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DISSERTATION

**CHARACTERISTICS OF INDIVIDUALS WITH
HIGH AND LOW DRIVING ANGER**

Submitted by

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Department of Psychology

In partial fulfillment of the requirements

For the degree of Doctor of Philosophy

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Spring 2000

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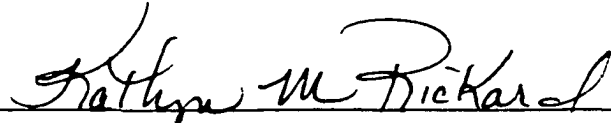
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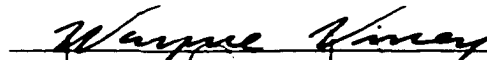
COLORADO STATE UNIVERSITY

June 8, 1999

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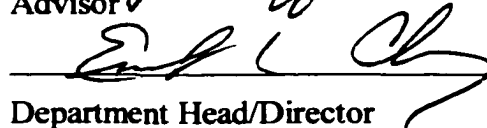








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ABSTRACT OF DISSERTATION
CHARACTERISTICS OF INDIVIDUALS WITH
HIGH AND LOW DRIVING ANGER

The study examined the relationship of personality factors to aggressive and risky driving and tested predictions of state-trait anger theory applied to driving anger. It also assessed implications for interventions to reduce driving anger by comparing two groups of introductory psychology students who were high in trait driving anger, one perceiving themselves as having a problem with driving anger and seeking counseling for those problems (high anger-problem or HAP) and another not perceiving themselves as having a problem with driving anger (high anger-no problem or HANP), to a low anger group who did not perceive themselves as having a problem with driving anger (low anger-no problem or LANP).

Predictions of state-trait anger theory were generally confirmed. Compared to low anger drivers, high anger drivers: (a) reported anger in response to a greater number of driving situations; (b) were more frequently and (c) intensely angered when driving; (d) expressed their driving anger in more hostile/aggressive and (e) less adaptive/constructive ways; (f) engaged in more aggressive and (g) risky behavior while driving, and (h) experienced more accident-related consequences. Findings were confirmed by surveys, logs of emotion and behavior while driving, and simulations involving visualization of provoking events. High anger participants also reported more general anger and impulsiveness and more negative, less constructive ways of expressing general anger.

Generally, HAP and HANP drivers were similar, but a few differences suggested that HAP drivers were somewhat more angry, aggressive drivers. Thus, both high anger groups were at elevated risk for angry, aggressive and risky driving, but implications for intervention are different. Because HAP participants saw themselves as having a problem and wanted counseling, they can be addressed with psychotherapeutic interventions (e.g., Deffenbacher, Huff, Lynch, Oetting, & Salvatore, in press). Given their elevations on general anger and impulsiveness, counseling should address these characteristics as well. However, since the HANP group did not perceive themselves as having a personal problem with driving anger, psychotherapeutic interventions are not appropriate. Interventions for this group should focus first on these self-perceptions and increase awareness of risk status and readiness for change.

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CHAPTER I

Introduction

In 1997, more than 35,500 occupants of motor vehicles died in automobile crashes in the United States, and another 339,900 were injured (National Highway Traffic Safety Administration Preliminary Report, 1997). The category of “injuries and adverse effects” was the leading cause of death for persons in the 15 to 24 year old age group in the United States in 1995, with 77 % of the deaths in the injuries and adverse effects category being the result of motor vehicle accidents (Anderson, Kochanek, & Murphy, 1997). Additionally, motor vehicle crashes accounted for approximately \$96.1 billion in societal costs in 1991 (National Safety Council, 1992). Drivers under the age of twenty-five had the highest rate of involvement in fatal crashes of any group, and also had the greatest tendency to be engaged in risky behaviors such as speeding and/or alcohol-drinking at the time of the crash (National Center for Statistics and Analysis, 1997). Specifically, in 1997, of those individuals who were 15 to 20 years old and involved in fatal crashes, 37% of male drivers and 26% of female drivers were speeding. The intoxication rate for 16 to 20 year old and 21 to 24 year old drivers involved in fatal crashes was 14.3% and 26.3%, respectively. Another risky driving behavior, driving without a seat belt, is associated with death or injury during a crash, and nearly two thirds of the vehicle occupants killed in traffic crashes were unrestrained.

In addition to examining risky driving behaviors, more and more researchers have also begun to study aggressive behaviors of drivers. This is not surprising given that some estimates indicate that aggressive driving accidents have been increasing seven percent annually from 1990 to 1995 (American Automobile Association, 1997). An

estimated 200 people have been murdered, and an additional 12,000 have been injured since 1990 as a result of violent and aggressive driving (American Automobile Association, 1997). While recognizing the importance and magnitude of these extreme cases of aggressive driving, it is important to note that there are many less extreme, but more frequent cases and consequences of aggressive and risky driving that may not be recorded. As a result of the frequency of this type of driving, it is important to study the variables related to it.

There has been a considerable amount of research into what it is that leads to risky and aggressive driving behavior and traffic crashes. Some researchers have focussed their efforts directly on developing or examining educational programs employed to decrease risky driving behavior (e.g., drinking and driving, speeding, and driving without seatbelts). The most commonly noted risk factor in driving behavior has been alcohol. Vegega and Klitzner (1988) reviewed 133 youth driving while under the influence (DWI) prevention models and found enormous diversity of focus, underlying assumptions, and activities. Youth DWI prevention programs ranged from school curricula, clubs, alternative transportation, teen retreats, and youth-focused legislation and regulation; however, reviews of many of these strategies (Goodstadt, 1985; Klitzner, 1987; Moskowitz, 1989) concur that evidence in support of these programs is minimal. Efforts to reduce speeding have also become more persistent through the use of hidden speed cameras that monitor driving speeds. Additionally, engineering approaches have assisted with the effort to decrease traffic-related injuries and fatalities through the development of things such as automatic seatbelts, airbags, and more visible brake lights.

Other researchers have focused more on individual differences in crash involvement and less on external variables related to driving behavior. Studies of these individual differences have largely revolved around several characteristics: driver skill level, gender, age, and personality and emotional factors.

Risky Driving and Driving Skill

West, French, Kemp, and Elander (1993) made a distinction between driving 'skill' and 'style'. Skill was described as the ability the driver has to control the car (e.g., clutch and steering control), and style was usual mode of operating the car on the road (e.g., speed, behavior at junctions, and distance to car in front). Some studies have provided support for the notion that inexperience accounts for a portion of the variance in crash rates between age groups (Evans, 1987; Williams, 1994); however, it is apparent that not all young drivers have the same risk of traffic crashes. Other studies have failed to show relationships between psychomotor performance, or skill, and accident rates. Other research has focused more on driving style (Quimby et al., 1986) than on driving skill. West and his colleagues (1993) examined driving style by specifically measuring speed, ability to remain calm in the face of potentially hazardous situations, and attentiveness/carefulness. Other items measured aggressiveness, consideration for other road users, use of signal indicators, talking while driving, crossing traffic lights late, and preferred distance to a car in front. They found that drivers could accurately report their own speed, calmness, and attentiveness (based on inter-observer reliability measures), but could not accurately gauge the other style variables. It was concluded that certain aspects of driving style do not merely reflect self-report bias, but are valid measures of driver behavior; therefore, they suggest that these aspects could be used to predict accident

involvement. It is also possible that these style variables account for some of the variance in risky driving behavior among young people.

Risky Driving and Age

Automobile accidents are the leading cause of death for people aged 15-24, with 40% to 50% of all teenage deaths being the result of injuries sustained in traffic crashes (Perrine, Peck, & Fell, 1989). As a result, many researchers have focused their efforts on understanding the over-involvement of young drivers in vehicle crashes. Jonah (1990) has attributed the greater involvement in crashes by youth to a “risk behavior syndrome”. He postulated that “risky driving may be less inhibited among youth because they do not perceive the likelihood or severity of the negative consequences of such actions” (p. 139). Furthermore, he suggested that the developmental tasks of youth predispose them to engage in other risky behaviors as well as risky driving (e.g., alcohol and drug abuse). Results of his research support his hypothesis, as young drivers (age 16-24) were not only more likely to engage in risky driving and have higher traffic accident and violation rates, but they were also more likely to report other risky behaviors as well. Lang, Waller, and Shope (1996) also examined young drivers and risk-taking behavior. They found that for young men, the most important indicator of higher rates of single-vehicle collisions and traffic crashes involving injuries was marijuana use. For young women, alcohol misuse and friends’ involvement with alcohol and marijuana were associated with injury crashes; propensity toward cigarette use was associated with higher rates of single-vehicle crashes for young women.

Donovan (1993) examined the relation of drinking-driving behavior in young people to other categories of risky behavior. He found that young people who tended to

drive after drinking also tended to drive after using marijuana and other illicit drugs, and they also tended to violate other types of traffic laws. In addition, drinking-driving was related to several other individual differences. Young adults who tended to drink and drive also tended to have higher levels of social unconventionality, enjoyed taking more risks, and were more hostile and aggressive than those who drank and drove less frequently. In fact, these three variables accounted for over a third of the variance in young adult drinking and driving. Results of another study on adolescents (Farrow, 1989) indicated that negative life events and self-perceived effects of alcohol on personal expression were possible predictors of dangerous driving involving alcohol. For example, DWI offenders felt that alcohol made them more aggressive, daring, unafraid, and loud compared to non-offending peers.

Other researchers (McMillen, Pang, Wells-Parker, & Anderson, 1992) have found that young drivers who drink and drive are not all the same in terms of personality characteristics. For example, while drinking and driving increased the risk of accident or moving violation for all drivers, some had an even greater risk than others did when the same amount of alcohol was involved. Young drivers, who drink heavily and are high in sensation seeking and hostility, and low in social responsibility, are more likely to drive impaired, and take more risks than other drinking-drivers. Arnett and colleagues (1997) found similar results when they studied reckless driving behaviors in young people. They found that "state aggressiveness", or the condition of being in an angry mood, was related to periods of high-speed driving. In other words, not only do aggressive adolescent drivers tend to drive more recklessly, but those who are in an angry mood drive recklessly as well. In addition, a relationship was found between sensation seeking and

reckless driving. They concluded that the tendency for adolescents to take risks lies in part in the traits of sensation seeking and aggressiveness, particularly for adolescent males who report stronger tendencies on both of these traits than adolescent females (Arnett et al., 1997).

Risky Driving and Gender

Farrow (1987) compared driving behavior of males versus females and found that 72% of males and 28% of females endorsed interview questions indicating they had driven with reckless intent. In addition, 80% of drivers ticketed for driving incidents were males, compared to 20% females. Risky driving behavior in general has been shown to be more prevalent for males than females, but the differences in frequency of risky behaviors for males and females tended to decrease as a function of age starting at approximately age 25 years (Jonah, 1990). Some researchers (Arnett et al., 1997) suggest that this difference between males and females may be due to differing levels of aggressiveness. They showed evidence for a link between aggressiveness and reckless driving. Moreover, they found that adolescent males reported higher levels of trait aggressiveness and higher rates of risky driving than females, but not higher rates of state aggressiveness; however, the finding regarding state aggressiveness was based on a relatively small number of driving episodes. In another study on gender, age and driving behavior (Simon & Corbett, 1996), individuals who were high offenders (i.e., endorsed a high rate of engaging in risky and illegal driving behaviors) reported more driving aggression than low offenders, and female high offenders were as aggressive as male high offenders. Overall, females offended less than males, but experienced more driving-related anxiety and general life stress than males (Simon & Corbett, 1996).

In a study assessing the risk for DWI, Farrow and Brissing (1990) found that tenth grade males scored significantly higher on a scale measuring the tendency to seek adventure, and on a scale measuring disinhibition than females. Similarly, Stacy, Newcomb, and Bentler (1991) found that sensation seeking was a direct predictor of DWI behavior among men, but not among women, although sensation seeking did predict DWI behavior indirectly for women through its effect on alcohol use. These studies indicate that a portion of the variance between men and women and the tendency toward risky driving behavior is accounted for by differences in personality variables. Males have a higher incidence of automobile accidents/fatalities and risky driving behavior than females, and also have greater sensation seeking and aggressiveness.

Risky Driving and Personality Characteristics

Other research on individual differences in driving behavior has focused on understanding how emotional and personality characteristics influence the way people drive and the risk of crash involvement. Early studies on psychological correlates of traffic accident risk focused primarily on characteristics associated with social deviance. These included expression of hostile influences (Barmack & Payne, 1961), and eccentricity, impulsivity, and mild psychopathy (McFarland, 1968). Results of these studies consistently showed a positive correlation with accident risk. Several more recent research studies have also provided evidence that features of antisocial behavior, such as aggression, hostility, impulsivity and recklessness characterize many DWI offenders (Donovan, 1980; Mozdierz et al., 1975). For example, Mozdierz and colleagues (1975) investigated differences in personality functioning for alcoholics with a high rate of traffic accidents/violations versus those with a low rate. They concluded that the group

with high rates of traffic accidents/violations were more impulsive, reckless, irresponsible, manipulative and controlling of others. Alternatively, Donovan, Marlatt, and Salzberg (1983) found evidence suggesting that there are several characteristics associated with high-risk driving behavior regardless of the presence or absence of alcohol. For example, one study compared aggression and hostility in three groups of drivers: (1) driving under the influence (DUI) offenders, (2) drivers with multiple non-alcohol related accident, and (3) general drivers (Donovan, Queisser, Salzberg, & Umlauf, 1985). In contrast to the general drivers, the first two groups reported more of the following characteristics: emotional lability, impulsiveness and thrill seeking, overt and covert expressions of anger and hostility, and feelings of depression and low levels of perceived personal control. They suggested that while these traits could be found in the general behavior of high-risk drivers, their impact is often manifested in driving-related attitudes and behaviors. In a subsequent study, Donovan and his colleagues (1988) further examined personality subtypes among high-risk drivers. They found that two of the groups had high levels of risk-enhancing characteristics. One of these groups exhibited impulsive, sensation seeking, aggressive acting-out behavior. The other group had high levels of dysphoria, emotional distress, resentment, and an external perception of control, and reported acting out their aggressive feelings while driving.

Arnett and colleagues (1997) have asserted that sensation seeking and aggressiveness are two of the personality traits that have been repeatedly identified in many recent studies on risky driving behavior. They further noted, however, that researchers who discuss aggressiveness rarely distinguish between the state and trait of aggressiveness. In their study, they sought to determine the role of each in risky driving

behavior. Results supported findings of previous studies on the relation between trait aggressiveness and risky driving, and added to these findings with evidence that an angry state is related to episodes of high-speed driving. They (Arnett et al., 1997) assert that “the findings suggest not only that more aggressive adolescents tend to drive more recklessly, but also that adolescents tend to drive more recklessly when they are in an angry mood” (p. 62). Similar results for state anger were reported by Lynch, Deffenbacher, Oetting, and Yingling (1995); state driving anger was associated with increased rates of risky and aggressive driving behavior.

Research such as Arnett and colleagues’ (1997) draws on Spielberger’s state-trait personality theory to illustrate the difference between aggressive states and traits. Spielberger and colleagues (Spielberger, Krasner, & Solomon, 1988; Spielberger, Reheiser, & Sydeman, 1995) originally applied state-trait personality theory to anger generally. They defined state anger as a transitory emotional-physiological condition characterized by both subjective feelings and physiological activation. Alternatively, trait anger was defined as a stable personality dimension of the tendency to experience state anger. Research (Deffenbacher, 1992; Deffenbacher, Oetting, Thwaites et al., 1996) has shown that high trait angry individuals tend to be characterized by several tendencies. They become angry in response to a greater number of events, and experience state anger more frequently and intensely than low state angry individuals. Additionally, they engage in more aggressive and dysfunctional behaviors, and experience more negative anger-related consequences.

It has been suggested that extending the state-trait theory to driving anger may help to explain the findings on risky driving and aggressiveness even further

(Deffenbacher, Oetting, & Lynch, 1994). Consistent with trait-state theory, some researchers have begun to focus on a more specific driving anger characteristic, a personality trait that may help explain risky and aggressive driving behavior (Deffenbacher et al., 1994). That is, they have begun to look at a driving anger trait that may explain certain individuals' propensity to experience an angry state while driving. When state-trait theory is adapted to driving anger, the expected findings for individuals with high trait driving anger would include the following: (1) a greater number of events would anger the driver; (2) state anger would be experienced more frequently while driving; (3) state anger would be experienced more intensely while driving; and (4) state driving anger would be experienced for a longer duration. This anger could also lead drivers to engage in more emotionally charged aggressive and risky driving behavior. Elevated state anger could also interfere with perception, information processing, and performance. Such individuals may then be at an increased risk for decreased attention and concentration, and this could lead to more accident-related consequences such as accidents, traffic citations, and potential injury or even death. Additionally, this behavior may put others at risk (e.g., obscene gestures or angry exchanges may increase the likelihood of serious conflicts, accidents, etc.). This leads to additional predictions for high anger drivers; they would (5) exhibit more aggressive driving behavior and express anger in more hostile/aggressive ways (e.g., arguing with other drivers and making obscene gestures); (6) engage in more risky driving behavior and express anger in less safe ways (e.g., speeding and not wearing a seatbelt); and (7) experience more accident-related consequences (e.g., loss of vehicular control and "close calls").

Several studies have begun to address these hypotheses (Lynch, Deffenbacher, Oetting, & Yingling, 1995; Deffenbacher, Huff, Lynch, Oetting, & Salvatore, in press). For example, it has been found that high anger drivers were more easily angered by many different types of driving situations (Deffenbacher et al., in press). When compared to a low driving anger group of individuals, the high anger group reported greater anger in normal traffic, rush hour traffic, and provocative (e.g., being yelled at by another driver) driving circumstances. Another study (Lynch et al., 1995) revealed that there was no correlation between trait driving anger and reported anger while driving unobstructed on an open country road, but there was a high correlation between trait driving anger and reported anger while driving in ordinary traffic, in rush hour traffic, and when being yelled at by another driver. Moreover, results suggested that as the level of provocation and stress increase, the impact of trait driving anger on anger reactions becomes more apparent (Lynch et al., 1995). In addition, these results suggest those individuals with high driving anger experience anger in response to many different situations, rather than in response to a particular frustrating circumstance. Therefore, while they are not angry all the time they are behind the wheel, they do appear to react to more situations and with more intense anger.

The suggestion that trait driving anger would predict state anger feelings which were more intense and frequent than low trait driving anger has also been supported (Deffenbacher et al., in press; Lynch et al., 1995). For example, one study required that participants complete a driving log on three consecutive driving days, and rate the frequency with which they became angry, and the intensity of the anger experienced. High anger drivers reported more frequent and intense anger than low anger drivers

(Deffenbacher et al., in press), becoming angry 3.2 times more often than their low anger counterparts. Similarly, Lynch and colleagues (1995) found that trait driving anger correlated with higher frequency and intensity of anger while driving. To date, the hypothesis that high driving anger individuals would experience anger for a longer duration has not been tested.

Other behaviors of individuals with high trait driving anger were also predicted by the state-trait theory. For example, it was expected that individuals with high trait driving anger would engage in more aggressive and risky driving behaviors. Thus far, the research (Lynch et al., 1995) has demonstrated driving anger is correlated with aggressive behaviors such as arguing with passengers or other drivers, physically fighting with other drivers, and damaging a vehicle (not in an accident). Deffenbacher and colleagues (in press) also found that driving anger was correlated with a number of aggressive behaviors including physical injury to the angry driver in non-accident related situations. High anger has also been found to be associated with risky driving behaviors. Specifically, failure to use a seatbelt, driving recklessly, and driving and drinking were correlated with high driving anger (Lynch et al., 1995). This evidence is consistent with the research of Donovan (1993) who found that young adults who tended to drink and drive also tended to be more hostile and aggressive than those who drank and drove less frequently.

Studies have explored the relations between driving anger and driving accidents and accident-related conditions. While driving anger was not directly related to major or minor accidents, it was related to a number of accident-related conditions (Lynch et al., 1995). Examples of these conditions included loss of concentration, loss of vehicular control, "close calls", and near accidents while driving. They suggested that over time, a

high number of accident-related consequences could result in increased accident rates. In a follow-up study, Deffenbacher and colleagues (in press) found that reports of lifetime prevalence of accidents, and rates of minor accidents in the last year were associated with driving anger. In addition, they replicated the results of Lynch et al. (1995) and demonstrated that nearly being in an accident was associated with driving anger.

To summarize the research on state-trait theory and its application to driving anger thus far, research (Lynch et al., 1995; Deffenbacher et al., in press) has demonstrated that trait driving anger is associated with (1) a greater number of events that anger the driver; (2) more frequent and (3) more intense state anger while driving; (4) more aggressive and (5) more risky driving behavior and anger expression; and (6) more accident-related consequences. Thus, trait driving anger appears to be a risk factor for increased anger, aggressiveness, and risky behavior on the road. The duration of state anger while driving is a variable that has not yet been explored.

It may be that these tendencies of high driving anger individuals may be exacerbated by other psychological characteristics. For example, it has been found that individuals with high driving anger are significantly more angry and anxious in general than those with low driving anger, and they tend to suppress their anger and express it more outwardly and in less controlled ways than low driving angry individuals (Deffenbacher et al., in press). It was suggested that the combination of these characteristics may increase the likelihood that at least a subgroup of high anger drivers may act out their anger in more impulsive, less controlled ways than others. This suggestion leads to the possibility that impulsivity may also be a factor that effects or

enhances the behavior of high driving anger individuals. This possibility draws together two of the clusters of personality characteristics that have so frequently been mentioned in the literature on risky driving behavior: anger/aggression and impulsiveness/sensation seeking. Hence, this combination warrants further investigation.

It is possible that impulsiveness, like general anger and anxiety, may interact with anger, facilitating even more impulsive, risky, potentially aggressive behavior. Thus, it may be an important factor in understanding some aspects of anger/aggression and risky driving behavior. Barratt (1972) described impulsivity as the control of thoughts and behaviors, and, more recently, he has described impulsivity as having three main components: motor, cognitive, and planning (Barratt, 1985). He has found that individuals with substance abuse problems, antisocial personality disorders, and impulsive aggressive tendencies tend to score higher on impulsiveness measures. Other recent research on impulsivity has shown that impulsive behavior is related to several socially important behaviors such as criminal behavior (Eysenck & McGurk, 1980), aggression (Berkowitz, 1993; Stanford, Greve, & Dickens, 1995), and risk-related sexual behavior (Clift, Wilkins, & Davidson, 1993). Research on impulsivity and risky driving behavior has also demonstrated an association between the two (Donovan et al., 1988; Mozdierz et al., 1975). As a result, in considering what is known about high versus low driving anger individuals, it is possible that a measure of impulsivity would explain even more of the differences between the two groups.

In addition, previous research has not examined the characteristics of the group of individuals with high driving anger who do not feel that they have a personal problem with driving anger. It is expected that the two groups (i.e., those high in driving anger

admitting a problem with driving anger versus those high in driving anger, but not admitting a problem with it) would be similar in terms of number of events that anger them, and in terms of the frequency and intensity of their anger while driving. However, what is less clear is whether they engage in risky and aggressive behaviors, and have negative consequences related to their driving. With regard to risky and aggressive behavior and negative consequences of driving anger, the two groups may be similar. Alternatively, it may be that the group that feels it does not have a problem with driving anger simply has a high level of anger while driving, but in fact, does not engage in problematic behavior or experience negative consequences.

Purpose of the Study

One purpose of this study is to test the theoretical applicability of state-trait theory to driving anger. As in earlier studies, it is predicted that trait driving anger will be associated with (1) a greater number of events that anger the driver (*elicitation hypothesis*); (2) more frequent state anger while driving (*frequency hypothesis*); (3) more intense state anger while driving (*intensity hypothesis*); (4) more aggressive driving behavior (e.g., arguing with a passenger or other drivers)(*aggressiveness hypothesis*); (5) more risky driving behavior (e.g., not using seatbelts)(*riskiness hypothesis*); and (6) more accident-related consequences (e.g., loss of vehicular control, “close calls”)(*consequence hypothesis*).

A second purpose of the study is to explore impulsivity and its relation to driving anger, risky and aggressive driving behavior, accidents, and accident-related consequences. The possibility that impulsivity may also be a factor that effects or enhances the behavior of high driving anger individuals will be examined.

A third purpose of the study is more clinical and descriptive. One group will be a client analog. They will be high in driving anger and perceive themselves as having a personal problem with driving anger and seeking counseling for their problem. Exploration of their characteristics will provide clinically useful information which can help determine intervention designs.

A fourth purpose of the study is to explore the characteristics of the group of individuals who have high driving anger, but do not feel that it is a problem. By examining how their characteristics are similar and how they may be different from the high anger group of individuals that feels there is a problem, many practical things may be learned. At this time we do not know about this group and whether they are at risk or not. If this study reveals negative driving consequences for the high driving anger group that believes it does not have a problem with driving, it may be useful to design awareness enhancement, informational and motivational interventions to enhance motivation and readiness for change. In other words, this group may require a somewhat different approach than other high driving anger individuals with regard to intervention. It is hoped that the present study will be helpful in determining (a) the characteristics of the high anger, no problem group, and therefore (b) the interventions, if any, that might be appropriate for them.

In summary, this study will test several predictions of state-trait anger theory adapted to driving anger, explore how impulsiveness may contribute or interact with driving anger, and describe the risk and behavioral characteristics of high driving anger individuals who do not see themselves as having problems with driving anger as well as

those who do see themselves as having a problem. Thus, the study embodies both tests of theoretical models and clinically relevant description.

CHAPTER II

Method

Participants

Participants were 99 (38 men, 61 women) high anger-problem (HAP), 82 (29 men, 53 women) high anger-no problem (HANP), and 80 (28 men, 52 women) low anger-no problem (LANP) introductory psychology students. The high anger-problem, client-like group consisted of individuals who scored in the upper quartile (scores > 53) on the short-form of the Driving Anger Scale (DAS; Deffenbacher et al., 1994) and who indicated that they have a problem with driving anger, and wanted help for it. The high anger-no problem group consisted of individuals who scored in the upper quartile (scores > 53) on the short-form of the DAS and who indicated that they did not have a problem with driving anger, but would like to participate in a study on driving. The low anger group scored in the lower quartile on the short-form of the DAS (scores < 42) and indicated that they did not have a problem with driving anger, but would like to participate in a study on driving. Participants received one of three required research credits for participation.

Instruments

Throughout descriptions of instruments, alpha reliabilities listed first in parentheses are from earlier studies, whereas the last one listed is from this study. If only one is listed it is from earlier studies, unless otherwise noted.

Measures included the 14-item, short-form and the 33-item, long-form of the Driving Anger Scale (DAS; Deffenbacher et al., 1994), reports of anger in three Driving Scenarios, reports of the two most angering situations on the Personal Driving Anger

Situations form, reports of anger expression on the Driving Anger Expression scale, general reports of accident-related variables and of aggressive and risky driving behavior on the Driving Survey, reports of state anger and aggressiveness in response to two audiotaped driving scenarios, and a Driving Log completed three times during a week.

Driving Anger Scale (DAS). The short-form of the DAS was used for screening participants into high and low anger groups, whereas the long-form was employed to explore the numbers of situations that provoke anger. The 14-item, short-form of the DAS ($\alpha = .80$) comprises a unidimensional measure of driving anger. It was constructed by choosing items that had the best single cluster structure, with the requirement that it include at least one item from each of the six subscales from the long-form of the DAS. The short-form of the DAS correlates .95 with the long-form (Deffenbacher et al., 1994). The 33-item, long-form of the DAS ($\alpha = .90$) contains subscales measuring anger in different driving-related situations. Items are answered on a 5-point scale (1 = not at all, 5 = very much) depending on the amount of anger the item elicits when encountered. Scores on the DAS correlate positively with the frequency and intensity of state anger while driving, with accident-related variables, with risky and aggressive behavior, and with general anger (Deffenbacher et al., 1998; Lynch et al., 1995).

Driving Scenarios. The Driving Scenarios measure anger in three common driving situations which vary in the level of provocation involved (i.e., driving along in ordinary traffic, being stuck in heavy traffic during rush hour, and being yelled at by another driver). Participants were asked to rate the degree of anger experienced when

they encounter those situations. Ratings are made on seven five-point semantic differential scales (e.g., hot headed – cool headed).

Personal Driving Anger Situations. The Personal Driving Anger Situations asked the participant to describe in detail his/her two most angering situations while driving. The level of anger is rated on a 0-100 point scale (0 = little or no anger, 100 = maximum level of anger you could ever experience). The purpose of these measures is to assess anger reactions unique to the individual. This measure is adapted from the Anger Situation measure (Deffenbacher, Demm, & Brandon, 1986), which has a 10-week test-retest reliability of .81 (Deffenbacher, Story, Brandon, Hogg, & Hazaleus, 1988), and small correlations with other general anger scores (Deffenbacher et al., 1986).

Driving Anger Expression Scale (DAX). The DAX consisted of 40 questions regarding reactions to anger while driving (Corum, Wentz-Kinnison, Petrilli, Lynch, & Deffenbacher, 1999). This scale is a recently developed measure of how individuals generally express and handle their anger on the road. It is based on a cluster analysis and is comprised of two major dimensions measuring two styles of driving anger expression: those of Constructive/adaptive ways of dealing with anger while driving and of Aggressive/hostile forms of expressing anger. Answers were rated on a 4-point scale (1 = almost never, 4 = almost always) regarding how one expresses his/her anger while driving. The Constructive/adaptive scale is a 15-item scale (alpha = .90 and .91) consisting of the following three subscales: (1) 5-item Attention and Problem Solving (alpha = .82 and .83) (e.g., I try to think of the positive thing to do); (2) 6-item Cognitive Reframing and Acceptance (alpha = .88 and .89) (e.g., I tell myself it's not worth getting all mad about); and (3) 4-item Cognitive Distraction (alpha = .73 and .67) (e.g., I turn on

the radio or music to calm down). The Aggressive/hostile scale is a 35-item scale (alpha = .91 and .94) consisting of the following eight subscales: (1) 4-item Physical Aggression (alpha = .78 and .70) (e.g., I try to get out of the car and tell the other driver off); (2) 9-item Aggressive Endangerment (alpha = .85 and .91) (e.g., I try to cut in front of the other driver); (3) 6-item Hostile Gestures (alpha = .80 and .81) (e.g., I shake my fist at the other driver); (4) 2-item Aggressive Lights (alpha = .69 and .78) (e.g., I flash my lights at the other driver); (5) 4-item Overt Verbal Aggression (alpha = .82 and .87) (I call the other driver names aloud); (6) 3-item Covert Verbal Aggression (alpha = .88 and .91) (e.g., I swear at the other driver under my breath); (7) 4-item Body Language (alpha = .71 and .81) (e.g., I glare at the other driver); and (8) 3-item Displaced Aggression (alpha = .65 and .72) (I yell at people who are riding with me). Hostile/aggressive and Adaptive/constructive types of driving anger expression form a small negative correlation ($r = -.26$). Hostile/aggressive scales form small to moderate positive correlations with each other (e.g., $r = .02$ for Physical Aggression and Covert Verbal Aggression to $r = .58$ for Overt and Covert Verbal Aggression), whereas Adaptive/constructive forms of expression were more consistently positively correlated ($r_s = .46$ to $.67$). Hostile/aggressive scales were uncorrelated or negatively correlated with Adaptive/constructive forms of expression (e.g., two largest $r_s = -.31$ for Aggressive Endangerment and Focused Attention/Problem Solving and for Covert Verbal Aggression and Cognitive Reframing/Acceptance). Males reported more Hostile/aggressive Expression than females, but gender did not differ on Adaptive/constructive Expression (Corum et al., 1999). Hostile/aggressive Expression correlates positively with the DAS ($r = .51$), with the frequency and intensity of state

driving anger ($r_s = .30$ and $.37$), and with the frequency of aggressive ($r_s = .41$ and $.61$) and risky ($r_s = .24$ and $.40$) driving behaviors (Hirschfeld, Richards, Lynch, & Deffenbacher, 1999). Adaptive/constructive Expression correlated negatively and to a lesser degree with the DAS ($r = -.15$), frequency and intensity of state driving anger ($r_s = -.07$ and $-.14$), and with aggressive ($r_s = -.19$ and $-.33$) and risky ($r_s = -.12$ and $-.27$) driving behaviors (Hirschfeld et al., 1999).

Survey of Driving. The Survey of Driving included general questions about accident-related variables and driving-related risky and aggressive behaviors. One question asked the respondent, "As a driver, I am...", and this statement was followed by four descriptive variables (very calm to very angry, very unaggressive to very aggressive, very cautious to very risk taking, and very safe to very unsafe). Participants were asked to rate each of these four pairs on a seven-point scale, depending on which part of the pair was more descriptive of them as a driver. Four more questions asked how many times in the previous three months the participant had (a) gotten moving (non-parking) tickets, (b) lost concentration while driving, (c) had a minor loss of control of a vehicle he/she was driving, and (d) had a "close call" but was not actually in an accident. These four questions were rated on a scale from 0 to 5+, with the number corresponding to the number of incidents. Two questions asked the number of times in the previous year that they had been in two types of accidents: (a) minor, and (b) major. Alpha reliabilities are based on data from the present study. Thirteen questions asked about how frequently the respondent had exhibited driving-related aggressive behaviors or experienced anger outcomes that were not the result of an accident ($\alpha = .88$). These items asked about behaviors such as honking the horn in anger, arguing with a passenger while driving, and

physically fighting with another driver. Frequencies were rated from 0 to 4+. Another 15 questions asked about risky driving behaviors ($\alpha = .86$). These items included questions about behaviors such as seat belt use, drinking and driving, and driving over the speed limit, and were rated in frequency from 0 to 4+. The questions about moving (non-parking) tickets, minor and major accidents, aggressive and risky behaviors were then asked again, but respondents were asked to reply based on the previous year, rather than on the previous three months. This one-year time frame was included to provide a longer-term gauge of consequences and behaviors that may not have a high rate of occurrence, particularly for college students (heavily freshmen) who have only been driving for two to three years.

State anger assessment. The audiotaped driving scenarios consisted of two driving scenarios. One scene involved another driver who did not turn on a green arrow causing the participant to be unable to go through the light, and the other involved a driver who stole a parking spot for which the participant had been waiting (see Appendix A for transcript). Participants were asked to listen to, visualize and experience the scenarios as if they were actually in each situation at that moment. After the first scenario, they were asked to complete the 15-item Spielberger State Anger Scale (Spielberger, 1988), which required them to rate the degree of anger they felt in response to the situation that was just visualized. The State Anger Scale yields three 5-item dimensions: (1) Anger ($\alpha = .89$ and $.93$) (e.g., I feel irritated); (2) Verbal Aggression ($\alpha = .90$ and $.94$) (I feel like yelling at someone); and (3) Physical Aggression ($\alpha = .85$ and $.91$) (I feel like kicking someone). Items were to be answered on a 4-point scale (1 = not at all, 4 = very much so) regarding how much they were feeling the item at

the time. Adaptive/constructive state expression was assessed by the two item Positive Coping Scale (e.g., I would stay composed and be constructive) from Novaco (1975). Respondents then rated the likelihood of engaging in the behavior on a 7-point scale (1 = not at all, 4 = some not much, 7 = very much). These two questions were answered immediately following the State Anger Scale for each of the audiotaped scenarios, according to the feelings the person had then. When the State Anger Scale and Positive Coping Scale were completed, the procedure was repeated for the second taped scenario.

Driving Logs. The Driving Logs required participants to (a) record the number of times angry while driving that day, (b) describe the event that led to the greatest amount of driving anger that day and rate the intensity of that anger on a 0-100 point scale (0 = no anger, 100 = maximal anger ever experienced), (c) check if they engaged in any of 14 risky behaviors (e.g., drank and drove, drove 10 miles over the speed limit), or (d) any of six aggressive behaviors (e.g., cursed or called another a name, made an angry gesture). Therefore, the logs provide a measure of the frequency and intensity of driving anger experienced, as well as the driver's risky and aggressive behavior on three days. This method is adapted from the Anger Log measure (Deffenbacher et al., 1986) which correlated moderately with other person-specific anger measures (Deffenbacher, 1992). It has been demonstrated that individuals with high trait driving anger had more frequent and intense state driving anger as measured by the Driving Logs than individuals with low trait driving anger. Similarly, high trait driving anger individuals had more aggressive and risky driving behavior as measured by the Driving Logs than individuals with low trait driving anger (Deffenbacher et al., in press; Lynch et al., 1995).

Impulsivity. Impulsivity was measured by the Barratt Impulsiveness Scale - Version 11 (BIS-11). The BIS-11 is a 30-item self-report scale designed to measure general impulsiveness (e.g., I plan tasks carefully, I say things without thinking, I act on the spur of the moment), taking into account the multi-factorial nature of this personality construct (Patton, Stanford, & Barratt, 1995). Items are rated on a 4-point scale (Rarely/Never, Occasionally, Often, Almost Always/Always), with 4 being the most impulsive response. The higher the summed score for all items, the higher the level of impulsiveness. Several items were worded to indicate nonimpulsiveness, and then they were reverse-scored to avoid a response set. Measures of the internal consistency of the BIS-11 have revealed alphas of .80 and .82 for college students and .82 for high school students (Patton et al., 1995; Stanford, Greve, Boudreaux, Mathias, & Brumelow, 1996). Alpha in the present study was .85. In a study on the factor structure of the BIS-11, first-order factors included (1) attention, (2) motor impulsiveness, (3) self-control, (4) cognitive complexity, (5) perseverance, and (6) cognitive instability. All first-order factor scores were significantly intercorrelated (.15 to .42), and all second-order factor scores were significantly intercorrelated (.46 to .53). Second-order factors combined (a) attention and cognitive instability into Cognitive Impulsiveness, (b) motor impulsiveness and perseverance into Motor Impulsiveness, and (c) self-control and cognitive complexity into Non-planning Impulsiveness. In the present study, alpha reliabilities were .71 for Cognitive Impulsiveness, .62 for Motor Impulsiveness, and .74 for Non-planning Impulsiveness.

Other measures. While driving anger and impulsiveness were the focus of the study, other measures were included to assess general anger characteristics of high

driving anger individuals. Trait anger was measured by the 10-item Trait Anger Scale (TAS; Spielberger, 1988). Items are answered on a 4-point scale (1 = almost never, 4 = almost always), and respondents rate their typical feelings or response of anger. Alpha reliability ranges from .81 to .91 (Spielberger, 1988), and test-retest measures range from .70 to .77 after a two-week interval (Jacobs, Latham, & Brown, 1988), and .75 after a two-month interval (Morris, Deffenbacher, Lynch, & Oetting, 1996). Validity measures demonstrate that the TAS correlates positively with measures of anger, aggression, hostility (Deffenbacher, 1992; Deffenbacher, Oetting, Thwaites et al., 1996; Spielberger, 1988) and anger consequences (Deffenbacher, Oetting, Lynch, & Morris, 1996). In addition, it correlates more strongly with anger variables than with other cognitive, emotional, behavioral and personality measures (Deffenbacher, 1992; Deffenbacher et al., 1996), and it discriminates high anger groups from low anger groups (Deffenbacher, Oetting, Thwaites et al., 1996, Lopez & Thurman, 1986). Anger expression was measured by 8-item Anger-In, Anger-Out, and Anger-Control scales from the State-Trait Anger Expression Inventory (Spielberger, 1988). These items were rated on a 4-point (1 = almost never, 4 = almost always) scale of how often the individual expresses anger in the manner described in the item. The Anger-In scale measures the tendency to experience, but suppress anger and to harbor grudges and criticism. Anger-Out assesses the tendency to express anger outwardly and in negative ways. Anger-Control measures the ways the individual attempts to calm down and control anger. Alpha reliabilities for these three scales range from .73 to .84 (Spielberger, 1988), and validity is demonstrated by different correlations with anger, personality, and

physiological variables (Deffenbacher, 1992; Deffenbacher, Oetting, Thwaites, et al., 1996; Spielberger, 1988).

Procedure

Potential participants received two copies of the informed consent form (See Appendix B for copy) in introductory psychology classes. They read, signed, and returned one; the other copy was kept for their own records. They then completed the short-form of the DAS. Screening criteria for high anger (HAP) participants with a driving anger problem were that respondents score in the upper quartile ($DAS > 53$), and checked a box indicating that there was a personal problem with driving anger. The criteria for the high anger-no problem (HANP) group consisted of individuals who scored in the upper quartile (scores > 53) on the short-form of the DAS and who checked a box indicating that they did not have a problem with driving anger, but would like to participate in a study on driving. Criteria for low anger (LANP) participants without a driving anger problem were that they were in the lower quartile ($DAS < 42$), and checked a box indicating that there was not a personal problem with driving anger, but there was an interest in a study on driving.

Students meeting these criteria were called and the conditions of the study were described. If the student expressed an interest, the informed consent form was read over the phone, and the individual was scheduled for the study.

Participants arrived in groups of approximately 10 to 35 and were seated in a moderate size university classroom. Two copies of the informed consent form were distributed (See Appendix C for copy), and participants read, signed, and returned one; the other copy was kept for their own records. They then completed the 33-item long-

form DAS, Driving Scenarios, Personal Driving Situations, DAX, Driving Survey, BIS-11, TAS, Anger Expression Inventory, and responses to the audiotaped scenarios, in that order. This order was chosen to move logically from driving anger to driving anger behavior and expression to driving consequences, before moving to more general measures of impulsiveness, anger, and anger expression. They then received three copies of the Driving Log with instructions to complete them on days on which they drove during the coming week. They were told that they would receive credit only after their Logs were returned. Students who did not return their Logs were called and reminded to do so.

CHAPTER III

Results

The analytic format is a 2 (Gender) x 3 (Anger Status) MANOVA, and multivariate effects refer to these. MANOVAs were performed on clusters of two or more variables assessed by the same methodology. Significant multivariate effects were followed by univariate ANOVAs, and interactions and significant anger main effects were explored by Tukey tests (p s at least $< .05$). Effect sizes for MANOVAs are Roys statistics, and eta square (η^2) for ANOVAs. Qualitative evaluation of effect sizes are based on Cohen's (1988) criteria where η^2 from .01 to .05 is small, .06 to .14 is moderate, and $> .14$ is large.

Perceptions of Self as a Driver

Table 1 summarizes participants' ratings of themselves as drivers. Significant multivariate effects were found for gender, $F(4, 243) = 3.60$, $p < .01$, Roys = 0.056, and anger, $F(8, 486) = 16.01$, $p < .001$, Roys = 0.209, but not for the interaction, $F(8, 486) = 0.98$. Univariate gender effects were found on ratings of aggressive and risk-taking, $F_s(2, 246) = 9.60$ and 9.03 , p s $< .01$, $\eta^2 = 0.038$ and 0.035 , due to males rating themselves as somewhat more aggressive and risk-taking (M s = 4.61 and 3.69) than females (M s = 3.99 and 3.13). Univariate anger effects were found on all ratings (Table 1). HAP drivers rated themselves as significantly more angry, aggressive, risk-taking, and unsafe (M s = 4.12, 5.07, 3.94, and 3.16) than HANP drivers (M s = 3.35, 4.19, 3.31, and 2.64). In turn, both high anger groups were significantly higher on these variables than the LANP group (M s = 2.13, 3.20, 2.63, and 2.09). Anger effect sizes were large for ratings of self as angry, aggressive, and risk-taking and moderate for ratings of self as unsafe.

Table 1

Perceptions of Self as Driver as a Function of Gender and Anger Status

Measure	Gender	Group						Univariate Anger F(2, 246)	Anger Effect Size η^2
		LANP		HANP		HAP			
		<u>M</u>	<u>SD</u>	<u>M</u>	<u>SD</u>	<u>M</u>	<u>SD</u>		
Calm/Angry	M	2.14	0.97	3.55	1.09	4.08	1.12	63.38*	.340
	F	2.13	1.00	3.23	1.13	4.14	1.23		
Unaggressive/ Aggressive	M	3.64	1.54	4.59	1.43	5.35	1.23	31.10*	.202
	F	2.94	1.45	3.96	1.67	4.90	1.40		
Cautious/Risk- Taking	M	2.96	1.17	3.55	1.55	4.35	1.23	19.03*	.134
	F	2.44	1.03	3.17	1.45	3.67	1.49		
Safe/Unsafe	M	2.25	1.11	2.69	1.28	3.19	1.17	15.99*	.115
	F	2.00	0.92	2.62	1.07	3.14	1.34		

* $p < .001$

Note. LANP = Low Anger, No Problem with Driving Anger; HANP = High Anger, No Problem with Driving Anger; HAP = High Anger, Admitted Problem with Driving Anger and Seeking Help; M = Male; and F = Female

Intensity of Anger in Responses to Driving Conditions

Anger in 33 different driving-related situations (DAS long-form), commonly occurring driving events (Driving Scenarios), and the person's most provocative driving situations is summarized in Table 2. For the long-form of the DAS, items which received a score of four or five, indicating "much" or "very much" anger, respectively, were considered to reflect a significant anger reaction to that situation. A significant univariate effect was found for anger on the number of angering situations, $F(2, 255) = 184.43$, $p < .001$, $\eta^2 = 0.591$, but not for gender or the interaction, $F_s(1, 255) = 0.60$ and 0.92 . HAP and HANP drivers ($M_s = 23.62$ and 22.40) reported anger in response to significantly more situations than did LANP drivers ($M = 6.94$), and the anger effect size was large.

For the Driving Scenarios, a significant multivariate effect was found for anger, $F(6, 498) = 28.45$, $p < .001$, $Roys = 0.255$, and for the interaction, $F(6, 498) = 2.78$, $p < .05$, $Roys = 0.032$, but not for gender, $F(3, 249) = 1.87$. The only univariate interaction effect was found for being yelled at by another driver, $F(2, 251) = 4.65$, $p < .05$, $\eta^2 = 0.036$. Although the interaction was significant, post hoc testing revealed that HAP and HANP men and women did not differ from each other, but all four of these groups differed significantly from the LANP men and women, who did not differ from each other. This suggests that the interaction was due to minor nonsignificant differences between high anger groups. Significant anger effects were found for all scenarios (Table 2), but between-group differences varied with the situation. For ordinary traffic, HAP drivers ($M = 16.44$) reported more anger than HANP drivers ($M = 14.01$), and both high anger groups reported more anger than the LANP drivers ($M = 10.83$). For being stuck in

Table 2

Anger Reactions as a Function of Gender and Anger Status

Measure	Gender	Group						Univariate Anger	Anger Effect Size η^2
		LANP		HANP		HAP			
		<u>M</u>	<u>SD</u>	<u>M</u>	<u>SD</u>	<u>M</u>	<u>SD</u>		
Number DAS	M	6.96	6.26	23.76	4.10	23.42	5.36		
Items Rated 4 or 5	F	6.92	6.41	21.66	6.59	23.74	6.35	184.43*	.591
Ordinary Traffic	M	11.21	4.18	13.45	4.73	15.73	5.67		
	F	10.62	3.91	14.32	5.04	16.88	5.67	23.58*	.158
Rush Hour Traffic	M	17.64	7.95	28.03	5.92	26.97	5.98		
	F	18.00	6.25	24.75	5.50	26.68	5.08	54.51*	.303
Yelled at by Another Driver	M	18.43	5.38	29.66	6.04	28.97	4.46		
	F	20.30	5.18	26.70	5.52	26.62	5.10	67.08*	.348
Personal Driving Situation I	M	62.68	19.95	85.97	8.79	79.76	18.43		
	F	62.25	20.59	81.38	13.60	83.49	12.82	39.56*	.237
Personal Driving Situation II	M	57.39	17.24	80.62	11.35	74.61	18.68		
	F	52.42	21.62	72.73	18.00	76.64	14.83	37.17*	.226

* $p < .001$

Note. DAS = Driving Anger Scale (long-form); LANP = Low Anger, No Problem with Driving Anger; HANP = High Anger, No Problem with Driving Anger; HAP = High Anger, Admitted Problem with Driving Anger and Seeking Help; M = Male; and F = Female

heavy, rush hour traffic, and for being yelled at by another driver, both HAP ($M_s = 26.79$ and 27.74) and HANP drivers ($M_s = 25.91$ and 27.52), while not differing from each other, reported significantly more anger than did the LANP group ($M = 17.87$ and 19.63). For the individual's two most angering driving situations, a significant multivariate effect was found for anger, $F(4, 508) = 20.64$, $p < .001$, Roys = 0.140, but not for gender, $F(2, 254) = 0.98$, or the interaction, $F(4, 508) = 0.98$. Univariate anger effects were found for both situations (Table 2). For both of their most angering driving situations, HAP ($M_s = 83.00$ and 75.86) and HANP drivers ($M_s = 82.06$ and 75.52) did not differ, but both reported significantly higher anger than LANP drivers ($M_s = 62.40$ and 54.16). Anger effect sizes were consistently large for reactions to commonly occurring and personally most aggravating situations.

Expression of Driving Anger

The two general forms of expressing driving anger (Table 3) yielded significant multivariate effects for gender, $F(2, 254) = 5.98$, $p < .01$, Roys = 0.045, and anger, $F(4, 508) = 33.96$, $p < .001$, Roys = 0.211, but not for the interaction, $F(4, 508) = 0.72$. Univariate gender effects were found on hostile/aggressive and adaptive/constructive forms of expressing driving anger, $F_s(1, 255) = 5.61$ and 10.16 , $p_s < .05$, $\eta^2 = 0.022$ and 0.038 , due to males reporting significantly more hostile/aggressive expression and significantly less adaptive/constructive expression ($M_s = 70.54$ and 28.94) than females ($M_s = 65.66$ and 32.52). Univariate anger effects (Table 3) were found on both general forms of driving anger expression with HAP drivers ($M = 77.56$) reporting more hostile/aggressive forms of expressing anger than HANP drivers ($M = 71.61$), who in turn reported significantly more hostile/aggressive expression than LANP

Table 3

Driving Anger Expression as a Function of Gender and Anger Status

Measure	Gender	Group						Univariate Anger F(2, 255)	Anger Effect Size η^2
		LANP		HANP		HAP			
		<u>M</u>	<u>SD</u>	<u>M</u>	<u>SD</u>	<u>M</u>	<u>SD</u>		
Hostile/Aggressive Expression	M	52.39	10.82	77.07	12.18	78.95	19.01	74.73*	.370
	F	49.69	8.48	68.62	14.23	76.69	17.90		
Physical Aggression	M	4.04	0.19	4.45	0.95	5.03	1.94	8.82*	.065
	F	4.06	0.24	4.06	0.30	4.28	0.99		
Aggressive Endangerment	M	14.46	4.20	22.24	5.73	22.95	6.90	51.82*	.289
	F	12.85	3.49	19.49	5.83	21.36	6.43		
Hostile Gestures	M	7.04	1.50	10.83	2.83	11.92	4.31	40.16*	.240
	F	6.75	1.25	8.87	2.99	10.69	4.18		
Aggressive Use of Lights	M	2.39	0.79	4.10	1.72	3.98	2.06	23.34*	.155
	F	2.27	0.56	3.00	1.39	3.80	1.84		
Overt Verbal Aggression	M	6.93	2.47	10.86	3.40	11.11	3.59	37.61*	.228
	F	7.06	2.82	10.21	3.45	11.44	3.61		
Covert Verbal Aggression	M	6.29	2.12	9.00	2.95	8.42	2.92	20.80*	.140
	F	6.42	2.30	8.62	2.74	9.05	2.82		
Aggressive Body Language	M	8.07	2.66	11.41	2.01	11.26	3.06	55.49*	.303
	F	6.90	1.91	10.89	2.91	11.54	2.64		
Displaced Aggression	M	3.18	0.61	4.17	2.11	4.29	1.64	11.47*	.083
	F	3.38	0.99	3.49	1.14	4.52	1.95		

Adaptive/Construct-M		34.75	9.60	26.79	7.24	26.29	6.17		
ive Expression	F	36.65	7.16	31.28	9.44	30.07	8.74	19.46*	.132
Focused Attention	M	12.00	3.93	8.97	2.89	9.24	2.52		
& Problem-solving	F	13.13	3.23	10.60	3.42	9.66	3.24	21.67*	.145
Cognitive Reframe	M	14.96	4.84	10.31	3.01	10.00	3.08		
& Acceptance	F	15.33	3.55	12.47	4.75	12.07	4.17	25.43*	.166
Cognitive	M	7.79	2.54	7.52	2.41	7.05	2.18		
Distraction	F	8.19	2.21	8.21	2.43	8.34	2.44	0.32	.002

*p < .001

Note. LANP = Low Anger, No Problem with Driving Anger; HANP = High Anger, No Problem with Driving Anger; HAP = High Anger, Admitted Problem with Driving Anger and Seeking Help; M = Male; and F = Female

drivers ($M = 50.64$). Both the HAP and HANP groups, while not differing from each other, reported significantly less constructive/adaptive expression ($M_s = 28.62$ and 29.70) than the LANP group ($M = 35.99$). Anger effect sizes on general styles of expressing anger while driving were large.

Since anger effects were found on both of the general anger expression styles, they were broken down into their constituent subscales (Table 3). Significant multivariate effects were found for gender, $F(11, 245) = 2.04, p < .05, \text{Roys} = 0.084$, anger, $F(22, 490) = 7.69, p < .001, \text{Roys} = 0.257$, and the interaction, $F(22, 490) = 1.58, p < .05, \text{Roys} = 0.066$. The only univariate interaction effect was found on physical aggression, $F(2, 255) = 3.35, p < .05, \eta^2 = 0.026$. This interaction effect was due almost entirely to HAP males (Table 3), who expressed significantly more physical aggression than all other groups except HANP males, who did not differ significantly from any other group. For physical aggression, gender and anger main effects must be qualified by this interaction. Univariate gender effects were found for physical aggression, aggressive endangerment, hostile gestures, aggressive use of lights, focused attention and problem solving, cognitive reframing and acceptance, and cognitive distraction, $F_s(1, 255) = 9.13, 7.46, 7.96, 5.72, 6.45, 8.87, \text{ and } 6.75, p_s < .05, \eta^2 = 0.035, 0.028, 0.030, 0.022, 0.025, 0.034, \text{ and } 0.026$, respectively. Men reported expressing their anger while driving more through physical aggression, aggressive endangerment, hostile gestures, and aggressive use of lights ($M_s = 4.56, 20.23, 10.15, \text{ and } 3.55$) than did women ($M_s = 4.14, 18.10, 8.88, \text{ and } 3.07$). Women, on the other hand, reported expressing their driving anger more through focused attention and problem solving, cognitive reframing and acceptance, and cognitive distraction ($M_s = 11.05, 13.22, \text{ and } 8.25$) than did men ($M_s = 9.97, 11.56, \text{ and}$

7.41). Gender differences were not found for expressing driving anger through overt and covert verbal aggression, displaced aggression, or aggressive body language, $F_s(1, 255) = 0.02, 0.14, 2.00, \text{ and } 0.17$. Univariate anger effects (Table 3) were found for all forms of expressing driving anger, except cognitive distraction. HAP ($M_s = 21.97, 3.87, 11.31, 8.81, 11.43, 9.49, \text{ and } 11.27$) and HANP ($M_s = 20.46, 3.39, 10.44, 8.76, 11.07, 10.02, \text{ and } 11.70$) groups, while not differing from each other, reported greater use of aggressive endangerment, aggressive use of lights, overt verbal aggression, covert verbal aggression, and aggressive body language, and less focused attention and problem solving, and cognitive reframing and acceptance than did LANP drivers ($M_s = 13.41, 2.31, 7.01, 6.38, 7.31, 12.74, \text{ and } 15.20$). HAP drivers, however, expressed themselves more often through physical aggression, hostile gestures, and displaced aggression ($M_s = 4.57, 11.16, \text{ and } 4.43$) than HANP ($M_s = 4.20, 9.56, \text{ and } 3.73$) and LANP ($M_s = 4.05, 6.85, \text{ and } 3.31$) groups, which did not differ from each other. HAP ($M_s = 9.49 \text{ and } 11.27$) and HANP ($M_s = 10.02 \text{ and } 11.71$) groups did not differ on the tendency to cope with their anger by focusing their attention on safe driving and problem solving or cognitively reframing and accepting difficulties on the road, but both groups engaged in these constructive ways of coping when angry less often than LANP drivers ($M_s = 12.74 \text{ and } 15.20$). HAP ($M = 7.85$), HANP ($M = 7.96$), and LANP ($M = 8.05$) drivers did not differ on their tendency to use cognitive distraction to cope with anger. Anger effect sizes varied with the form of expressing driving anger, but tended to be largest with the most overt forms of aggressive behavior and for the most adaptive, positive ways of experiencing one's anger while driving.

State Anger and Coping Strategies

State anger, verbal and physical aggression, and positive coping strategies in response to visualized driving situations are summarized in Table 4. These indices were analyzed separately for Scenario 1 (being stuck at a left-hand turn signal, the light turns green, and the person in front of you does not go) and Scenario 2 (finally finding a parking spot, and another driver pulls in front of you and takes the spot). For Scenarios 1 and 2, significant multivariate effects were found for gender, $F_s(4, 252) = 3.59$ and 4.12 , $p_s < .01$, $Roys = 0.054$ and 0.062 , anger, $F_s(8, 504) = 15.81$ and 11.91 , $p_s < .001$, $Roys = 0.201$ and 0.160 , and the interaction, $F_s(8, 504) = 3.41$ and 2.19 , $p_s < .05$, $Roys = 0.051$ and 0.027 . For both scenarios, an interaction effect was found on verbal aggression, $F_s(2, 255) = 4.26$ and 6.92 , $p < .05$, $\eta^2 = 0.033$ and 0.051 , and physical aggression, $F_s(2, 255) = 8.43$ and 11.16 , $p < .05$, $\eta^2 = 0.062$ and 0.080 , and for Scenario 2 only, an interaction was found for positive coping, $F(2, 255) = 3.18$, $p < .05$, $\eta^2 = 0.024$. For Scenario 1 and 2, post hoc testing of the verbal aggression interaction effect (Table 4) revealed that HAP men and women did not differ from each other, but HANP men reported significantly higher verbal aggression scores than HANP women. All four of these groups had significantly higher scores than the LANP men and women, who did not differ from each other. This suggests that the interaction was due primarily to the HANP women. Similarly, post hoc tests of the physical aggression interaction for Scenarios 1 and 2 revealed that HAP men and women did not differ from each other, but HANP men reported significantly higher physical aggression scores than HANP women. All of these groups, except HANP women, had significantly higher scores than the LANP men and women, who did not differ from each other. There was one minor difference

Table 4

State Anger and Coping as a Function of Gender and Anger Status

Measure	Gender	Group						Univariate Anger	Effect Size η^2
		LANP		HANP		HAP			
<u>Scenario 1</u>									
		<u>M</u>	<u>SD</u>	<u>M</u>	<u>SD</u>	<u>M</u>	<u>SD</u>	F(2, 255)	
State Anger	M	11.04	3.85	17.97	3.75	16.45	3.89	59.07*	.317
	F	10.98	3.79	15.87	3.62	16.54	3.61		
State Verbal	M	7.86	3.82	16.28	4.84	14.39	4.55	47.89*	.273
Aggression	F	8.35	3.67	11.91	4.76	14.56	5.07		
State Physical	M	5.46	2.08	11.03	4.72	8.24	3.94	22.03*	.147
Aggression	F	5.38	1.03	6.57	2.85	8.07	4.06		
Positive Coping	M	6.36	3.18	2.48	2.25	3.68	3.10	27.56*	.178
	F	6.88	3.30	4.42	3.29	3.25	2.78		
<u>Scenario 2</u>									
State Anger	M	13.00	3.81	18.57	3.13	17.82	2.84	40.57*	.243
	F	13.17	4.12	16.46	3.83	17.64	3.43		
State Verbal	M	10.07	4.00	17.57	3.67	16.13	4.16	42.45*	.251
Aggression	F	10.08	4.14	13.75	5.04	15.80	4.85		
State Physical	M	5.86	2.49	11.68	4.94	9.53	4.70	19.62*	.134
Aggression	F	5.83	1.97	6.87	3.45	8.49	4.26		

Positive Coping	M	5.71	2.93	2.29	2.49	2.63	2.89		
	F	5.63	2.79	3.50	3.20	2.84	2.68	25.71*	.169

*p < .001

Note. LANP = Low Anger, No Problem with Driving Anger; HANP = High Anger, No Problem with Driving Anger; HAP = High Anger, Admitted Problem with Driving Anger and Seeking Help; M = Male; and F = Female

between the physical aggression interaction for Scenario 1 and 2. For Scenario 1, HANP men reported significantly more physical aggression than HAP men, and HAP and HANP women did not differ from each other, while for Scenario 2, HAP and HANP men and women did not differ. For Scenario 1, there was also an interaction effect for positive coping. Although this interaction was significant, post hoc testing revealed that HAP and HANP men and women did not differ from each other, but all four of these groups had significantly less positive coping than the LANP men and women, who did not differ from each other. This suggests that the interaction was due to minor nonsignificant differences between high anger groups. For verbal and physical aggression, however, gender and anger main effects must be qualified by the interactions.

For Scenarios 1 and 2, univariate gender effects were found for verbal, $F_s(1, 255) = 4.47$ and 5.67 , $p_s < .05$, $\eta^2 = 0.017$ and 0.022 , and physical aggression, $F_s(1, 255) = 13.54$ and 16.20 , $p_s < .05$, $\eta^2 = 0.050$ and 0.060 , but not for state anger, $F_s(1, 255) = 2.02$ and 2.26 , or positive coping $F_s(1, 255) = 2.93$ and 1.44 . For Scenarios 1 and 2, men reported more verbal ($M_s = 13.04$ and 14.76) and physical aggression ($M_s = 8.24$ and 9.07) than women ($M_s = 11.77$ and 13.35 for verbal aggression and 6.75 and 7.14 for physical aggression). Univariate anger effects (Table 4) were found on all variables. For Scenario 1, HAP ($M_s = 16.51, 14.49, 8.13,$ and 3.41) and HANP ($M_s = 16.61, 13.45, 8.15,$ and 3.73) groups, while not differing from each other, experienced significantly more state anger, verbal and physical aggression, and significantly less positive coping than the LANP group ($M_s = 11.00, 8.18, 5.41,$ and 6.70). Similarly, for Scenario 2, HAP ($M_s = 17.71, 15.93, 8.89,$ and 2.76) and HANP ($M_s = 17.20, 15.09, 8.55,$ and 3.08) groups, while not differing from one another, experienced significantly more state anger,

verbal and physical aggression, and significantly less positive coping than the LANP group ($M_s = 13.11, 10.08, 5.84, \text{ and } 5.66$). Anger effect sizes were large for all variables.

Reactions to Day to Day Driving

Data from logs were averaged over three days and are presented in Table 5. A 29% attrition rate can be noted for this measure, and this is due to students who did not drive. A large percentage (75.5%) of participants were freshman, and many were without a vehicle to drive at school. A significant multivariate effect was found for anger, $F(12, 350) = 7.31, p < .001, \text{ Roys} = 0.200$, but not for gender, $F(6, 175) = 1.39$, or the interaction, $F(12, 350) = 1.64$. No differences between groups were found for the frequency or number of miles participants drove, suggesting that findings were not confounded by exposure to or amount of driving. Univariate anger effects were found on all variables, except the frequency of driving and miles driven (Table 5). HAP ($M_s = 2.30, 60.23, 2.02, \text{ and } 3.47$) and HANP ($M_s = 2.61, 50.47, 1.52, \text{ and } 3.43$) participants did not differ significantly from one another on frequency and intensity of anger while driving or aggressive and risky behavior, but were significantly higher on all four variables than the LANP group ($M_s = 0.90, 25.25, 0.48, \text{ and } 1.64$). Anger effect sizes were large for intensity of anger, aggressive behavior, and risky driving, and moderate for frequency of anger. Effect sizes communicate findings statistically, but given that log measures reflect frequencies of behavior, they can also be expressed as risk ratios and relative rates of occurrence. HAP drivers were 2.6 times more likely to be angered, 4.2 times more likely to engage in aggressive behavior, and 2.1 times more likely to engage in risky driving than LANP drivers. HANP drivers were 2.9 times more likely to be

Table 5

Day to Day Driving (Driving Logs) as a Function of Gender and Anger Status

Measure	Gender	Group						Univariate Anger F(2, 180)	Anger Effect Size η^2
		LANP		HANP		HAP			
		<u>M</u>	<u>SD</u>	<u>M</u>	<u>SD</u>	<u>M</u>	<u>SD</u>		
Number of Times Driven	M	2.17	0.99	3.67	2.62	2.59	1.41	0.66	.007
	F	3.11	3.12	2.26	1.11	2.56	1.46		
Number of Miles Driven	M	36.73	45.55	38.34	38.82	47.78	59.39	1.37	.015
	F	38.87	40.10	38.58	36.28	52.09	49.44		
Frequency of Anger	M	0.77	0.80	2.54	2.49	2.11	1.71	10.44*	.104
	F	0.97	0.94	2.65	3.33	2.45	1.59		
Intensity of Anger	M	19.90	20.48	57.82	26.86	55.91	23.04	33.85*	.273
	F	28.06	20.96	46.27	27.67	63.56	23.03		
Aggressive Behavior	M	0.38	0.56	2.03	1.38	2.11	1.54	27.41*	.233
	F	0.54	0.62	1.23	1.18	1.95	1.33		
Risky Behavior	M	1.75	1.51	4.06	2.19	3.38	2.27	19.71*	.180
	F	1.59	1.20	3.08	1.63	3.54	1.96		

* $p < .001$

Note. LANP = Low Anger, No Problem with Driving Anger; HANP = High Anger, No Problem with Driving Anger; HAP = High Anger, Admitted Problem with Driving Anger and Seeking Help; M = Male; and F = Female

angered, 3.2 times more likely to behave aggressively, and 2.1 times more likely to engage in risky driving than LANP drivers.

Aggressive, Risky, and Accident-Related Behavior (Three Months/One Year)

Three-month and one-year reports of aggressive behaviors, risky behaviors, and accident-related behaviors and outcomes were added into three general indices (Table 6). On three-month reports, multivariate effects were found for gender, $F(3, 253) = 5.64$, $p < .01$, Roys = 0.063, and anger, $F(6, 506) = 16.83$, $p < .001$, Roys = 0.166, but not for the interaction, $F(6, 506) = 1.15$. Univariate gender effects were found for aggressive and risky behaviors $F_s(1, 255) = 6.03$ and 8.51 , $p < .05$ and $p < .01$, $\eta^2 = 0.023$ and 0.032 , but not accident-related behavior, $F(1, 255) = 0.64$. Men engaged in more aggressive and risky behaviors ($M_s = 19.22$ and 28.15) than women ($M_s = 15.42$ and 23.34). Univariate anger effects (Table 5) were found on aggressive, risky, and accident-related behaviors. HAP ($M_s = 22.86$, 28.49 , and 6.29) and HANP ($M_s = 19.77$, 29.05 , and 6.40) groups, while not differing from one another, engaged in significantly more aggressive, risky, and accident-related behavior than did the LANP group ($M_s = 6.28$, 16.83 , and 4.80). Anger effect sizes were large for aggressive and risky driving and moderate for accident-related behaviors. Relative risk ratios of these behaviors were calculated from the data over the last three months. HAP drivers, compared to LANP drivers, were 3.6 times more likely to engage in aggressive behavior while driving, 1.7 times more likely to engage in risky driving, and 1.3 times more likely to report accidents or accident-related behaviors. HANP drivers, compared to LANP drivers, were 3.1 times more likely to exhibit aggression, 1.7 times more likely to demonstrate risky behaviors, and 1.3 times more likely to report accidents or accident-related behaviors.

Table 6

Three-Month and One-Year Reports of Aggressive, Risky, and Accident-Related Behavior as a Function of Gender and Anger Status

Measure	Gender	Group						Univariate Anger	Anger Effect Size η^2
		LANP		HANP		HAP			
		<u>M</u>	<u>SD</u>	<u>M</u>	<u>SD</u>	<u>M</u>	<u>SD</u>		
Aggressive Behavior (3 mos.)	M	7.79	7.25	23.14	10.96	24.66	13.57	51.33**	.287
	F	5.46	5.81	17.92	10.83	21.74	13.67		
Risky Behavior (3 mos.)	M	19.71	12.66	35.17	15.63	29.00	14.31	21.80**	.146
	F	15.27	7.76	25.70	11.27	28.18	15.63		
Accident-Related Behavior (3 mos.)	M	4.40	2.51	6.93	3.45	5.53	4.29	5.97*	.045
	F	5.02	2.95	6.11	2.99	6.77	3.74		
Aggressive Behavior (1 yr.)	M	15.36	11.93	34.10	13.49	34.71	15.25	54.73**	.301
	F	10.92	9.56	26.37	11.64	31.30	14.47		
Risky Behavior (1 yr.)	M	28.11	14.85	47.00	17.78	42.16	16.13	21.20**	.143
	F	23.90	12.98	34.44	13.50	37.54	18.03		
Accident-Related Behavior (1 yr.)	M	0.75	0.80	1.10	1.47	1.45	1.64	4.88*	.037
	F	0.71	1.02	1.02	1.16	1.28	1.46		

* $p < .01$, ** $p < .001$

Note. LANP = Low Anger, No Problem with Driving Anger; HANP = High Anger, No Problem with Driving Anger; HAP = High Anger, Admitted Problem with Driving Anger and Seeking Help; M = Male; and F = Female

The questions about moving (non-parking) tickets, minor and major accidents, aggressive and risky behaviors were then asked again, but respondents were asked to reply based on the previous year, rather than on the previous three months. This one-year time frame was included to provide a longer-term gauge of consequences and behaviors that may not have a high rate of occurrence. Other questions about more frequently occurring behaviors were not included because it was thought that they would be difficult to recall accurately over a year interval (e.g., lost concentration while driving, had a minor loss of control of a vehicle he/she was driving, and had a “close call” but was not actually in an accident). On one-year reports, multivariate effects were found for gender, $F(3, 252) = 4.51, p < .01, \text{Roys} = 0.051$, and anger, $F(6, 504) = 18.15, p < .001, \text{Roys} = 0.178$, but not for the interaction, $F(6, 504) = 0.72$. Univariate gender effects were found for aggressive and risky behaviors, $F_s(1, 254) = 9.79$ and $12.41, p_s < .01, \eta^2 = 0.037$ and 0.047 , but not accident-related behavior, $F(1, 254) = 0.33$. Men engaged in more aggressive and risky behaviors ($M_s = 28.82$ and 39.49) than women ($M_s = 23.32$ and 32.27). Univariate anger effects (Table 6) were found on aggressive, risky, and accident-related behaviors. On aggressive and risky behaviors, HAP ($M_s = 32.61$ and 39.31) and HANP ($M_s = 29.14$ and 38.94) groups, while not differing from one another, engaged in significantly more aggressive and risky behavior than the LANP group ($M_s = 12.48$ and 25.38). On accident-related behaviors, HAP drivers ($M = 1.34$) had significantly more accident-related behaviors than the LANP drivers ($M = 0.73$), but neither of these groups differed significantly from the HANP group ($M = 1.05$). Anger effect sizes were large for aggressive and risky driving and small for accident-related behaviors. Relative risk ratios of these behaviors over the last year showed that HAP drivers, compared to LANP

drivers, were 2.6 times more likely to engage in aggressive behavior while driving, 1.5 times more likely to engage in risky driving, and 1.8 times more likely to report accidents or accident-related behaviors. HANP drivers, compared to LANP drivers, were 2.3 times more likely to exhibit aggression, 1.5 times more likely to demonstrate risky behaviors, and 1.4 times more likely to report accidents or accident-related behaviors.

Other Psychological Characteristics

Trait anger and general anger expression styles are summarized in Table 7. A significant multivariate effect was found for anger, $F(8, 504) = 15.97, p < .001, \text{Roys} = 0.202$, and the interaction, $F(8, 504) = 2.48, p < .05, \text{Roys} = 0.038$, but not for gender, $F(4, 252) = 1.06$. An interaction effect was found on trait anger, Anger-In, and Anger-Control, $F_s(2, 255) = 6.16, 3.44, \text{ and } 4.66, p_s < .05, \eta^2 = 0.046, 0.033, \text{ and } 0.010$. Post hoc tests on the interaction for trait anger showed that HAP and HANP men and women (Table 7) reported significantly more trait anger than the LANP groups, which did not differ from each other. Within the high anger groups, the HANP women reported significantly less trait anger than the other high anger groups, suggesting that this group was the primary contributor to the interaction. Post hoc tests on the interaction effect for Anger-Control revealed that HAP men and women did not differ from each other, but reported significantly less Anger-Control than the LANP groups, which did not differ from each. However, the HANP women reported significantly more Anger-Control than HANP men, so it was the gender difference for the HANP group that was the primary contributor to the interaction. Post hoc tests on the interaction effect for the Anger-In variable revealed that HANP men and HAP women had significantly higher scores than the LANP men, who did not differ from the LANP women. This suggests

Table 7

Trait Anger, General Anger Expression, and Impulsivity as a Function of Gender and Anger

Measure	Gender	Group						Univariate Anger	
		LANP		HANP		HAP		Anger	Effect
		<u>M</u>	<u>SD</u>	<u>M</u>	<u>SD</u>	<u>M</u>	<u>SD</u>		
Trait Anger	M	16.79	3.31	26.66	5.11	25.18	5.57		
	F	16.71	3.21	22.13	5.71	26.00	6.16	67.73**	.347
Anger Expression-	M	16.04	2.83	18.76	3.94	17.34	4.23		
In	F	16.40	4.00	17.04	3.90	18.87	4.44	5.14*	.039
Anger Expression-	M	15.43	3.96	19.86	4.26	19.58	5.31		
Out	F	14.54	2.40	17.28	4.36	20.23	4.96	27.66**	.178
Anger Expression-	M	24.50	4.98	19.93	4.17	20.47	4.81		
Control	F	24.96	4.62	23.15	4.64	19.26	4.83	22.20**	.148
Overall	M	68.93	5.70	72.86	8.56	74.66	9.16		
Impulsiveness	F	68.90	6.17	71.87	6.79	73.72	6.89	10.93**	.079
Cognitive	M	17.44	2.24	19.38	3.40	19.58	3.37		
Impulsiveness	F	17.50	3.01	18.43	3.15	19.26	3.20	8.18**	.060
Motor	M	22.26	3.31	24.52	3.64	25.13	4.90		
Impulsiveness	F	22.13	2.73	24.60	3.98	25.69	3.72	15.32**	.108
Non-planning	M	29.22	3.43	28.97	4.10	29.95	4.61		
Impulsiveness	F	29.27	3.19	28.83	4.05	28.77	3.93	0.30	.002

* $p < .01$, ** $p < .001$

Note. LANP = Low Anger, No Problem with Driving Anger; HANP = High Anger, No Problem with Driving Anger; HAP = High Anger, Admitted Problem with Driving Anger and Seeking Help; M = Male; and F = Female

that the primary contributor to the interaction was the gender difference for the two different high anger groups. For trait anger, Anger-Control and Anger-In, anger main effects must be qualified by these interactions.

Univariate anger effects were found on all variables (Table 7). HAP drivers ($M = 25.69, 19.98, \text{ and } 19.73$) reported significantly more trait anger and Anger-Out, and significantly less Anger-Control than HANP drivers ($M = 23.73, 18.20, \text{ and } 22.01$), who in turn reported significantly more trait anger and Anger-Out, and significantly less Anger-Control than LANP drivers ($M = 16.74, 14.85, \text{ and } 24.80$). The HAP group ($M = 18.28$) reported significantly more Anger-In than the LANP group ($M = 16.27$), but neither group differed from the HANP group ($M = 17.65$). Anger effect sizes were large for trait anger, and the outward and controlled expression of anger generally, and small for the suppression of anger.

Impulsivity results are also summarized in Table 7. On the overall measure of impulsivity, univariate effects were found for anger, $F(2, 254) = 10.93, p < .001, \eta^2 = 0.079$, but not for gender or the interaction, $F_s(1, 254) = 0.48 \text{ and } 0.12$. Although not differing from each other, HAP and HANP drivers ($M_s = 74.08 \text{ and } 72.22$) reported significantly more impulsivity than the LANP group ($M = 68.91$), and the anger effect size on impulsivity was moderate. Since an anger effect was found on the overall impulsivity measure, it was broken down into its constituent subscales (Table 7). Multivariate effects were found for anger, $F(6, 504) = 5.53, p < .001, \text{ Roys} = 0.062$, but not for gender or the interaction, $F_s(3, 252) = 0.72 \text{ and } 0.48$. Univariate anger effects were found for cognitive and motor impulsivity, but not for nonplanning impulsivity. HAP ($M_s = 19.38 \text{ and } 25.47$) and HANP ($M_s = 18.77 \text{ and } 24.57$) groups, while not

differing from one another, reported significantly more cognitive and motor impulsivity than did the LANP group ($M_s = 17.48$ and 22.18). Anger effect sizes were large for motor impulsivity and moderate for cognitive impulsivity.

CHAPTER IV

Discussion

The high anger groups did not differ from low anger individuals in the frequency with which they drove or in the number of miles driven. This suggests that the differences observed were not due to differences in base rates of driving, and therefore, are not likely due to differential exposure to different amounts or types of frustration on the road. As a result, differences are likely to be a reflection of differences in driving anger status, rather than in driving per se.

Test of State-Trait Anger Theory

Consistent with state-trait theory, it was predicted that trait driving anger would be associated with a greater number of events that anger the driver (*elicitation hypothesis*), more frequent (*frequency hypothesis*) and intense (*intensity hypothesis*) state anger while driving, more aggressive (*aggressiveness hypothesis*) and risky (*riskiness hypothesis*) driving behavior, and more accident-related consequences (*consequence hypothesis*) while driving.

Elicitation hypothesis. It was predicted that more things would anger high anger drivers (i.e., they are more vulnerable to becoming angry on the road). This was determined by examining the number of items on the long-form of the DAS which participants indicated would anger them “much” or “very much”. The vulnerability to anger elicitation was demonstrated by the fact that high anger drivers reported that more potential driving situations elicited anger than was reported by the low anger drivers. These findings support the prediction that trait driving anger is associated with a greater number of events that anger the driver, consistent with previous research which tests this hypothesis (Deffenbacher et al., in press).

Frequency hypothesis. It was also predicted that trait anger would be associated with a greater frequency of state anger while driving. This hypothesis was tested by looking at data from the driving logs which measure day to day driving. The logs provided a self-report measure of actual, rather than laboratory, driving experiences. While there were no differences for the frequency or number of miles participants drove, both high anger groups reported more frequent anger while driving than the low anger group. If one assumes that log frequencies reflect typical driving, and that participants drove 300 days per year, high anger drivers would experience an average of 737 anger episodes per year, while low anger drivers would experience 270 anger episodes per year. High anger drivers were two and a half to three times more likely to be angered than low anger drivers, supporting the prediction that individuals high in trait driving anger would experience anger more frequently than those low in trait driving anger (Deffenbacher et al., in press; Lynch et al., 1995).

Intensity hypothesis. Another hypothesis was that trait anger would be associated with more intense anger while driving. On general ratings of themselves as angry drivers, both high anger groups rated themselves as more angry drivers than the low anger group. Similarly, in different driving scenarios, high anger groups reported more intense driving anger than the low anger group for ordinary traffic, heavy, rush hour traffic, being yelled at by another driver, their own most angering driving situations, and the two audiotaped scenarios (being stuck at a left-hand turn signal, the light turns green, and the person in front of you does not go, and finally finding a parking spot, and another driver pulls in front of you and takes the spot). High anger groups also reported significantly more intense anger in day to day driving (Driving logs). Thus, the intensity

hypothesis was supported by several different measures and methodologies, which is consistent with previous findings (Deffenbacher et al., in press; Lynch et al., 1995).

Aggressiveness hypothesis. Another prediction was that trait driving anger would be associated with more aggressive driving behavior. On general ratings of themselves as aggressive drivers, the high anger groups rated themselves as more aggressive drivers than the low anger group. With regard to the expression of anger while driving, the two high anger groups also reported more hostile/aggressive expression of anger while driving. On specific measures of hostile/aggressive expression of anger while driving, the high anger groups reported greater use of aggressive endangerment, aggressive use of lights, overt and covert verbal aggression, and aggressive body language than the low anger group. The HAP group, but not the HANP group, also reported more physical aggression, hostile gestures, and displaced aggression than the low anger group. For the two audiotaped scenarios, driving logs, and measures based on longer term reports of aggressive driving behavior (three-month and one-year), the high anger groups reported more aggressive behavior than the low anger groups. Based on log data and assuming 300 driving days per year, in one year, high anger drivers would engage in an average of 531 aggressive behaviors while driving, while low anger drivers would engage in 144 aggressive behaviors. This means that high anger drivers are three to four times more likely to engage in aggressive behaviors than low anger drivers. These results support the prediction that trait driving anger is associated with more aggressive driving (Deffenbacher et al., in press).

Riskiness hypothesis. Another hypothesis derived from state-trait theory was that trait driving anger would be associated with more risky driving behavior. On general

ratings of risky and safe driving, high anger groups rated themselves as more risk-taking and unsafe than the low anger group. With regard to the expression of anger while driving, the two high anger groups reported less adaptive/constructive forms of driving anger expression overall than the low anger group. Specific measures of adaptive/constructive expression revealed that the high anger groups reported less focused attention and problem solving, and less cognitive reframing and acceptance than the low anger group. However, high and low anger groups did not differ on their reported use of cognitive distraction while driving. Similar results were found in the response to visualization of provocative events; high anger participants responded with less positive coping. Data from the driving logs and from longer term (three-month and one-year) reports of driving behavior also showed that high anger drivers engaged in more risky behavior than low anger drivers. Based on log data and 300 driving days, high anger drivers would engage in an average of 1035 risky driving behaviors per year, whereas low anger drivers would engage in 492 risky behaviors. This means that high anger drivers are roughly twice as likely to engage in risky driving behavior than low anger drivers. Thus, results from several different sources support the prediction that trait driving anger is associated with more risky driving behavior (Deffenbacher et al., in press; Lynch et al., 1995).

Consequence hypothesis. It was also predicted that trait driving anger would also be associated with more accident-related consequences. For three-month reports of accident-related behavior (i.e., moving or non-parking tickets, minor and major accidents, loss of concentration, minor loss of control of vehicle, “close calls”), high anger groups reported significantly more accident-related behavior and outcomes than the low anger

group. On one-year reports of accident-related behavior while driving (i.e., moving tickets, and minor and major accidents), the HAP group, but not the HANP group, reported more accident-related outcomes than the low anger group. This difference in results for three-month and one-year reports may be due to the limited content of the one-year measure. The year measure was included to provide a better gauge of behaviors that do not have a high rate of occurrence, so it did not include questions about more frequently occurring behaviors. This suggests that trait anger is associated with more accident-related consequences on three-month reports; however, the one-year reports provide mixed results. HAP drivers reported more accident-related consequences than low anger drivers, but HANP drivers did not. However, data generally supported the consequence hypothesis (Deffenbacher et al., in press).

Other Psychological Characteristics

Based on the results of prior research (Deffenbacher et al., in press), it was also expected that other psychological characteristics (e.g., general anger and impulsivity) would be associated with trait driving anger, potentially facilitating even more impulsive, risky, and aggressive driving behavior.

Results of this study provide additional support for the finding that individuals with high driving anger are significantly more angry in general than those with low driving anger, and they tend to suppress their anger and express it more outwardly and in less controlled ways than individuals low in driving anger. However, with regard to the suppression of anger, the high anger groups reported more suppression than the low anger group, but this was not true for both genders within the high anger groups.

It was also predicted that impulsiveness, like general anger, might interact with driving anger, facilitating even more impulsive, risky, and aggressive behavior. On the measure of overall impulsivity, the high anger drivers reported significantly more impulsiveness than the low anger drivers. Specifically, the high anger drivers reported more cognitive and motor impulsivity than low anger drivers. There were no differences between high and low anger drivers for nonplanning impulsivity.

These findings are important for several reasons. First, the general anger and anger expression data replicate findings from previous research (Deffenbacher et al., in press), suggesting that these findings are not isolated to this sample. Second, these results show that high anger drivers are more likely to be angered and express that anger less constructively in response to a wide-range of non-driving situations. This suggests that anger in other situations and poor expression thereof may transfer or facilitate anger behind the wheel (Berkowitz, 1990). Conversely, being more easily angered on the road may transfer to non-driving circumstances, potentially setting up mutually reinforcing cycles of anger and conflict both on and off the road. This is consistent with research which demonstrates that the condition of being in an angry mood is related to the tendency to drive more recklessly (Arnett et al., 1997). Third, the findings on impulsivity suggest that this personality characteristic is also associated with driving anger, and may facilitate even more impulsive and risky behavior on the road. Barratt (1994) suggests that the higher the individual's level of impulsivity, the less control they have over their aggressive response. He and others (Coccaro, 1989) label this group of individuals as having "impulsive aggression". These findings, combined with those of the present

study, suggest that highly impulsive and generally angry individuals are at a higher risk for aggressive and risky behavior behind the wheel.

HAP Versus HANP Groups

Another issue explored in this study was potential differences between the high anger group comprised of individuals who perceived themselves as having a personal problem with driving anger, and the high anger group who did not feel they had a problem with driving anger. Results indicate that there are many similarities and some differences between the two high anger groups.

On all measures, except expression of driving anger through physical aggression, hostile gestures, and displaced aggression, and one-year reports of accident-related behavior while driving, both the HAP and HANP groups were significantly different from the low anger group. Notably, however, there were several measures on which the HAP and HANP drivers also differed from one another. For example, on all indices which measured the drivers' perceptions of themselves as drivers the HAP and HANP drivers differed. HAP individuals rated themselves as more angry, aggressive, risk-taking, and unsafe than HANP drivers. Their perception of themselves as drivers was consistent with their perception of whether or not they had a problem with driving anger, with those who see themselves as having a problem with driving anger also seeing themselves as possessing more problematic characteristics. Importantly though, the HANP drivers still saw themselves as more angry, aggressive, risk-taking, and unsafe than the low anger drivers.

These general self-perceptions were not consistently born out on other measures, however. There were no significant differences in the number of events that angered the

two high anger groups or in the frequency with which these two groups were angered on the road. Additionally, the only difference with respect to intensity of anger was under ordinary traffic situations, in which HAP drivers reported more intense anger than HANP drivers. It must be noted, however, that HANP drivers still reported more intense anger than the low anger group on this measure, and did not differ from HAP drivers on all other measures of anger intensity.

Perhaps the most discriminating dimension upon which the two high anger groups differed was with regard to the *aggression hypothesis*. For example, the HAP drivers rated themselves as expressing their anger in more hostile/aggressive ways overall than the HANP drivers. Moreover, on specific dimensions of hostile/aggressive expression, the HAP group reported more physical aggression, hostile gestures, and displaced aggression than the HANP, which did not differ from the low anger groups. So, not only did the two high anger groups differ from each other, but the HANP group did not even differ from the low anger group on several of these dimensions. This suggests that perhaps the HAP group is indeed somewhat more aggressive while driving than the HANP group. Nonetheless, the two high anger groups did not differ on several forms of hostile/aggressive anger expression, aggressive behavior as measured by driving logs, verbal and physical aggression in response to visualized provocation, and three-month and one-year reports of aggression. Thus, there is a suggestion of greater aggression on some measures, but much data suggest a lack of differences between high anger groups on aggression.

While there were no differences between the HAP and HANP drivers on three-month reports of accident-related behavior while driving (*consequence hypothesis*), on

one-year reports of accident-related behavior while driving (e.g., moving [non-parking] tickets, minor and major accidents), the HAP group had higher scores than the low anger group, but neither of these groups differed from the HANP group. This difference in results for three-month and one-year reports may be due to the limited content of the one-year measure. This measure was included to provide a better gauge of behaviors that do not have a high rate of occurrence, so it did not include questions about more frequently occurring behaviors. Interestingly, when more frequently occurring accident-related behaviors were included, the high anger groups did not differ from each other, but when they were not included, only the HAP group, and not the HANP group, differed significantly from the low anger group. Once again there were not striking differences among the high anger groups.

With regard to other psychological characteristics, the HAP and HANP groups had similar levels of impulsivity and trait anger. The only difference was on the measure of the outward expression of general anger, in which the HAP drivers had higher scores than the HANP drivers, again suggesting a minor difference between groups.

To summarize the findings on the two high anger groups, it appears that HAP drivers may be somewhat more aggressive while driving than the HANP group, but the two groups report engaging in similar amounts of risky behavior while driving. Moreover, HANP drivers were higher than the low anger group on all indices of anger, most indices of aggressive anger expression, all other indices of aggression, all indices of risky driving, and one of two measures of accident-related behavior. Notably, on the vast majority of measures they were similar to HAP drivers. It is possible that the HANP group reports not having a problem with driving anger because they do not perceive

themselves as acting aggressively. In fact, based on their perceptions of themselves as drivers, they may not even see themselves as risky drivers. The data (i.e., elevated anger, aggressive and risky behavior, and accident-related consequences), however, suggest that there is a need for intervention with this group.

Interventions for the HANP group, however, need to have different components than treatment for the HAP group since they do not see themselves as having a problem and do not avail themselves of counseling when it is offered. Interventions for the HANP group might focus primarily on educating and clarifying the potential consequences of risky behavior while driving. Rather than cognitively and relaxation focussed interventions, which have been shown to be effective with the HAP group (Deffenbacher et al., in press) and aim to reduce angry emotionality and the desire to aggress on the road, the focus for HANP drivers must be on enhancing awareness of the problem and readiness for interventions. It may be that some individuals from this group would ultimately benefit from treatments that have been used with HAP drivers, but that the first step is to increase their readiness for these treatments through educational programs.

Interventions for the HAP drivers also might be expanded to address the findings on general anger, general anger expression, and impulsivity in this study. Treatment plans (e.g., cognitive and relaxation coping skills) should not only target driving anger, but also general anger and its expression. This would enhance the individual's awareness of how other sources of anger and dysfunctional expression influences anger behind the wheel and provide him/her with skills to reduce their influence. Cognitive and motor, but not non-planning impulsivity were associated with driving anger, and are likely to be exacerbating the tendencies of both high anger groups. Interventions with a focus on

reducing the tendency to think and act impulsively are likely to be useful. For example, a useful exercise may include assisting drivers with generating alternative thoughts and actions while driving and therefore, encouraging them to slow down the reaction process. These could also be combined with relaxation. Research has suggested that impulsive individuals report rapid subjective experiences of thought processing, and judge time to pass very quickly (Barratt & Patton, 1983). Techniques which assist them with rethinking and generating alternative behaviors are likely to be successful in helping them manage their impulsivity.

Gender Differences

Another issue suggested by this study is how gender is related to trait driving anger. Gender interacted with level of trait driving anger on several variables; HAP males expressed more physical aggression than all other groups except HANP males, and HANP males reported more verbal and physical aggression than HANP females. For verbal aggression, both groups had higher scores than the low anger group, but for physical aggression, the HANP females did not differ from the low anger group. There were also some gender main effects; males rated themselves as more aggressive and risk-taking than females, and males reported expressing their anger in more hostile/aggressive and less adaptive/constructive ways than females. Specifically, males reported expressing their anger more through physical aggression, aggressive endangerment, hostile gestures, and aggressive use of lights than females, and females expressed anger more through focused attention and problem-solving, cognitive reframing and acceptance, and cognitive distraction. Finally, males report more aggressive and risk-taking behavior on three month and one year reports than females.

These findings are consistent with the data which show that males have higher levels of aggressiveness and higher rates of risky driving than females (Arnett et al., 1997), and replicate some of the previous research. For example, the finding that males report more verbal and physical aggression than females is a replication of previous findings (Deffenbacher et al., in press). However, there were many more nonsignificant than significant differences between genders on measures, and many of the current findings do not replicate previous research findings. For example, Deffenbacher and colleagues (in press) found gender differences on reports of aggressive and risky behavior on driving logs, whereas no gender differences were found for that measure in the present study. Overall, it appears there are some important differences between men and women with respect to the expression of anger while driving, but they seem to have many more characteristics in common. Moreover, effect sizes for gender tended to be small, also suggesting similarities between genders. Further research is needed to continue to clarify the differences and to determine whether they have clinical relevance. Currently, findings suggest that men and women are similar enough to be treated in mixed gender groups (Deffenbacher et al., in press).

Future Research

Based on this study, there are several areas that warrant further study. For example, in the present study, measures relied on self-report. Future research which incorporates other measurement formats (e.g., behavior on a driving simulator, physiological measures, reports from family/friends, legal reports) could serve to strengthen the current findings. Other formats may be particularly useful in future

research which compares HAP and HANP groups of individuals, since these groups were initially formed based on the results of self-report measures.

Future research might also focus on continuing to explore the relationship between impulsivity and trait driving anger. Results of this study suggest that there are important differences in impulsivity for high and low trait driving anger individuals, so it may be useful to explore the possibility that there is an impulsive subset of trait angry drivers who have more accident-related consequences than those who score lower on impulsivity. In addition, the findings of this study suggest that it is cognitive and motor impulsivity that differs for high versus low driving anger individuals, so future research which more specifically examines these components of impulsivity would be useful.

The impulsivity findings also suggest important possibilities for clinical treatment studies. For example, future treatment studies might incorporate interventions which explicitly address impulsivity (e.g., education about risk-taking), and this treatment could be compared to current treatment modalities which have been shown to be effective (Deffenbacher et al., in press). It may be that directly addressing the issues related to impulsivity in treatment would make it even more successful. It is likely that this addition would be useful for both HAP and HANP groups. Other treatment study formats might incorporate the present findings by exploring the effect of intensive, educational, readiness treatment for the HANP individuals. Treatment which focuses more on risky behavior than on aggressive behavior initially is likely to be more effective for this group, but additional research in this area is needed to determine this.

Finally, future research on gender might examine the HANP group of drivers to further clarify the gender differences for this group. The present study suggest that there

may be several gender differences (e.g., verbal and physical aggression) for this group, and these differences may have important clinical implications, especially within the HANP group.

Summary and Conclusions

In summary, this study has examined the applicability of state-trait anger theory to driving anger, explored the relationship of other psychological characteristics (particularly general anger and impulsivity) to trait driving anger, and examined the differences between individuals who feel they have a problem with driving anger and those who do not. It was found that individuals high in trait driving anger experienced anger in response to a greater number of events, and with more frequency and intensity. They also engaged in more aggressive and risky behavior while driving, and experienced more accident-related consequences than individuals low in trait driving anger. Thus, predictions from state-trait theory were generally supported. Differences in impulsivity were also found for individuals high in trait driving anger versus those who were low, with cognitive and motor impulsivity specifically. Finally, some differences were also found between HAP and HANP drivers, with HAP drivers reporting somewhat more anger and aggressive behavior while driving. These differences support the need for interventions which are tailored to address the differences between the two groups and require exploration of alternative interventions for the HANP drivers as they do not initially see driving anger as a problem or avail themselves of counseling interventions.

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Appendix A

Transcript of Audiotaped Scenarios

In a moment, the tape is going to describe a situation you might encounter while driving. Your job will be to visualize that scene vividly and clearly. Be there, like it's happening to you right now. You are then to get in touch with how you feel when this kind of situation happens. We'll have you do this for approximately a minute, then we'll have you stop, open your eyes, and fill out the questionnaire about how you feel right now while you're experiencing the situation. So, take a moment and get yourself in a comfortable position and close your eyes so that you're ready to visualize the first scene. That's it, just settling and closing your eyes and getting ready to visualize. Now put yourself right into this situation, having the feelings, the thoughts, the reactions that you would have if it were happening to you right now:

(Scenario 1)

You're in fairly heavy traffic. You've just pulled into a left-hand turn lane and are the second person back (pause, two seconds). You've been waiting for the left-hand turn light to change (pause, two seconds), the left-hand turn arrow has just changed to green, but the person in front of you does not go (pause, two seconds). That person seems to be busier talking to the other person in the car than paying attention to the situation (pause, five seconds) you're sitting there and the person just seems to be sitting, talking, not looking at what's happening in front of them (pause, three seconds). Be there, let yourself experience what it's like as you're sitting there, waiting for this person to make the left-hand turn (pause, five seconds). Just sitting, sitting, behind that car, it's not moving (pause, four seconds), and the people behind you seem to be getting aggravated as well as one of them honks his horn. You're there, and that situation is happening to you right now (pause, three seconds), having the kinds of feelings you're having as you're sitting there waiting for this person to move (pause, three seconds). Now, just as the light turns orange, the driver appears to see it and darts through the intersection, leaving you unable to go through on this light. You're there, reacting to that situation (pause, fifteen seconds).

OK, now erase that scene from your mind, open your eyes, and fill out the questionnaire according to how you feel right now...

(wait for participants to complete questionnaire)

In a moment, we're going to have you do the same thing with another situation while driving. Again, your job is to close your eyes, and visualize the scene vividly and clearly like it's happening to you right now. So, take a moment, close your eyes, and get ready to visualize the next scene.

(Scenario 2)

You're on your way to an important meeting. You're in a large parking lot looking for a place to park. The place is absolutely jammed and you've been driving around for 10 minutes or so, not finding any place to park (pause, two seconds). You see a person getting into his car and you wait patiently for the person to back out. As the person is backing out and backing toward you, another car comes from the other direction and pulls into the parking spot ahead of you (pause, one second), pulls into the parking spot that you've been waiting for. You're there, sitting in the parking lot where the person has just taken the parking spot you've been waiting for (pause, three seconds). Be there. Have the kind of feelings and reactions that you would if that situation were happening to you right now (pause, eight seconds). You're in the parking lot where you've been waiting for a spot that somebody else has just taken (pause, four seconds), a person who pulled up after you did (pause, nine seconds), having the feelings and reactions at that time (pause, six seconds).

OK, now clear that scene from your mind, open your eyes, and fill out the questionnaire according to how you feel now as you've been in that parking lot situation.

Appendix B

Directions: *Do not complete this form if you are under the age of 18.* If you agree to participate in completing the attached questionnaire, then remove the first copy of this page and keep it for your records, sign the second copy, and complete the questionnaire on the third page. If you are not interested, please just turn in the blank forms as you leave. There is no academic penalty for not completing the questionnaire.

Title of Project: The Reduction of Driving Anger

Name of Principal Investigator: Jerry L. Deffenbacher, Ph.D., Department of Psychology

Contact Person for Questions/Problems: Jerry L. Deffenbacher (970-491-6871), C-53 Clark Building

Sponsor of Project: Centers for Disease Control

Purpose of the Research: This study is designed to study anger while driving and to evaluate strategies for reducing anger while driving.

Procedures/Methods to Be Used: Students who feel they have a problem with anger while driving will be identified and complete some questionnaires about anger and driving. Some will receive counseling and others will not. Information from the group receiving counseling will be compared to a group not receiving counseling in order to assess counseling effects. Other students will complete questionnaires about driving and emotions to help us understand more about these topics. If you would like to potentially participate, then sign this consent form and complete the attached questionnaire.

Risks Inherent in the Procedures: There are no known risks. The questionnaire is voluntary and may be terminated at any time. It is not possible to identify all potential risks in an experimental procedure, but the researcher has taken reasonable safeguards to minimize any known and potential, but unknown, risks.

Benefits: Benefits to you at this point are minimal, but participants receiving counseling should gain added skills in reducing anger as programs have successfully helped students in the past.

Confidentiality: All information is confidential. Names are required initially only to contact participants. All data are kept in locked files.

Liability: (The following statement is required on all consent forms in studies conducted by CSU personnel.) The Colorado Governmental Immunity Act determines and may limit Colorado State University's legal responsibility if an injury happens because of this study. Claims against the University must be filed within 180 days of the injury.

Questions about subjects' rights may be directed to Celia S. Walker (970) 491-1563.

Your participation in this research is voluntary. If you decide to participate in this study, you may withdraw and stop participating at any time without penalty or loss of benefits to which you are otherwise entitled.

Page 1 of 2 Subject initials _____ Date _____

Your signature acknowledges that you have read the information stated and willingly sign this consent form. Your signature also acknowledges that you have received, on the date signed, a copy of this document containing 2 pages.

Participant name (printed)

Participant signature

Date

Investigator signature

Date

Page 2 of 2 Subject initials _____ Date _____

Appendix C

Colorado State University Informed Consent to Participate in a Research Project

Title of Project: The Reduction of Driving Anger

Name of Principal Investigator: Jerry L. Deffenbacher, Ph.D., Department of Psychology

Contact Person for Questions/Problems: Jerry L. Deffenbacher (970-491-6871), C-53 Clark Building

Sponsor of Project: Centers for Disease Control

Purpose of the Research: This study is designed to help us understand the nature of anger while operating a motor vehicle and its relationship to other things such as driving behavior and accidents, and general anger and anger expression.

Procedures/Methods to Be Used: You will complete a series of questionnaires about driving anger, driving behavior, and general anger and will complete a driving log for a week in order to see how driving anger relates to actual experiences of driving.

Risks Inherent in the Procedures: There are no known risks. All questionnaires are self-report and non-invasive. It is not possible to identify all potential risks in an experimental procedure, but the researcher has taken reasonable safeguards to minimize any known and potential, but unknown, risks.

Benefits: You will receive one research credit for Py 100 for full participation in this project (i.e., completing questionnaires and the log). Information will help us better understand driving anger and to design interventions for driving anger reduction.

Confidentiality: All information is confidential. Names are initially required to give research credit, to contact participants, and to match questionnaires and the log information. Once questionnaires and logs are matched and coded, names are removed. All data are kept in locked files.

Liability: (The following statement is required on all consent forms in studies conducted by CSU personnel.) The Colorado Governmental Immunity Act determines and may limit Colorado State University's legal responsibility if an injury happens because of this study. Claims against the University must be filed within 180 days of the injury.

Questions about subjects' rights may be directed to Celia S. Walker (970) 491-1563.

Participation: You are consenting to participate in a project on driving anger. In agreeing to participate, you understand that:

- (1) All information you provide will be used only for research purposes.
- (2) All information you provide will be kept confidential; and
- (3) You will receive one research credit for Py 100 for full participation in this project.

Your participation in this research is voluntary. If you decide to participate in this study, you may withdraw and stop participating at any time without penalty or loss of benefits to which you are otherwise entitled. If you withdraw before the end of the program, you will receive research credits pro-rated for the amount of the study you have completed.

Page 1 of 2 Subject initials _____ Date _____

Your signature acknowledges that you have read the information stated and willingly sign this consent form. Your signature also acknowledges that you have received, on the date signed, a copy of this document containing 2 pages.

Participant name (printed)

Participant signature

Date

Investigator signature

Date

Page 2 of 2 Subject initials _____ Date _____