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PREVIEW

**COGNITIVE-BEHAVIORAL TREATMENT FOR
COURT-REFERRED AND SELF-REFERRED
AGGRESSIVE DRIVERS**

By

Tara E. Galovski

A Dissertation

Submitted to the University at Albany, State University of New York

**In Partial Fulfillment of
the Requirements for the Degree of
Doctor of Philosophy**

College of Arts and Sciences

Department of Psychology

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PREVIEW

Abstract

Aggressive driving is considered by some to be as great a threat to public safety as drunk driving. This study consisted of two parts: in the first, psychological and psychophysiological data on 20 court-referred (CR) and 10 self-referred (SR) aggressive drivers was compared to that of 20 non-aggressive driving controls. Secondly, the efficacy of a brief (4 session) cognitive-behavioral intervention specifically targeting aggressive driving behavior was investigated by comparing immediate treatment to a wait-list condition. Drivers were followed up after two months to assess maintenance of treatment gains. Overall results indicated that the entire aggressive driving population proved to be significantly psychiatrically impaired, with a high degree of comorbid Axis I and II diagnoses (as ascertained through the use of SCID I & II). The CR group endorsed less psychological distress than the SR group, but more than the controls on self-report measures. However, despite arrests for fairly severe driving infractions (misdemeanors to felonies), the CR group endorsed less driving anger than both comparison groups, suggesting the possibility of “faking good” or denial. Furthermore, 35% of the aggressive driving population was diagnosed with Intermittent Explosive Disorder (IED), indicating significant impulse control related to anger in other areas of important functioning. Treatment results showed significant improvement on measures of driving anger, general anger, and state anxiety. The subjects reduced aggressive driving behavior by an average of 62%, based on daily behavior monitoring diaries. Psychophysiological reactivity to provoking driving situations was significantly reduced from pre- to post-treatment for the group as a whole. The SR drivers improved more than the CR drivers.

INTRODUCTION

The Impact of the Automobile

Globally, the advent of the automobile in the twentieth century has dramatically altered the occupational, social, interpersonal, economic, and environmental realms of individual countries to varying degrees. Nations have both benefited and been disadvantaged by the sweeping changes fostered by the automobile. The United States has perhaps realized the greatest transformation, on a per capita basis, of all the major world powers. In a 1996 report, the United States Department of Transportation (USDOT) compared the number of automobiles across several countries including Japan, France, Germany, Sweden, The United Kingdom, Canada, Mexico, and the United States (Federal Highway Administration, Office of Highway Information Management, 1998). The citizens of the United States, in 1995, owned three times as many cars (136,066,045) as Japan's citizens (45,000,000), the next highest ranking country in number of automobiles. The United States also exceeded all other countries in number of automobiles (517.0) per 1000 people with Canada ranking second (495.5 cars per 1000 people). Similar trends were seen for buses and trucks. Japan leads the world in number of motorcycles and mopeds with the United States ranking second. Structurally, the United States is the world leader in number of kilometers of major roads and secondary roads. In the United States alone, the total vehicle kilometers of travel in 1995 was estimated at 2,480,763,000,000 km. The average automobile in the United States logged 18,232 km in 1995. These figures do not include the 64,778,472 trucks, 3,767,029 motorcycles/mopeds, or 685,504 buses also sharing the American roadways.

A substantial by-product of the global explosion of automobile ownership and usage has been the increasing toll of automobile related injury and death. As early as 1940, traffic statistics indicated that death rates increase with auto registration in a linear fashion (Ross, 1940). The United States reported the highest rates (37,221) of automobile fatalities worldwide in 1995. Relative to the number of vehicles driving on the road, the United States ranks in the middle of the reported countries with .95 fatalities per 100 million vehicle kilometers. Mexico, France, Germany, and Japan respectively, rank the next highest in fatality rates per 100 million vehicle kilometers (Federal Highway Administration, Office of Highway Information Management, 1998). In addition to fatalities, acute and lingering injuries, along with millions of dollars in property damage add to the enormity of the problem.

Fatalities and injuries resulting from automobile crashes have decreased from 1970 to 1996 in the United States (BTS USDOT, 1998) with the improvements made in transportation safety and public awareness. Such improvements include structural improvements in the highways and secondary roads, technological advances in the safety features of the automobiles themselves, legislation in safety (seat belt laws), and social reform (such as in the area of drunk driving). However, complacency in vehicle safety is not yet warranted as the United States Department of Health and Human Services (USDHHS, 1997) reports that motor vehicle accidents (MVAs) account for more than 95% of all transportation fatalities. MVAs were also the leading cause of deaths (29%) by injury in the US in 1996. An average of 115 people died every day (one person per every 13 minutes) as a result of an MVA in 1997. Societal economic losses are estimated by the National Highway Traffic Safety Administration (NHTSA) to approximate \$150

billion annually (Blincoe, 1996). MVAs have recently been reported as the leading cause of death for people ages 6-27 (USDOT NHTSA, 1998).

Anger, Hostility, and Aggression

Part of the difficulty in any research addressing anger, aggression, and/or hostility as a component of a given behavior or disorder is the lack of definition for these constructs. A portion of the overall confusion stems from the absence of anger as a clinical condition or diagnostic entity in the DSM-IV. For the most part, researchers agree that the three constructs are related (Spielberger, Johnson, Russell, Crane, Jacobs, & Worden, 1985). However, the definitions of anger, hostility, and aggression have differed from researcher to researcher. Adding to the level of confusion, these terms are often used interchangeably. Although related, for the purposes of this paper, the constructs of anger, hostility, and aggression are considered to be separate entities. Because of the level of overlap of the definitions, the three constructs together have been termed the AHA! Syndrome (Spielberger, et al, 1985). These constructs will be defined as follows based on Spielberger, Reheiser, and Sydeman's (1995) review of the differing definitions of the three constructs.

Anger

Anger can be conceptualized as primarily an emotional condition involving feelings ranging from irritation and annoyance to the more extreme stages of rage and fury. Anger can be further dichotomized into state and trait anger (Deffenbacher, Oetting, Thwaites, Lynch, Baker, Stark, Thacker, & Eiswerth-Cox, 1996). State anger involves a transitory emotional and physiological reaction consisting of subjective feeling and physiological activation which occur in response to a stimuli and vary in intensity

and duration (which is relatively short). The subjective feelings involve the range of emotive levels discussed above. The physiological activation occurs along a continuum of little or no change to marked sympathetic arousal, increased facial tension, and the release of adrenal hormones. Conversely, trait anger involves a tendency to experience state anger with some regularity and can be equated to a personality trait of anger proneness. Spielberger (1966, 1972) suggests that high trait anger individuals experience anger at a higher frequency, intensity, and duration. Deffenbacher et al. (1996) found that scores on trait anger correlated positively to scores on hostility.

Hostility and Aggression

Hostility, while often experienced with anger, refers to a complex set of attitudes towards other individuals which motivates the behavior defined as aggression. The aggression itself, then, becomes the actual acts of destructive and/or punitive harm towards others, property, or self. These authors further delineate between hostility and aggression by dividing aggression into two sub-categories dependent on the intent of the aggressor. The first of the categories is termed hostile aggression and refers to aggressive behavior which stems from the experience of anger. Instrumental aggression involves aggression aimed at the removal of an obstacle blocking goal-directed behavior. This form of aggression is not seen to be motivated by anger. Both sub-categories are relevant to the aggressive driving situation depending on the circumstances or precipitants that precede the aggressive driving behavior. Certainly a driver could perform aggressively when angry because of a perceived attack by another driver (i.e. driving at excessive speeds to “race” another driver after being cut-off). Contrarily, a driver could engage in a similar behavior (speeding) in order to get to work after being delayed in a traffic jam.

Identifying the sub-category of aggression to which a given driver's behavior belongs is important for treatment purposes.

Different theorists have approached the constructs of anger, hostility, and aggression through a number of different perspectives. The *frustration-aggression theory* posits that aggression is necessarily preceded by frustration (Dollard, Doob, Miller, Mowrer, & Sears, 1939). The overt act of aggression can be inhibited by the presence or perception of a punishment or negative consequences. Three interventions for the reduction of the aggressive response in accordance with this theory include punishment, the release of the aggressive drive as in catharsis, and the reduction or the elimination of the frustrating stimulus. This theory is based on the premise that the aggressive drive regulates the expression of aggressive behavior. Thus the aggressive drive must be either discharged, delayed, or prevented. The *cue-elicited aggression theory* presents a modification to the frustration-aggression theory. Berkowitz (1965, 1973) proposed that frustration produces a level of arousal which is considered to be a readiness to respond aggressively. Aggression-eliciting cues are then necessary to elevate this level of arousal into actual acts of aggression. It is therefore the cues that precipitate the aggression rather than the frustration. These cues originate from past experience where one experienced anger and aggressive responses. The interpretation of the event along with the interpretation of past events is involved in the aggressive responses. Thus, cognitive appraisal of events plays an integral role in an aggressive expression. Bandura (1973) developed a theory he labeled the *social learning theory*. This theory explains the acquisition of aggressive behaviors, the precipitants of aggression, and the maintenance of such responses. According to his theory, aggressive responses are acquired through a

learning process. This process is both direct (through direct experience) and indirect (through observation of others' behavior). Cognitive appraisal mechanisms impact the level of arousal in any given individual in an angering situation. It is precisely the given individual's appraisal of any situation that will or will not result in the emotional experience of anger. Thus the experience of anger is, according to Bandura's theory, generated internally (through such cognitive exercises as rumination, interpretation of events, etc.). The emotional arousal of anger then facilitates aggression. The process is susceptible to change through both cognitive restructuring and attention to anticipated consequences of behavior.

People become angry for a number of different reasons and often experience anger to some degree on an everyday basis. Many subjective feelings of anger are fleeting and pass without developing into an aggressive act. However, some particular circumstances may lend themselves to inflaming anger and resulting in acts of aggression with some regularity. Thus anger and aggression, although separate constructs, are closely related. Chesney (1985) posits a pathway which traces this relationship. Anger is aroused by cognitive expectations and appraisals of events in the environment. Such arousal is a strong precipitant of aggression (although not a necessary precursor). Anger and aggression interact similarly in that levels of one are reflective of the other and vice versa. Both are influenced by environmental responses (punishment, reward, etc.). Thus the experience of anger as an emotion and the aggressive expression is a dynamic process involving and influenced by environmental characteristics. Identifying the characteristics of inflammatory situations may lower the risk of angry and aggressive responses through

avoidance of such situations or the development of coping strategies to more effectively deal with such situations.

Ben-zur and Breznitz (1991) investigated nine event dimensions of reported anger based on everyday provocations. The authors found several characteristics of provocations to significantly effect anger intensity over and above the general tendency for human beings to become angry. Such characteristics of anger-provoking situations found to be significantly positively related to the experience of anger include the extent of actual damage which occurred, the perception of the perpetrator's intent to cause damage, and the expectation that damage may occur from a given situation. As the degree of damage suffered showed the greatest effect on anger, damage was broken down into further components. Damage which was not able to be corrected led to higher degrees of anger, along with damage to property that had a higher investment, and damage that could have been prevented. Awareness of such characteristics of anger-provoking events has important treatment implications as will be discussed further in the treatment section of this paper.

Anger is one of the least studied emotions. The paucity of research in this area detracts from the ability to effectively conceptualize, understand, and treat anger, hostility, and aggression. Novaco (1976) presents a functional model of the arousal of anger as well as the cognitive processes seen to regulate anger. Because anger has often been confused with aggression and hostility, anger is often conceptualized as an aggressive force. In fact, anger serves adaptive functions similarly to that of emotion in general. For instance, Hokansen, Burgess, and Cohen (1963) found that subjects who experienced and vented their anger lowered their level of physiological reactivity to a

stressful stimuli. Thus anger may serve a homeostatic purpose. Additionally, anger may serve a potentiating function as a means to create a personal experience of control. Thus, although anger is a separate entity from aggression, anger is influenced by the course of action that taken in response to a stressor. For instance, backing away from a provocation as opposed to taking an attack stance differentiates an anxiety response for the former to an anger response for the latter.

Novaco (1976) theorizes that, in addition to its adaptive function, the subjective experience of anger can be satisfying. Clinical levels of anger can be difficult to treat because of the positive reinforcement that the feeling of anger provides as well as the rewards of the expression of anger through aggression. This satisfaction derived from the experience of anger occurs because anger serves important positive functions in coping with stress. Novaco thus describes anger as an effective mechanism with which to cope with stress. He analyses eight functions that anger serves. The first such function is labeled *the energizing function* as anger increases the ability to react to a situation with increased energy. The second function is called *the disruptive function* in that when arousal or energy levels are too high, task performance deficits result. Cognitive processes become less efficient and impulsivity increases. Effective anger management thus includes strategies geared toward increasing patience and regaining composure and constructive thought processes. The third function is called *the expressive function* which, in a healthy relationship, facilitates discussion and constructive negative feedback. Anger can also lead to disruptions in the ability to communicate, another area worthy of clinical attention in treating anger. The fourth function of anger is termed *the self-promotional function*. This particular function involves the demonstration of anger and

its resulting effect on society. The outwardly angry individual appears potent, expressive, and determined. Such people are more likely to be respected or attended to than their more apathetic or anxious counterparts. Thus the expression of anger has powerful social implications. The rewarding qualities of perceived power and authority creates difficulty in treating clinical levels of anger. The fifth function is labeled *the defensive function* and is conceptualized as the protection of the ego rather than a more physical defense. Anger serves the function, in this case, of externalizing the conflict and turning the emotion outward rather than toward the self. Thus the ego is less vulnerable as an outside force bears the brunt of the anger. The sixth function is called *the potentiating function* and is related to the defensive function. This function involves the sense of potency or power that anger induces. The overt expression of anger increases one's personal perception of one's own control or power over a given situation or individual. The seventh function is termed *the instigative function*. Thoughts about a given conflict or arousal in general can instigate aggression. Over time, a connection between aggression and anger is learned. Clinical intervention requires replacement of aggressive coping strategies secondary to anger with more appropriate strategies. Finally, the eighth function is labeled *the discriminative function*. This function has to do with the arousal of anger as a discriminative cue. Learning to identify signs of anger and related arousal can attune an individual to the need to apply coping strategies. Identifying the rewarding qualities and the maintaining variables of anger and substituting more adaptive coping strategies are integral parts of anger management treatment programs.

Aggressive Driving

A certain proportion of crashes can be attributed to vehicle malfunction, roadway conditions, or other unpreventable occurrences. However, most motor vehicle crashes are preventable with human factors significantly contributing to a high percentage of MVAs. Ross (1940) noted almost six decades ago that mechanical malfunctions in cars and road conditions accounted for no more than 10% of MVAs. Ross estimated (from systematic study of 58,550 accident reports in 7 Michigan cities) that human factors accounted for the remaining 90% of MVAs. He elaborated further that accidents most frequently result from drivers' attitude and behavior problems. Such behaviors include speeding, cutting in, refusing to yield right of way, driving on the wrong side of the road, and other aggressive driving behavior.¹ Driver attitudes, which were seen to contribute to the prevalence of MVAs, were described as negligent, reckless, and anti-social. Thus Ross (1940) suggested that the problem of traffic accidents be addressed not so much through mechanical improvements (car and highway safety features) or education, but through socio-psychological intervention. It should be noted that these estimates of driver-attitude and behavior related accidents may not all be entirely due to aggressive driving per say. Although Ross describes it as such, the examples given in the text do not suggest the level of aggression or, at least the definition of aggression, as required in the current study. For instance, Ross puts forth the example of a man who drives into a tree while eating popcorn and driving home from a carnival. The young man's "laissez-faire individualism" is included as an attitude-related accident with "recklessness" cited as the inclusionary criteria. In the current study, aggressive driving is defined as driving behaviors performed with the *intent* to harm another.

¹ Refer to Anger, Hostility and Aggression section for a definition of these constructs.

Clayton and Mackay (1972) estimated that 44.7% of accidents are caused by the driver. These particular driver factors were defined as judgment errors, traffic law violations, and operational errors. Driver-related causes of accidents contributing to roadway fatalities in 1995 were reported by the Bureau of Transportation Statistics, US Department of Transportation (1998). For MVAs which occurred on the highway, 28% of drivers involved in fatal crashes failed to stay in their proper lane or drove off the road. Speeding contributed to 20.8% of fatal MVAs, while failure to yield the right-of-way contributed to 8.7% of fatalities. Reckless, negligent, erratic, or careless driving contributed to 5.1% of fatalities in MVAs. Stradling and Parker (1997) grouped driving behaviors into three categories: Lapses, Errors, and Violations. Lapses are exemplified by such behaviors as pulling away from the curb in third gear, or switching on one control when trying to turn on another. Errors include failure to see a sign, misjudging a distance, etc. Violations involve *intent* and are related to aggressive driving. Examples of the latter include disregarding the speed limit, running a red light, or tailgating. Subjects who endorsed these Violations as common driving behaviors were found to be significantly more likely to have been involved in a traffic accident or to be involved in a traffic accident in the future. As will be discussed later, these driving behaviors have been classified as aggressive driving. Thus, aggressive driving behaviors can be considered to be contributing significantly to the overall number of automobile crashes.

Clearly, human factors contribute significantly to the fatality rates and the overall preponderance of the number of annual MVAs. As the United States continues to become more crowded, and highways and urban centers more congested, stress levels on the roads increase. Stress and annoyances experienced on the roadways can lead to minor

acts of negligence and mild discourtesy which can quickly escalate into dangerous and aggressive driving behaviors. These aggressive driving behaviors greatly increase the risk of crashes and, undoubtedly, significantly contribute to the fatality statistics cited above. Aggressive driving behaviors vary in range and intensity from mild infractions of the law and discourtesies, to clear antisocial behaviors and deliberate attempts to harm others.

Thus aggressive driving includes, but is not limited to, the following: Slow driving with the intent of blocking other vehicles, tailgating, improper passing (cutting drivers off when passing), failing to yield the right of way, failing to keep right, horn-honking, flashing high beams and failing to signal properly have all been identified as acts of aggressive driving (Maiuro, 1993). Personal attacks on fellow drivers are also included in aggressive driving behaviors. These include obscene gesturing, verbal insults, throwing objects, and, in extreme cases, physical assault. Such behaviors tend to be reciprocated quickly, and a relatively minor infraction can quickly escalate into a major altercation resulting in injury, property damage, or even death. The AAA Foundation for Traffic Safety estimates that at least an average of 1500 people died annually as the result of an escalation of aggressive driving behavior from 1990-1996 (Mizell, 1997).

In an effort to quantify the extent of aggressive driving, the Automobile Association conducted a 1995 survey of 526 drivers (Joint, 1997). The results indicated that 90% of those surveyed reported having witnessed incidents of driving aggression in the last 12 months. Sixty percent reported personally "losing their temper" at the wheel. Specific aggressive driving behaviors experienced included tailgating (62%), high beam

flashing (59%), obscene gesturing (48%), deliberately being blocked by another vehicle (21%), and experiencing verbal insults by other drivers (16%). One percent of drivers had been physically assaulted by another driver. Six percent of drivers admitted to tailgating, 45% of drivers had flashed their high beams, 22% had gestured obscenely, 12% had delivered verbal abuse, and 5% had deliberately blocked other vehicles' passage. Fifty-four percent of women endorsed aggressive driving behaviors as compared to 64% of men.

Recent media attention, along with the coining of the phrase "road rage", has generated current interest in the problem of aggressive driving. However, research indicates that this phenomena of aggression on the roads can be traced back over several decades. Parry (1968) administered a 77-item questionnaire to over 380 British drivers for the purpose of ascertaining their perceptions of other drivers' behavior with particular attention to aggressive driving behaviors. Many drivers admitted to engaging in aggressive driving behaviors themselves once they were behind the wheel. The most common form of aggression was directed at other drivers, although some aggression was directed at self and at inanimate objects as well. Aggression was endorsed as both reactive and proactive. Parry found aggressive behaviors to be related to road accidents. Specifically, drivers between the ages of 17-35 (mostly male) admitted to the most aggressive driving behavior and were the most likely to be in an accident. Further, this sub-population indicated the most overt aggression including behaviors such as chasing another vehicle, driving straight at another vehicle when angered, trying to edge another car off the road, fighting other drivers and having difficulty controlling one's temper.

Turner, Layton, and Simons (1975) selected 12 questions from Parry's (1968) questionnaire and administered them to 26 men and 27 women. Results indicated that 23% of the men and 18% of women reported feeling easily provoked when driving. Forty percent of men and 41% of women endorsed losing their temper when another driver "does something silly". Fifty percent of men and 15% of women admitted to flashing headlights in anger. Twenty-three percent of both men and women felt angry when a traffic light turned red as they approached. Fifteen percent of men and 11% of women admitted to making a rude gesture to another driver. Twelve percent of men and 18% of women felt that they could have killed another driver. Fifty-eight percent of men and 92% of women expressed annoyance at the failure of another driver to use their turning signal. Twenty-three percent of men and 41% of women admitted to swearing out loud at another driver, while 77% of men and 56% of women swore under their breath. Twelve percent of men and 4% of women have given chase to a driver. Twenty percent of men and 12% of women admitted to some sort of retaliation to a driver who shines their lights in the mirror. Nineteen percent of men and 7% of women feel impatient at an intersection. Thus aggressive driving, both historically and currently, appears to be a fairly common occurrence on the roadways.

Social and Interpersonal Variables Contribute to Aggressive Driving

A number of factors have been identified as causing or contributing to these driving behaviors known as aggressive driving. In the relevant literature, the social significance of the automobile as well as social and interpersonal factors involved in driving have been somewhat neglected in favor of individual factors (i.e. reaction time) and the manipulation of various stimuli (Knapper & Cropley, 1981). Thus while a wide

breadth of literature on the mechanics of driving exists, a relative paucity of research is found on the personological variables contributing to anger on the roads and the resulting aggressive driving behaviors. A number of these variables, such as perceived social class (status), gender, ethnicity, perception of aggression, and age, have been seen to play a significant and often overlooked role in the development, maintenance, and exacerbation of aggressive driving behaviors.

In a remark on humans' fascination with the automobile, Marsh and Collett (1986) note the many drawbacks to the automobile. The average speed of the many commuters is slower than the horse and buggy, cities are blanketed with dense covers of smog from the pollutants spewed out by automobiles, roadways cut through beautiful countryside and consume huge portions of cities at the expense of peoples' homes and businesses, and the roadways account for thousands of injuries and deaths. Yet, despite the negative consequences of the automobiles, people choose to spend hours in traffic jams instead of alternative transportation, spend thousands of dollars on their automobiles, and cope with the plethora of everyday hassles and expenses of owning a car. The answer to this seeming contradiction, as put forth by these authors, does not lie in the political or economic arenas, but instead in the psychology of the car. One important feature of this human-car relationship is the social status that the car symbolizes.

Doob and Gross (1968) examined the role of social status as associated with cars and aggressive driving behaviors. They hypothesized that high status implies the ability to exercise sanctions. Thus, the fear of retaliation from a high status individual would prevent a low status individual from engaging in aggressive behaviors when faced with a

higher status individual. In order to investigate this hypothesis, the researchers stopped either old (low status) or new (high status) vehicles at an intersection, effectively blocking subsequent cars' passage. Horn latency (time it took for blocked vehicle to sound horn), frequency (number of beeps), and duration (length of beep) were measured. The make, model, and year of the blocked car were recorded along with characteristics of the occupants of the blocked car including sex, estimated age, number of occupants, and number of subsequent cars behind the blocked car. Thirty-eight subjects comprised the low-status condition with 36 in the high status condition. In the low status condition, 84% of subjects honked at least once compared to 50% in the high status condition. Subjects also waited longer on average to honk at the high status car that was blocking their passage. Status thus appeared to have an inhibitory effect on aggression in that subjects tended to exhibit less patience and more aggression (as measured by honking) toward a low status vehicle.

Replicating the Doob and Gross (1968) study, Deaux (1971) investigated the sex of the frustrator in addition to the previously investigated status and sex of the frustrated subject. Similar trends for status were found as compared to Doob and Gross's study. However, these trends did not reach statistical significance. Sex of the frustrating driver was found to be the most influential variable. Fifty-two percent of all drivers honked at the frustrating car when it was driven by a male as opposed to 71% of drivers honking at a car driven by a female who engaged in identical frustrating behavior. Differences in the sex of the frustrated subject emitting the behavior of honking was not found to be statistically significant. The lack of sex differences in aggressive driving is further supported by the results of the survey by Turner, Layton, and Simons (1975) mentioned

previously. These authors had found that, overall, aggressive driving and provocation on the roads did not differ significantly between men and women. However, trends indicated that women engaged in more covert and less detectable forms of aggression (losing temper, feeling as if they could kill the other driver, feeling annoyed at lack of turn signaling, and swearing out loud) than men. Conversely, men tended to engage in more overtly aggressive behaviors which could be detected by other drivers (flashing headlights in anger, making rude gestures, giving chase to another driver, and retaliating in some way to another aggressive driver).

Further replications of this study yielded different results. Chase and Mills (1973) found that newer cars produced more honking (opposite effect for status) and found no significant effect for sex. Their study was conducted 10 years later and in a different region of the country which may account for some of the differences in the results. Hanks-Drielsma (1974) replicated the original study in Canada and measured an ethnicity factor by prominently displaying a clear symbol of ethnic identification. Honking was found to have significantly shorter latencies in the vehicle which did not display an ethnic symbol.

Turner, Layton, and Simons (1975) used similar methodology in investigating the role of a prominently displayed symbol of aggression (a gun in the rack located in plain view of the subject's car) as well as a variable of dehumanization or anonymity (visibility of the driver). The investigators arranged to have a truck, with a visible gun prominently displayed in a gun rack paired with an aggressive or non-aggressive bumper sticker, block the intersection. The mutual visibility of both the subject and the confederate was varied by either pulling a curtain over the rear window to effectively block the view of the driver

or leaving the curtain open. Results indicated that the male subjects were more likely to honk at an anonymous individual supporting the hypothesis that inhibitions towards aggression are lowered when the victim is dehumanized (through anonymity). When the gun was paired with the aggressive bumper sticker, horn honking responses were modified. In the case of the visible gun paired with the aggressive bumper sticker and an anonymous driver, more rapid horn honking ensued. The authors surmise that aggressive stimuli may provoke aggressive responses or that the stimuli may serve as a retrieval cue and cause subjects to recall unrelated incidents of aggression. Ellison, Govern, Petri, and Figler (1995) also found that anonymity of drivers blocking traffic resulted in shorter honking latencies, longer honk duration, and more frequent honks as compared to visible drivers. The greater degrees of aggression observed in the conditions of anonymous drivers supports Milgram's (1965) findings that a subject is more likely to aggress against an anonymous victim than against a visible victim.

Age was found to have a negative relationship with driver stress and aggression in several studies. Matthews, Dorn, and Glendon (1991) found that age was negatively correlated with several dimensions of driver stress. Older drivers generally reported lower overall levels of stress. Younger drivers reported a higher rate of aggression and more negative reactions about being overtaken and overtaking other cars. These findings replicated previous research conducted by the same investigators which found that younger individuals report more daily stress in driving during commuting. As a result of more stress, younger drivers were seen to use more inefficient coping strategies (especially aggressive driving behaviors) as compared to their older driving counterparts