide data on the perceived usefulness of general types of safety information, along with some data on the reported willingness to follow certain NAGCAT recommendations. While many farm parents in the survey do seem willing to follow the recommendations at least to some degree, willingness to follow the recommendations also is strongly influenced by agreement with guidelines. As a result, it is not clear how much impact the NAGCAT will have on those who disagree. Overall, the project provides no data on actual change in parental decisions regarding children's farm work, let alone the impact of any changes on child agricultural injuries. While the NAGCAT would probably have some impact on parental decisions, it is difficult to tell exactly how much and with what consequences.

What the study does show is that there are significant attitudes and beliefs among farm parents that will serve as barriers to using the NAGCAT. These include:

PUBLICATIONS

Neufeld, S. and Cinnamon, J. (Forthcoming) "Farm Parents' Attitudes towards Farm Safety Experts." Forthcoming in *Rural Sociology*, 69(4).

Neufeld, S. (2004) "Social Context and the Construction of Risk: Farm Parents' Perceptions of Childhood Farm Injuries." Under review at *Risk Analysis*.