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Effects of aggressive driving and driver characteristics on road rage

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Abstract

To what extent is road rage triggered by aggressive driving behavior (frustration-aggression) or by characteristics of an aggressive driver (frustration-selective aggression)? Two scenarios on aggressive driving were presented to 144 undergraduates: impeding traffic (passive aggression) and reckless driving (active aggression). Age, gender, and cell phone use of a fictitious aggressive driver were manipulated in a $2 \times 2 \times 2$ factorial design. Dependent variables were anger that was created by each scenario, intentions to retaliate against the other driver, and intentions to report the incident to police. Age, gender, and cell phone use had no significant effects on results. Subjects raged far more against aggressive driving than against particular classes of aggressive drivers. Strategies for lowering road rage are discussed. © 2001 Elsevier Science Inc. All rights reserved.

1. Introduction

The study of aggressive driving is not new (Williams, 1997); however, aggressive driving only recently has received attention as a national concern. A growing trend of vigilante driving has been termed *road rage*. James (1997) argued that road rage has become rampant because today driving experiences are filled with stress, anxiety, anger, antagonism, and fear. Research has shown that as traffic congestion increases, the potential for confrontation and retaliation also increases (Connell & Joint, 1996; Novaco, Stokols & Milanese, 1990; Puente & Castaneda, 1997). With over 168 million licensed drivers on increasingly congested roads,

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and a trend toward vigilante driving, the study of road rage has taken on great significance (Kuminski et al. 1995, p. 293).

Aggressive driving is increasing (Altman 1997; James 1997; Joint, 1995; Vest, Cohen & Tharp, 1997). The AAA Foundation for Traffic Safety reported that violent driving incidents have increased almost seven percent per year since 1990 (Mizell, 1997). The Department of Transportation estimated that, in 1996, two-thirds of the 41,907 reported deaths resulting from automobile accidents could be attributed to aggressive driving (Martinez, 1997).

The significant increase in aggressive driving has sparked public concern on the issue. Forty-percent of respondents to a survey in Maryland, Washington, DC, and Virginia said that aggressive driving was their greatest concern (Willis, 1997). Nationally, 64% of Americans believed that drivers in their own area were driving much less courteously and safely than five years ago (Willis, 1997).

Road rage can be explained by a classic frustration-aggression model (Dollard, Doob, Miller, Mowrer & Sears, 1939). It operates on the notion that aggression can be directed at the frustrator, or it can be displaced onto a scapegoat such as someone of lesser status. We asked if the aggressive driver (the frustrator) were of lesser status, would road rage be stronger?

The majority of aggressive drivers are men between the ages of 18 and 26 (American Automobile Association, 1997; Larson, 1997; Malfetti, 1993; Puente & Castaneda, 1997). In fact, age is the most important factor in aggressive driving incidents (Arnett, 1994; Beirness & Simpson, 1988; Jaccard & Turrisi, 1987; Jonah, 1986; Puente & Castaneda, 1997; Zuckerman, Eysenck & Eysenck, 1978).

Younger men are not the only drivers who are aggressive. While, Mizell (1997) estimated that only four percent of aggressive drivers were women, a report by the American Automobile Association (1995) found that 54% of female respondents admitted that sometimes they drove aggressively. In fact, Deffenbacher, Oetting, and Lynch (1994) found that young men and young women exhibited equal driving anger. Women were angrier than men about traffic obstructions and illegal driving, and men were angrier about police presence and slow driving.

Research on ageism in the United States has shown inconsistent results. Some studies have shown that the attitudes of younger adults toward older adults were negative (Allen, 1981; Cornelius & Caspi, 1986; Hummert, 1990; Kite, Deaux & Miele, 1991; Kite & Johnson, 1988; Palmore, 1982; Ryan, 1992). Other studies showed that younger adults held positive or neutral attitudes about older adults (Knox, Gekoski & Johnson, 1986; Murphy-Russell, Die & Walker, 1986; Kite & Johnson, 1988; Kogan, 1979).

While gender and age of the aggressive driver can affect road rage, another variable warrants consideration. During the past decade, over two million people have acquired cellular phones, and McKnight & McKnight (1997) predicted that as cellular service becomes more widely available, the number of users could increase to twenty million. A large percentage of cell phones are used while people are driving, and research shows that the use of the phones compromises safety. Redelmeier and Tibshirani (1997) found that the chance of a collision was four times higher when the driver was using the phone (see also Alm & Nilsson, 1995). Of particular concern are the consistent findings that drivers talking on the phone think they have more space in front of their car than they really have, and cell

phone users have slower response times (Alm & Nilsson, 1995; Brown, Tickner & Simmonds, 1969; McKnight & McKnight, 1997). Recently, the authors saw a bumper sticker that said, “Hang-up and Drive!”

2. Prejudice and discrimination

In addition to more crowded roads, James (1997) argued that the diversity of road users has gone up; therefore, anger and retaliation created by driving may result in aggression that is directed at the usual targets of discrimination: women, ethnic minorities, and younger/older drivers. In fact, some research has documented incidents of bias against drivers who are general targets for prejudice and discrimination (Bowser & Hunt, 1981; Ponterotto & Pedersen, 1993; Wolfe & Spencer, 1996). Therefore, we predicted that anger and retaliation would be greater for aggressive drivers who were women, older drivers, and using a cell phone.

3. Method

3.1. Subjects

Data were collected from 144 undergraduate students at a western university of 6,000 students. Of the students, 35% were men, and 65% were women. Their mean age was 22.23 years. Since most of the subjects were younger drivers, it was predicted that older drivers would be more likely targets of their anger.

3.2. Materials

Subjects were presented with a packet containing two vignettes. One vignette described a vehicle as changing lanes at a high rate of speed, nearly hitting the subject’s front fender (active-aggressive). The other vignette depicted a driver who was traveling below the speed limit and not allowing faster traffic to pass (passive-aggressive)

3.3. Manipulated variables

In each vignette, three characteristics of the driver were represented: age (teens/60’s), gender (his/hers), and whether or not the driver was using a cellular telephone (see Appendix). The variables were manipulated in a completely randomized 2×2×2 full factorial design, and the order in which the vignettes were presented to the subjects also was randomized.

3.4. Dependent measures

The dependent variables were anger specific to the driving situation, an intent to retaliate against the other driver, the likelihood of reporting the incident to authorities, and a desire

that the offending driver be punished. Items that measured these variables appeared immediately after each vignette. For example, after reading the scenario on a reckless lane change, subjects were asked, "What would you do?" This item measured the amount of retaliation. We used a scheme of twenty categories of retaliation (James, 1997). "Mentally condemning other drivers was scored 1 point, making a visible obscene gesture at another driver was scored 10 points, and killing someone was scored the maximum, 20 points. We added another category to the scheme. A score of zero indicated that the subject would not retaliate at all.

Another item asked, "How angry are you?" Seven response categories were anchored by zero (not at all) and six (very). Two additional Likert-type items stated, "I would report the incident to the police," and "The other driver should be punished." Responses were scored on a seven-point scale anchored by "strongly disagree" and "strongly agree."

After subjects responded to the vignettes, we asked them to answer 14 items from the Driving Anger Scale (Deffenbacher et al., 1994) and to report their own demographic characteristics. Our findings replicated those of Deffenbacher et al. (see above).

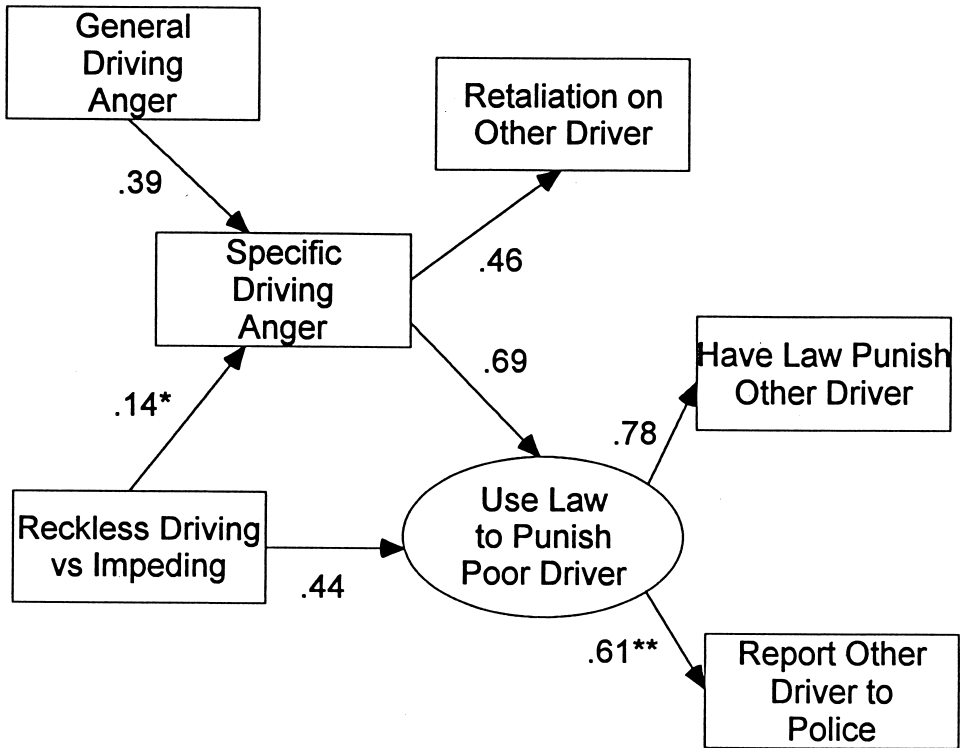
4. Results

Fig. 1 presents a structural equation model (SEM) of reactions to aggressive driving. Manipulated characteristics of the other driver as female, older, or as using a cell phone did not have an effect on any other variable in the model, so they were omitted. All measures of association on Fig. 1 are standardized regression coefficients that are statistically significant beyond the 0.05 level.

General driving anger was associated with *specific driving anger* (0.39). *Reckless driving* was associated with greater *specific driving anger* directed toward the other driver (0.14) and *using the law to punish the other driver* (0.44). Using the law to punish the other driver was a latent variable (factor). Two variables loaded on this latent variable: *having the law punish the other driver* (0.78) and an intention to *report the other driver to police* (0.61). To solve the equations, the parameter for this latter variable was fixed at 1.0 (see Fig. 1). Greater *specific driving anger* was associated with greater *retaliation* (0.46) and with greater *use of the law to punish the other driver* (0.61).

The overall fit of the model to the data was very good. The Comparative Fit Index (CFI) was 0.99. It showed a strong correspondence between a saturated model and our restricted model. The $\chi^2/\text{degrees of freedom}$ ratio was $9.03/8 = 1.13$. A ratio less than 2 indicates a well-fitting model. The χ^2 was not significant at the 0.05 level; therefore, the covariance matrix of the restricted model was not significantly different from the covariance matrix of the saturated model.

Additional examination of the relation between *retaliation* and *using the law to punish the other driver* showed a zero-order correlation coefficient of 0.14 ($p < .05$) for the entire sample. Furthermore, when *retaliation* was split at the median, the correlation between low level retaliation and using the law was -0.17 ($p < .05$). For high level retaliation, the correlation was 0.31 ($p < .01$). This finding suggested a u-shaped relation between *retaliation* and *using the law to punish the other driver*. This relation was tested via a quadratic



Notes: * Coefficient significant beyond .05; others significant beyond .001.

** Fixed parameter

Fig. 1. Structural Equations Model of Reactions to Aggressive Driving

equation. The procedure consisted of computing a squared variable of intent to retaliate, and using this variable and the original variable of intent to *retaliate* as independent variables in a multiple regression analysis that predicted using *the law to punish the other driver*. If the relation were u-shaped, the beta for retaliation would be negative, and the beta for intent to retaliate (squared) would be positive (Allison, 1978). Results showed that the beta for the retaliation variable was -0.84 ($p < .01$), and the beta for the squared retaliation variable was 0.94 ($p < .01$).

5. Discussion

Reckless driving produced more road rage than impeding traffic, and this difference was more important in predicting the reactions of subjects than were characteristics of the other driver, such as gender, age or cell phone use. This finding indicated that prejudice was not the main mechanism that created specific driving anger, retaliation, or reporting the incident.

Additionally, active aggression created more specific anger than passive-aggression, probably because reckless driving is more dangerous. A frustration-aggression model is consistent with these findings.

Analysis showed that retaliation and using the law to punish the other driver resulted from general driving anger and anger specific to the situation. Reckless driving created greater specific anger at the other driver, and greater commitment to use the law to report and to punish the offender.

Additional research should examine conditions under which the same aggressive driving evokes no direct retaliation but the victim reports the incident to police. Results of our correlation analysis showed that using the law to punish the other driver was highest when retaliation was either low or high. A variable of seriousness of the aggressive driving probably interprets this relation. When seriousness is low, subjects probably consider retaliation inappropriate. If they retaliated following only a minor incident, they would have to admit that they were quick to anger. One course of action is for them to report the incident to police. On middle levels of seriousness, subjects may believe that retaliation is warranted, and because they have retaliated (and therefore bear some responsibility for the outcome), they do not intend to use the law to punish the other driver. In high seriousness incidents, the gravity of the situation can encourage the victim to retaliate *and* to use the law to punish the other driver. In these situations, subjects said they would first punish the other driver, and then they would report the incident to police. Apparently, these subjects were morally indignant enough to believe that police would cite only the other driver and ignore the retaliation.

Retaliation is partly a result of a belief that the law cannot (or will not) *do* anything about fleeting transgressions such as those described in our study. Several strategies have been fashioned to lower road rage by increasing the likelihood of catching aggressive drivers and by increasing the sanctions. Police have added more traffic officers to the ranks, and they have trained these officers to be alert for aggressive driving and signs of road rage.

If collective sanctions such as retaliation remain more effective than the bureaucratic solution offered by police, road rage will continue. Additional collective sanctions have emerged to punish aggression. The Wisconsin Road Rage Site (1998) presents a *Road Rager List* in which motorists can post the license numbers of aggressive or drunk drivers. As many as 19 incidents have been turned-in for a single car! The veracity of these data has not been established.

A second strategy aims to lower frustration by improving the movement of vehicles along streets and highways. Unfortunately, better roads often encourage longer commutes, greater traffic congestion during rush hours, and greater general driving anger. Additionally, enhanced vehicle performance and safety may make drivers feel invincible regarding accident and injury; therefore, they may be more willing to take chances behind the wheel. Under these circumstances, road rage could increase despite efforts to curtail it.

A third strategy is public education. According to the American Automobile Association (1997), drivers should drive well and be courteous, so they will avoid offending other drivers. Additionally, drivers should learn to deal constructively with their own anger. This approach recognizes the importance of dealing with both frustration and aggression, but since it is a voluntary program, it is unclear how well this strategy will work.

Precursors to road rage and retaliation have existed within the culture for a long time. As young people have realized guns are more deadly than fisticuffs (and shooting someone has become the ultimate statement), motorists have realized that their cars are brutally effective weapons to wreak vengeance on drivers who frustrate them. Unfortunately, many of the most deadly exchanges have occurred when the raging drivers were carrying guns in their cars.

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Appendix. Scenarios

You are driving northbound on Interstate 25 in the left lane going 75 mph, the speed limit. In your rearview mirror you see a car approaching at high speed. Before you can change lanes to get out of the way, the speeding car passes you on the right. Then the driver cuts back into the left lane ahead of you, almost hitting your right front fender. The driver of the other car is in [his teens/her teens/his 60s/her 60s/on a cell phone/no mention].

You are driving the speed limit of 55 mph westbound on Highway 24 between Divide and Florissant. From behind, you approach a car traveling 40 mph. The road is curvy, and the two lanes are separated by a continuous double-yellow line. The other car does not use either of the first two turnouts. The other driver is in [his teens/her teens/his 60s/her 60s/on a cell phone/no mention].

References

- Allen, B. J. (1981). Knowledge of aging: A cross-sectional study of three different age groups. *Educational Gerontology*, 6, 49–60.
- Allison, P. D. (1978). Measures of inequality. *American Sociological Review*, 43, 865–880.
- Alm, H. & Nilsson, L. (1995). The effects of a mobile telephone task on driver behavior in a car following situation. *Accident Analysis and Prevention*, 27, 707–715.
- Altman, K. (1998). (1997). Road rage runs rampant in high-stress U.S. society. *U.S. News [On-line]* Retrieved October, 2. (<http://www.cnn.com/US/9707/18/aggressive.driving/index.html>).
- American Automobile Association. (1995). *Road Rage*. Retrieved October 2, 1998 (<http://www.theaa.co.uk/theaa/u40.htm>).
- American Automobile Association. (1997). *Road rage on the rise, AAA Foundation reports*. Retrieved, October 2, 1998 (<http://www.aaafacts.org/Text/research/roadrage.htm>).
- Arnett, J. (1994). Sensation seeking: A new conceptualization and a new scale. *Personality and Individual Differences*, 16, 289–296.
- Beirness, D. J. & Simpson, H. M. (1988). Lifestyle correlates of risky driving and accident involvement among youth. *Alcohol, Drugs and Driving*, 4, 193–204.
- Bowser, B. P. & Hunt, R. G. (1981). *Impacts of racism on white Americans*. Beverly Hills, CA: Sage.

- Brown, I. D., Tickner, A. H. & Simmonds, D. C. V. (1969). Interference between concurrent tasks of driving and telephoning. *Journal of Applied Psychology*, 53, 419–424.
- Connell, D., & Joint, M. (1996). Driver Aggression. In *Aggressive driving: Three studies*. Retrieved September 28, 1998. (<http://phoenix.webfirst.com/aaa/text/research/agdrtext.htm>).
- Cornelius, S. W. & Caspi, A. (1986). Self-perceptions of intellectual control and aging. *Educational Gerontology*, 12, 345–357.
- Deffenbacher, J. L., Oetting, E. R. & Lynch, R. (1994). Development of a driving anger scale. *Psychological Reports*, 74, 83–91.
- Dollard, J., Doob, L., Miller, N., Mowrer, O. H., & Sears, R. R. (1939). *Frustration and aggression*. New Haven, CT: Yale University Press.
- Hummert, M. L. (1990). Multiple stereotypes of elderly and young adults: A comparison of structure and evaluations. *Psychology and Aging*, 5, 182–193.
- Jaccard, J. & Turrissi, R. (1987). Cognitive processes and individual differences in judgments relevant to drunk driving. *Journal of Personality and Social Psychology*, 53, 135–145.
- James, L. (1997). *Aggressive driving and road rage: Dealing with emotionally impaired drivers*. Retrieved October 2, 1998 (<http://www.house.gov/transportation/surface/sthearin/ist717/james.htm>).
- Joint, M. (1995). Road Rage. In *Aggressive driving: Three studies*. Retrieved September 28, 1998 (<http://phoenix.webfirst.com/aaa/Text/Research/agdrtext.htm>).
- Jonah, B. A. (1986). Accident risk and risk-taking behavior among young drivers. *Accident Analysis and Prevention*, 18, 255–271.
- Kite, M. E., Deaux, K. & Miele, M. (1991). Stereotypes of young and old: Does age outweigh gender? *Psychology and Aging*, 6, 19–27.
- Kite, M. E. & Johnson, B. T. (1988). Attitudes toward older and younger adults: A meta-analysis. *Psychology and Aging*, 3, 234–244.
- Knox, V. J., Gekoski, W. L., & Johnson, E. A. (1986). Contact with and perceptions of the elderly. *Gerontologist*, 26, 309–313.
- Kogan, N. (1979). Beliefs, attitudes, and stereotypes about old people. *Research on Aging*, 1, 11–36.
- Kuzminski, P., Eisele, J. S., Garber, N., Schwing, R., Haimes, Y. Y., Li, D., & Chowdhury, M. (1995). Improvement of highway safety I: Identification of causal factors through fault-tree modeling. *Risk Analysis*, 15, 293–312.
- Larson, J. A. (1997). *Testimony before the House Committee on Transportation and Infrastructure Subcommittee on Surface Transportation*. Retrieved September 28, 1998 (<http://www.house.gov/transportation/surface/sthearin/ist717/larson.htm>).
- Malfetti, J. L. (1993). *A study of young driver insurance records: Opportunities for automotive insurers*. Retrieved September 28, 1998 (<http://www.aafts.org/Text/research/young/youngtoc.htm>).
- Martinez, R. (1997). *Testimony before the House Committee on Transportation and Infrastructure Subcommittee on Surface Transportation*. Retrieved September 28, 1998 (<http://house.gov/transportation/surface/sthearin/ist717/martinez.htm>).
- McKnight, J., & McKnight, A. S. (1997). The effect of cellular phone use upon driver attention. AAA Foundation for Traffic Safety Retrieved September 28, 1998 (<http://www.aafts.org/Text/research/cell/cell0toc.htm>).
- Mizell, L. (1997). Aggressive Driving. In *Aggressive driving: Three studies*. Retrieved September 28, 1998. (<http://phoenix.webfirst.com/aaa/Text/research/agdrtext.htm>).
- Murphy-Russell, S., Die, A. H., & Walker, J. L. (1986). Changing attitudes toward the elderly: The impact of three models of attitude change. *Educational Gerontology*, 12, 241–251.
- Novaco, R. W., Stokols, D., & Milanese, L. (1990). Objective and subjective dimensions of travel impedance as determinants of commuting stress. *American Journal of Community Psychology*, 18, 231–257.
- Palmore, E. B. (1982). Attitudes toward the aged: What we know and need to know. *Research on Aging*, 4, 333–348.
- Ponterotto, J. G. & Pedersen, B. (1993). *Preventing prejudice: A guide for counselors and educators*. Newbury Park, CA: Sage.

- Puente, M., & Castaneda, C. J. (1997). Rage starting to rule the nation's roads. *USA Today*. Retrieved September 28, 1998. (<http://www.dialog.carl.org:2030/sgibin/cw.htm>).
- Redelmeier, D. A., & Tibshirani, R. J. (1997). Association between cellular-telephone calls and motor vehicle collisions. *The New England Journal of Medicine*, 336, 453–458.
- Ryan, E. B. (1992). Beliefs about memory changes across the adult life span. *Journal of Gerontology*, 47, 41–46.
- Vest, J., Cohen, W., & Tharp, M. (1997). Road Rage. *U.S. News and World Report* June, 2, 26–30.
- Williams, A. F. (1997). *Testimony before the House Committee on Transportation and Infrastructure Subcommittee on Surface Transportation* Retrieved on September 28, 1998 (<http://www.house.gov/transportation/surface/sthearin/ist717/williams.htm>).
- Willis, D. K. (1997). *Testimony before the House Committee on Transportation and Infrastructure Subcommittee on Surface Transportation*. Retrieved September 28, 1998 (<http://www.house.gov/transportation/surface/sthearin/ist717/willis.htm>).
- Wisconsin Road Rage Site (1998). Retrieved on September 17, 1998 (<http://members.aol.com/WIRRoadRage/index.html>)
- Wolfe, C. T. & Spencer, S. J. (1996). Stereotypes and prejudice: Their overt and subtle influence in the classroom. *American Behavioral Scientist*, 40, 176–185.
- Zuckerman, M., Eysenck, S. B. G., & Eysenck, H. J. (1978). Sensation seeking in England and America: Cross-cultural, age, and sex comparisons. *Journal of Consulting and Clinical Psychology*, 46, 139–149.