Accident Analysis and Prevention 41 (2009) 931–937

Contents lists available at ScienceDirect

Accident Analysis and Prevention

journal homepage: www.elsevier.com/locate/aap

Identification of differences between rural and urban safety cultures

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ARTICLE INFO

Article history:
Received 12 February 2009
Received in revised form 12 May 2009
Accepted 18 May 2009

Keywords:
Rural
Urban
Traffic safety
Culture
Fatality factors
Safety interventions
Survey methodology

ABSTRACT

The prevailing risk of traffic fatalities is much larger in rural areas compared to urban areas. A number of explanations have been offered to explain this including road design, emergency medical service proximity, and human factors. This research explored the potential contribution of rural driver attitudes that may underlie the increased fatal crash risk in rural environments. This analysis examined differences between rural and urban drivers in terms of self-reported risk taking for driving behaviors associated with fatal crashes and attitudes toward safety interventions using a large-scale survey. The results suggested that rural drivers engage in riskier behavior, such as not wearing seatbelts, because they have lower perceptions of the risks associated with such behaviors. Results also suggested that vehicle type (e.g., pickup trucks versus passenger vehicles) may be related to seatbelt compliance and frequency of driving under the influence of alcohol. Rural drivers perceived the utility of government-sponsored traffic safety interventions to be lower than their urban counterparts. This study provides insights into the role of the human factor in rural fatal crashes and provides policy suggestions for developing safety interventions that are designed with respect to the psychosocial factors that define the rural culture.

1. Introduction

The death rate from many common causes in the United States (US) is significantly higher in rural, compared to urban areas (Eberhardt et al., 2001), even accounting for the older age of the rural population (Wright et al., 1985). This higher mortality rate among rural residents can be attributed to a higher incidence of unintentional injury and traumatic deaths (Svenson et al., 1996). Per vehicle mile traveled, the total number of annual traffic fatalities and the rate of fatalities are higher in rural areas (NHTSA, 2001). The higher fatal crash rate within rural, compared to urban areas, begs the question of why rural crashes are predisposed to be fatal (Zwerling et al., 2005). To answer this question, we must recognize that the types and conditions of the crashes in rural areas are distinct from those in urban areas. In comparison, fatal rural crashes more often involve the following characteristics: (1) more than one fatality per crash; (2) male driver; (3) younger driver; (4) alcohol consumption; (5) truck involvement; (6) higher speed; (7) vehicle rollover; (8) head-on collision; and (9) ejected person due to seatbelt non-compliance (Blatt and Furman, 1998; NHTSA, 2001, 1996).

There are three main factors that may explain the higher fatality crash rate in rural areas. First, design elements related to the instance or outcome of a crash may distinguish rural and urban driving environments. For example, a majority of fatal crashes occur on high speed two-lane, two-way highways that are typically located through rural areas (Blatt and Furman, 1998). This means that rural crashes may often result from unsafe speeds for the road conditions present. Road curvature may also play a role; although 15% of all rural crashes occur on non-straight roads, these roads account for 30% of all rural fatal crashes (NHTSA, 2001). In addition, the method and frequency at which drivers sample visual information from these environments may also play a role, where the seemingly less complex rural environments lead drivers to adapt inappropriate or maladaptive strategies (Crundall and Underwood, 1998). These differences may suggest that the driving environment is more hazardous in rural than in urban areas, resulting in more fatalities.

Second, it has been proposed that the higher fatality rate in rural areas is related to how fast medical personnel can respond to a crash. Medical treatment in the first "golden hour" after a traumatic crash increases the probability of patient recovery (Champion et al., 1999). Given the low density of population and few medical care facilities in rural areas, *proximity* to medical care seems to be a significant factor for outcome of fatal crashes (Svenson et al., 1996) rather than the *quality* of medical care (Chen et al., 1995). It has been documented that response time to a rural crash by Emergency Medical Services (EMS) is typically longer than for urban areas (Svenson et al., 1996), which may reflect a delay in both notification of a crash

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doi:10.1016/j.aap.2009.05.008

as well as the response to that crash (Champion et al., 1999). Indeed, it was estimated that approximately 30% of EMS crash responses in rural areas between 1993 and 1997 took longer than 1 h, compared to less than 8% for urban cases (Champion et al., 1999). These delays may be why the dead-at-scene rate in rural areas is higher than it is for urban areas (Brown et al., 2000).

Third, there may be attitudinal and psychological differences between rural and urban drivers in the perception of risk factors and safety interventions. This supposition is based on the fact that most rural crashes involve rural residents while most urban crashes involve urban residents (Blatt and Furman, 1998). Moreover, rural crashes are over-represented by male and young drivers who reportedly demonstrate risk-taking behaviors and inappropriate attitudes toward traffic safety (Blatt and Furman, 1998). The attitudes and behaviors of rural residents may be engendered by the prevailing culture within rural areas, including a predilection toward inaccurate appraisals of risk factors associated with crashes, and incorrectly attributing risk to external factors (Sticher, 2005). However, the hypothesis that rural attitudes predispose rural drivers to engage in behaviors that increase crash risk has seldom been examined scientifically.

By understanding the human factors in fatal traffic crashes attributed to these psychological differences, we may strategically develop interventions (e.g., education or enforcement programs) to best address the needs and culture of a particular community. Specifically, a number of behavioral factors have already been identified as potential contributors to the higher rural fatal crash rate. For example, there are lower rates of seatbelt and child safety seat use in rural areas in the US (NHTSA, 1996) and Minnesota crashes statewide, in both 2005 and 2006, confirm that the percentage of unbelted occupants killed or injured is more than double in rural versus urban areas (FARS-NHTSA, 2006). Recent fatal crash data (NHTSA, 2006a) has also shown that, "restraint use among fatally injured occupants of SUVs and pickup trucks is much lower compared to passenger cars and vans" (p. 3). Therefore, there is the potential to address specific crash risks for particular sub-groups of drivers, e.g., rural SUV and truck drivers who frequently do not wear safety belts.

The purpose of this study was to address deficiencies in the knowledge base, pertinent to this problem by investigating differences between residents from rural and urban areas. Respondents were asked to complete a number of questionnaires relating to their personality and social influences for driving behaviors as well as questionnaires relating to their own driving behaviors. The overall goal was to better understand regional safety culture trends in order to improve future policies and safety interventions. Based on previous findings (Sticher, 2005), it was hypothesized that respondents from rural areas will report having personality and social influences as well as driving behaviors that reflect more inaccurate appraisals of risk factors and incorrect attribution of risks to external factors when compared to respondents from urban areas.

2. Methods

2.1. Selection of geographic regions

Data for all 87 Minnesota (MN) counties were tallied between the years 2000 and 2004 to determine the fatality rates per 100 million vehicle miles traveled (100M VMT) for each county (range = 0.56–3.06). Our rural region was composed of three counties that represented a range of traffic fatality rates ($M = 1.73$, for the 78 rural MN counties). These counties did not have a major paved, undivided road with a speed limit greater than 60 mph within their boundaries and they did not contain a city with a population over 5000, which is the current accepted definition of a rural area by the Minnesota Department of Transportation. In each selected rural county, approximately 1000 surveys were mailed to randomly selected addresses, split evenly among our three age groups.

Our urban region was composed of three counties representing the most densely populated areas of Minnesota and having the highest total VMT. These counties have some of the lowest fatality rates per 100M VMT in Minnesota ($M = 1.14$, for the 9 urban MN counties). In order to sample people from the most populated areas within these counties, participants were only selected from the top 10 populated cities within each selected urban county. In each selected urban county, approximately 650 surveys were mailed to randomly selected addresses, split evenly among our 3 age groups.

2.2. Participants

Participants were selected equally (and randomly) from three age groups, based on the 2000 Minnesota census population pyramids (Minnesota Department of Administration, 2006). The purpose of having these groups was to ensure that we sampled from a range of ages that represent known high-risk (i.e., young and older) age groups and heavily represented (i.e., middle) age groups currently on the road. It was not our intention to make comparisons among these age groups which explains why participant age was used as a covariate in our analyses. The three age groups were:

- Young: 18–26 years old (birth years 1980–1987), representing approximately 12% of Minnesota's population.
- Middle: 30–50 years old (birth years 1955–1975), representing approximately 33% of Minnesota's population.
- Old: 65 years or older (birth years 1940 or earlier), representing approximately 12% of Minnesota's population.

Potential survey participants were selected from Minnesota drivers' license data issued to the Division of Epidemiology at the University of Minnesota in August of 2005. The cases were selected by age group and geographical area and then randomized. We excluded potential recipients if their license was expired or not valid, if they only held an Identification card, or if they held a moped- or permit-only status.

2.3. Survey protocol

Participants were sent a postcard one week prior to receiving the survey packet to tell them a survey was forthcoming. Subsequently, the survey packet contained a welcome letter, an instruction sheet, a survey booklet (8-page booklet, folded and stapled), and a return envelope. The survey asked participants if they wished to take part in a $50 Target gift card drawing; 20 winners were selected at random from the returned surveys. Participants then received a postcard a few weeks after receiving the packet to remind them to answer the survey. Participants who did not respond to the first mailing were sent a second survey packet six weeks after the first packet mailing.

2.4. Dependent measures

These measures were intended to assess general risk-taking tendencies. This included respondents' propensity to commit driving violations or engage in risky driving behaviors, as well as their associated perceptions of risk associated with these behaviors. The survey also assessed driver attitudes toward common traffic safety interventions that target risky driving behaviors. These surveys measured personality and social influences as well as self-reported driving behaviors of the respondents.