Driver Attitudes, Beliefs and Reported Behavior Associated with Sharing Public Roads with Farm Vehicles

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ABSTRACT

In previous research, farmers identified farm-vehicle public-road crashes as their top safety concern. In addition, they indicated *other drivers' lack of respect* as a major safety problem. One purpose of this research was to identify non-farm vehicle driver attitudes, beliefs and self-reported driving behaviors that are associated with disrespectful public road behavior toward farm vehicles. A second purpose was to examine the relationship between non-farm vehicle driver attitudes, beliefs and behaviors and how they interpret farm vehicle driver hand signals. Pearson correlations (n = 267) assisted in categorizing non-farm vehicle drivers into low-, medium-, and high-risk driver profiles. Drivers growing up on or near a farm significantly more strongly interpreted a description of a farm vehicle driver's hand signal to indicate a left turn. Responses of drivers not growing up on or near a farm were more variable. Implications for preventing disrespectful driver behavior and avoiding incorrect interpretation of farm vehicle driver signals are discussed.

INTRODUCTION

Driving farm vehicles on public roads was identified as a major safety concern according to a sample of 574 North Carolina (NC) farmers participating in a mail survey (Costello, Schulman, & Luginbuhl, 2003; North Carolina Department of Labor [NCDOL], 2000). In particular, farmer study participants cited *lack of respect by other drivers* as a top public road safety problem (NCDOL, 2000).

Farm Vehicle Public Road Crashes

Estimates suggest 30,000 farm vehicle crashes occur on US public roads annually (Becker, 1991). Farm vehicle public road crashes are more likely to result in a fatality than other types of vehicle crashes (American Trucking Associations, 2000). Although farm vehicle public road crashes account for less than 1 percent of all public road crashes in NC, Costello et al. (2003) showed that farm vehicle public road crashes in NC occur at a rate higher than for all other vehicle-to-vehicle public-road crash classifications. These findings suggest farmers are at high risk for a crash. Correspondingly, there is also a risk to passenger and other vehicle occupants driving on public roads that farmers use.

Contributing Factors

Road crash data (Templeman, 1997) suggest three major scenarios are associated with farm vehicle crashes: (1) a non-farm vehicle driver is speeding and does not see the farm vehicle in time to avoid a rear-end collision; (2) a non-farm vehicle driver becomes impatient behind a slower-moving farm vehicle and attempts to pass when it is unsafe; and (3) a farm vehicle is positioned on the right side of the road preparing to make a left turn and a non-farm vehicle driver attempts to pass. Related to the last crash scenario, Hughes and Rodgman (2000) and NCDOL (1999, 2000) suggest that farm vehicle driver signaling, and how those signals are understood by non-farm vehicle drivers, may play a role in public road crashes, as well as exhibiting what has been defined as disrespectful driver behavior.

Sharing Public Roads

When driving on public roads, vehicles are sometimes involved in situations that require drivers to communicate between vehicles. Hand signals are commonly used by farmers when driving farm vehicles on public roads to communicate with other vehicle drivers, because many farm vehicles are not equipped with flashing turn signals. A fully outstretched arm is used to indicate that the farm vehicle driver is either: (a) preparing to make a left turn into a driveway or field; or (b) waving to let non-farm vehicle drivers pass. It may be that some farm vehicle public road crashes are due to misinterpretation of these hand signals.

The public road environment is changing. Population increases in rural areas historically dedicated to farming

mean more drivers sharing public roads with farm vehicles. Drivers who did not grow up around agriculture may not be as familiar with farm vehicle driver hand signals. In some cases, the farmer may simply be moving his left arm without intending to give a signal. Little is known regarding non-farm vehicle driver knowledge and interpretation of these farm vehicle driver hand signals. This present research examines aspects of this issue.

Disrespect

Implied in the act of "sharing the road" is a mutual respect for the rights of all motorists to use public roads. Findings by NCDOL (1999, 2000) suggest that farmers feel their right to use public roads is not always respected by motorists. NC farmers, sampled by NCDOL (1999, 2000) through a mail survey, identified several non-farm vehicle driver characteristics that contribute to disrespectful driver behavior and farm vehicle crashes: (1) speeding, (2) not understanding farm vehicle hand signals, (3) unsafe passing, and (4) aggressive, anger-based behavior. The present research examined how these disrespectful driving behaviors are associated with non-farm vehicle driver attitudes, beliefs and behaviors with respect to farm vehicles sharing public roads.

Study Purpose

The present research investigated the following issues. First, the research examined non-farm vehicle driver attitudes, beliefs, and reported driving behavior with regard to sharing public roads with farm vehicles. Second, the study investigated whether there are non-farm vehicle driver profiles that can help differentiate among high-, medium-, and low-risk drivers. Third, the investigation examined whether farm vehicle driver hand signal interpretation is related to growing up on or near a farm.

METHOD

Participants

Two hundred sixty-nine people from central North Carolina (Raleigh-Durham area) were asked to participate, and 267 provided completed questionnaires for data analysis. Study participants were solicited and volunteered as part of a human factors transportation class project at North Carolina State University in Raleigh, NC.

Participants' mean age was 25 years (SD = 10.10 years). Males represented 59 percent of the sample. Participants reported a mean of nine years driving experience (SD = 10.17 years).

Procedure

Participants were asked to read and rate the 17 statements shown in **Table 1.**

Survey Measures

The top section of **Table 1** shows six statements assessing driver-related behavior. Participants rated these statements using a nine-point Likert scale ranging from 0 to 8, with verbal anchors tied to the even numerical ratings as follows: (0) would not behave this way, (2) somewhat likely would behave this way, (4) likely would behave this way, (6) very likely would behave this way, and (8) definitely would behave this way.

The bottom section of **Table 1** shows ten statements measuring non-farm vehicle driver attitudes and beliefs regarding sharing public roads with farm vehicles. Those ten statements were rated using a nine-point Likert scale ranging from 0 to 8, with verbal anchors tied to the even numerical ratings as follows: (0) do not agree at all, (2) somewhat agree, (4) agree, (6) very much agree, and (8) definitely agree.

Two additional statements were included. They were measured using this same Likert agreement scale. Both statements concerned farm vehicle driver hand signals: (1) if a farmer is pointing his arm out of his vehicle window, he is most likely signaling me to pass; (2) if a farmer is pointing his arm out of his vehicle window, he is most likely signaling to make a left turn.

RESULTS

Approximately 57 percent of respondents reported *not* growing up on or around a farm, whereas 43 percent reported they did. Study respondents reported encountering farm vehicles on public roads a mean of 15 times per year (SD = 46.66). Approximately 3 percent of all study participants reported ever having been involved in a farm vehicle public road crash.

Agreement ratings by non-farm vehicle drivers for statements associated with the interface between farm and non-farm vehicles were examined. As **Table 1** shows, there was a reasonable amount of patience reported by drivers. However, the standard deviations indicate that respondents also varied in their level of agreement. Given the variability in responses to these statements, it may be possible to categorize non-farm vehicle drivers along the scales according to high-, medium- and low-risk driver profiles.

Associations among non-farm vehicle driver attitudes, beliefs, and behaviors regarding sharing public roads with farm vehicles were examined. Because of the substantial

Table 1. Mean ratings and standard deviations for non-farm vehicle driver attitude, belief and behavior statements

	Grew up on farm (n = 115)		Did not grow up on farm (n = 152)		Total Sample (n = 267)	
Driver Behavior Statements	**Mean**	**SD**	**Mean**	**SD**	**Mean**	**SD**
(1) I would patiently wait until it was safe to pass. **	6.3	2.2	5.3	2.5	**5.7**	**2.4**
(2) I would get impatient and try to pass at the first chance.	2.1	2.4	2.3	2.5	**2.2**	**2.5**
(3) I would not attempt to pass the farm vehicle.	1.7	2.3	1.8	2.2	**1.8**	**2.2**
(4) I would get very angry and begin swearing.	1.6	2.4	1.5	2.2	**1.5**	**2.3**
(5) I would pass the farm vehicle even if it were unsafe.	0.9	2.0	0.6	1.2	**0.7**	**1.6**
(6) I would let the farm vehicle driver know how angry I am by gesturing.	0.8	1.8	0.6	1.3	**0.6**	**1.5**
Attitude and Belief Statements						
(1) I am a safe driver.	6.0	1.6	5.6	1.7	**5.8**	**1.7**
(2) It is important to be patient. *	6.1	2.0	5.6	2.0	**5.8**	**2.0**
(3) We should all share the road.	5.1	2.3	4.7	2.2	**4.9**	**2.3**
(4) Driving slowly is dangerous and can cause accidents.	4.2	2.4	4.3	2.4	**4.2**	**2.4**
(5) Farm vehicles have a right to use public roads.	4.5	2.7	3.9	2.4	**4.1**	**2.6**
(6) I would speed on public roads.	4.0	2.7	3.8	2.6	**3.9**	**2.6**
(7) I like to speed whenever I can.	3.3	2.5	3.2	2.5	**3.3**	**2.5**
(8) It bothers me that farm vehicles drive so slowly. **	2.4	2.1	3.2	2.4	**2.9**	**2.4**
(9) I like taking risks.	2.2	2.2	2.4	2.2	**2.3**	**2.2**
(10) I do not mind driving behind a farm vehicle.	2.4	2.5	1.9	1.9	**2.1**	**2.2**
(11) I think farm vehicles should not be allowed on public roads. *	1.8	2.0	2.4	2.2	**2.1**	**2.1**

Note: Likert range = 0 – 8. * $p < .05$, ** $p < .01$ between drivers growing up on or near a farm and drivers who did not.

Table 2. Pearson's correlations (r) for disrespectful driver profiles

Driver Profile	Statement	Get im-patient	Pass un-safely	Get angry	Gesture	I would speed	I like to speed
Risk-Taker	I like taking risks.	.40	.36	-	-	.33	.48
Impatient	I get impatient and try to pass.	-	.61	.51	.37	.29	.31
Angry	I get very angry and swear.	.51	.50	-	.56	-	-
Gesturing	I let know how angry by gesturing.	-	.59	-		-	-
Unsafe Passing	I will pass even if unsafe.	.61	-	.50	.59	-	-
Non-Road Sharing	Farm vehicles should *not* be allowed.	.31	-	.41	.37	-	-

Note: all p's < .001; n = 267

number of correlations generated, it was necessary to control for Type I (alpha) error rate. Therefore, the criterion for significance was set at a conservative level, i.e., $p < .001$.

Pearson r correlation coefficients suggest a number of non-farm vehicle driver profiles. **Table 2** illustrates some of them. Non-farm vehicle driver profiles that reflect low- to medium-risk driver behavior (e.g., safe driver, patient driver, road sharing driver) tend to be associated with patience, safe passing, and sharing the road, in particular with farm vehicles. Driver profiles reflecting a high-risk driver (e.g., risk-taker driver, impatient driver, angry driver, gesturing driver, unsafe passing driver) tend to be associated with disrespectful driver behaviors such as: getting impatient, passing unsafely, getting angry, gesturing, and not considering it important to be patient. Respondents who agree with sharing the road also tend to report being patient.

This research also examined how participants interpret a description of a farmer giving a hand signal. Respondents were equally as likely to interpret a farmer's hand signal as an indication: (1) to pass (m = 3.5, SD = 2.7), as (2) the farmer is making a left turn (m = 3.5, SD = 2.6). Differences were found, however, between drivers who grew up on or near a farm and drivers who did not. Drivers growing up on or near a farm exhibited two significant behaviors: (1) they interpreted the farmer's signal as a left turn indication more often than respondents not growing up on or near a farm (m = 4.1 versus m = 3.4, respectively) $t(265) = 2.04$, $p < .05$; and (2) they were more likely to interpret the farmer's hand signal as a left turn indication than as an indication to pass the farm vehicle (m = 4.1 versus m = 3.3, respectively) $t(265) = 2.16$, $p < .05$. The left turn signal interpretation is less likely to contribute to disrespectful driver behavior or a crash. Those same two behaviors for respondents not growing up on or near a farm were non-significant.

DISCUSSION

Participants' self-reported attitudes, beliefs and behaviors regarding interactions with farm vehicles correspond with disrespectful driving behaviors identified by farmers in earlier research. The variation in responses between drivers who grew up on or near a farm and those drivers who did not indicates that non-farm vehicle drivers exhibit "disrespectful" driving practices to different degrees, suggesting that they might be categorized into low-, medium-, and high-risk behavior profile groups. Having grown up on or near a farm was significantly associated with three characteristics: (1) more strongly valuing patience, (2) reporting safe, respectful driver behavior, and (3) a willingness to share public public roads with farm vehicles. In addition, respondents who grew up on or near a farm were more strongly associated with interpreting a farmer's hand signal as a left turn indication. The left tun interpretation is potentially safer, since the driver will then wait until the farm vehicle has turned, rather than trying to pass while the farm vehicle is turning and being involved in a crash.

Although most participants tended to view themselves as patient and safe drivers, findings indicate that there are persons who report tendencies that outwardly appear as disrespectful. Driving behind farm vehicles may prompt non-farm vehicle drivers to exhibit multiple behaviors in varying degrees: (1) become impatient, (2) try to pass unsafely, (3) get angry, and (4) gesture. The low-risk driver profile group reports being patient, not attempting to pass, and supporting sharing public roads with farm vehicles. The medium-risk driver profile group generally speeds and becomes impatient driving behind a slow-moving vehicle. Correlations show these individuals might get angry and swear, but are less likely to gesture. This group also reported a greater willingness to wait until it was safe to pass. The high-risk driver profile group has a tendency to demonstrate several problematic attitudes and behaviors: (1) being against sharing public roads, in particular with farm vehicles, (2) becoming angry and swearing, (3) gesturing, (4)speeding, (5) passing unsafely, and (6) not placing importance on being patient.

Research findings suggest a small, high-risk group of non-farm vehicle drivers report contributing to disrespectful public driving behavior. These findings may be helpful in targeting intervention and research efforts designed to prevent disrespectful driver behavior and avoid incorrect interpretation of farm vehicle driver signals. Given the changing demographics of public road users, especially in historically agricultural areas, drivers not familiar with how to respectfully share public roads with farm vehicles might benefit from interventions that enhance communication between them and farm vehicle drivers.

Future research on reducing crashes involving farm vehicles might consider the following areas: public health promotion (e.g., public service announcements); road signage (e.g., slow-moving vehicle signage and "share the road" message, hand signal interpretation message); hardware for signaling and marking (e.g., farm vehicle signaling equipment upgrades, signal message testing and development); and road design (e.g., slow-moving vehicle lanes, left turn lanes). Future studies are warranted to continue examining disrespectful driver behavior and farmer hand signal interpretations. Since valuing patience is positively associated with respectful driver behavior, research on ways to enhance patience might be fruitful for reducing disrespectful behavior. Incorporating the notion of "valuing patience" might be useful in research and intervention frameworks.

ACKNOWLEDGEMENTS

The authors would like to acknowledge the North Carolina "Gold Star" growers and the North Carolina Agricultural Safety Council for drawing attention to farm vehicle public road crashes. Also, the authors wish to thank NC farmers, Regina Luginbuhl, Roger Mitchell, Michael Schulman, Joy Smith and Lois Smith for their assistance.

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