MODELING AGGRESSIVE DRIVING: ASSESSING LOW SELF-CONTROL

THEORY WITH THE GENERAL AGGRESSION MODEL

By

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Abstract

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Aggressive driving behavior is a serious problem in the U.S. and many other parts of the world. Since the late 1940's numerous researchers have tried to understand why individuals engage in aggressive, and a majority of them come at the problem from a psychological perspective. While aggressive driving is a serious traffic offense, the subject has not been addressed very widely in the criminal justice literature. Most importantly, most of the limited studies undertaken in this area have not been couched within a comprehensive theory which could be tested against empirical evidence.

The present study attempts to understand aggressive driving viewed as a criminological issue, and it explores the utility of Gottfredson and Hirschi's Self-Control Theory (1990) as applied within the framework of Psychology's General Aggression Model (GAM, Anderson & Bushman, 2002). Two separate studies featuring independent samples and different but related measures are used to explore how four low self-control personality traits — sensation seeking, impulsivity, consideration of future

consequences [CFC], and anger or temper arousal — relate to risky driving and aggressive driving within the framework of the GAM.

Results of both Study 1 and study 2 reveal similar evidence to support the research hypotheses: 1) sensation seeking, impulsivity, and CFC might be associated with aggressive driving through their possible relationships with temperamental personality (e.g., trait of temper arousal); 2) sensation seekers might create the situations (e.g., risky driving) for themselves to act aggressively; and 3) impulsive people and sensation seekers may become frustrated by different driving conditions, and the level of frustration may mediate the effects of impulsivity and sensation seeking on aggressive driving.

This study extends the research of low self control theory by demonstrating how the personality traits involved in this construct are associated with criminal/analogue deviant behaviors. The findings not only validate the meditational model of the GAM, but also imply that the GAM could serve as a useful framework to study the phenomenon of violent crime and property crime in future research. More importantly, this study offers several actionable implications for the driver education curriculum, for aggressive driving prevention, and aggressive driving post-offense treatment programs.

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DEDICATION

This dissertation is dedicated to my parents and, to my country — Taiwan, where my soul

belongs to

謹將此論文獻給我深愛的父親和母親

CHAPTER ONE

BACKGROUND INFORMATION

At some point you may have been the recipient of an unsolicited honk, to
which you immediately responded with defensive anger – *What?!* – only
to learn that the honker was trying to convey to you that you left your gas
cap open.   *Thanks! Have a good one!*   (Vanderbilt, 2008, p. 21)

Amaya, who was in an unmarked unit, said he noticed Feliciano after
changing lanes near Northwest 41st Street in order to move into a SunPass
lane.   "As I was next to the defendant's vehicle, he put his window down,
leaned his torso out of the window [while yelling] and proceeded to show
me his left middle finger," Amaya wrote in the report… Feliciano then
grabbed a revolver and held it up in his right hand so that he could see the
gun.   Amaya then called 911 and backed off." (Smiley, 2009)

These two scenarios could happen to many drivers in any number of modern
societies, but the outcomes could be different depending on how the driver reacts to the
situations depicted here.   The problem of aggressive driving, and the extreme form of
aggressive driving known as road rage, has become a major concern for every roadway
user in the United States and in other modern, automobile-dependent societies (e.g.,
Lajunen & Parker, 2001; Mizell, 1997; Rathbone & Huckabee, 1999; Steel Alliance -
Canada Safety Council, 2003).   Motor vehicle accidents are the leading cause of
accidental death and injury in the United States, and they constitute the leading cause of
death of persons age 5 to 29 years (U.S. Department of Transportation, 2009).

According to the United States Department of Transportation, motor vehicle accidents caused more than 42,000 deaths and more than 2.5 million injuries in the United States in the year of 2006 (U.S. Department of Transportation, 2009).   International estimates of the annual incidence of motor vehicle accidents have ranged from 300,000 to 500,000 fatal accidents and 10 to 15 million accident-related injuries worldwide (U.S. Department of Transportation, 1999).   Martinez (1997) estimated that about **one-third** of the motor vehicle accidents and about **two-thirds** of the reported accident-related fatalities can be attributed directly to behaviors associated with aggressive driving.

The Problem of Aggressive Driving

Between 1987 and 1997, the number of miles of roads in the United States has only increased by one percent, but the number of vehicle miles driven has increased by far more – an estimated 35% (Martinez, 1997).   Martinez (1997) also estimated that the number of cars grew by 27% during this 10-year period, and he argued that most automobile journeys are taking longer than drivers expect.   As a consequence, many individuals have taken their frustrations on the road to a high level of aggressiveness.   Wrightson (1997) reports behaviors such as these: "When bad driving escalates into violence, men tend to resort to guns, knives, or baseball bats, while irate women are more likely to use the car itself as a weapon."   The occurrence of such behavioral phenomena were documented in a study done by Mizell (1997).   He observed that in 4,400 of the 10,037 known aggressive driving incidents, as indicated by a collection of official nationwide data sources, the perpetrator made use of a firearm, knife, club, fist, feet or other standard weapon for attacks on other drivers.   In about 2,300 of these cases the aggressive driver

used an even more deadly weapon – namely, his or her own vehicle (Mizell, 1997). In the same study, Mizell displayed data indicating that the number of aggressive driving incidents increased steadily each year over the course of a decade, with a total of 218 murders and 12,610 injuries occurring, many of which were severe in character.

Fumento (1998) argued in a later publication that the 218 deaths Mizell found to be related to reported road rage incidents were only a small proportion (0.08%) of approximately 280,000 traffic deaths which occurred during the same period. Besides, Mizell's estimate of at least 1,500 annual injuries related to aggressive driving also accounts only a fraction of the approximately 3 million annual injuries, an amount (as is the case with fatalities) that has been fairly constant throughout the 1990's. However, it should be noted that Mizell's report was restricted to aggressive driving incidents that were sufficiently severe in nature to warrant news media coverage and elicit law enforcement involvement. Similarly, David K. Willis, past President of the American Automobile Association Foundation for Traffic Safety, observed the following in this regard: "For every aggressive driving incident serious enough to result in a police report or newspaper article, there are hundreds or thousands more which never get reported to the authorities" (AAA Foundation for Traffic Safety, 1999).

Several empirical studies have examined the incidence of aggressive driving in large samples of drivers in the United States. In one of the earliest such studies, Novaco (1991) collected data from 412 drivers in Orange County, California who participated in a court-approved program for traffic violators seeking to avoid or reduce court-imposed fines and insurance company notification of violations which raise insurance coverage

rates.   He found that 34% endorsed some form of verbal or gestural aggression (obscene gestures, threatening remarks).   Although the samples were traffic violators instead of regular drivers, this prevalence rate is similar to findings reported in other studies conducted with general population drivers.   Miller et al. (2002) also found that 34% of drivers surveyed in Arizona admitted making obscene gestures or cursing other drivers with the past year.   Weller-Parker et al. (2002) conducted a telephone survey in 1998 with 1,382 adult drivers across the United States about their current driving experiences. They found most drivers stated that they had on some occasion given other drivers a "dirty look," and about 40% indicated that they had honked at or yelled through a window at another driver.   Only 16% of the drivers contacted in the survey admitted to having ever made obscene gestures toward other drivers.   In a similar study conducted more recently Hemenway et al. (2006) found about 17% of the U.S. licensed drivers they surveyed admitted making obscene or rude gestures in the past year.

Fortunately, vehicular forms of aggression are less common.   The prevalence of tailgating and blocking other vehicles, as judged from survey evidence, has ranged from 14% and 19% for tailgating or blocking, respectively (Wells-Parker, et al., 2002), up to 28% for either tailgating or blocking (Miller, et al., 2002).   Some 14% of drivers surveyed admitted to ever having sped past a car specifically for the purpose of expressing anger to another driver (Wells-Parker, et al., 2002).   The more extreme form of aggressive driving, such as engaging in physical assault upon another person, thankfully is a rare occurrence.   Although 31% of the traffic offenders reported having given chase to other drivers (Novaco, 1991), only 3% of the general population of drivers reported engaging in this type of behavior (Wells-Parker, et al., 2002).   Among the

cross-section of regular drivers, only 5% report ever having made sudden or threatening driving moves, and only 1% report ever having tried to cut a car off or running a car off the road (Wells-Parker, et al., 2002).   For traffic offenders, the prevalence of physical aggression ranged from 12% (throwing objects) to 0.7% (shooting another driver) (Novaco, 1991).   However, in the general population of drivers the prevalence of physical confrontations is estimated to be 0.1 or less (Wells-Parker, et al., 2002).

The incidence of aggressive driving in other counties had also been studied in other countries.   Parker, Lajunen, and Stradling (1998) studied the phenomenon of aggressive driving among drivers in England with a mail survey.   Parker and his colleagues found that only 11% of drivers claimed that they never given chase, indicated hostility to other drivers, or honked their car horn in annoyance.   However, in the United Kingdom study a very large majority of drivers (88%) reported being on the receiving end of road rage incidents during the past year.   Included in the definition of road rage were the behaviors of aggressive tailgating (62%), headlight flashing (59%), rude or aggressive gestures (48%), deliberate blocking of vehicles (21%), verbal abuse (16%), and physical assault (1%) (Joint, 1995).   Smart, Mann, and Studuto (2003) employed a telephone survey to study a 1-year self-reported prevalence of victimization and perpetration of road rage in the Province of Ontario in Canada.   About half (47%) of the 1,395 survey respondents reported being the victim, or being with someone else who was the victim, of shouting, cursing, or rude gestures by someone in another vehicle during the previous 12 months.   Almost one third of the respondents (32%) to this survey reported having engaged in one or more of these activities over that same 12-month period.

In an early study of directly observed behavior conducted in the Netherlands, Hauber (1980) assessed aggressive driving reactions (e.g., failing to stop, honking, making gestures and yelling) to delays made by confederate pedestrians and found that approximately one quarter of the drivers observed reacted with some sort of aggressive response. Most of the responses observed were verbal or gestural in nature, but Hauber also indicated that experimenters occasionally had to run to escape drivers who failed to stop, regardless of the fact that the pedestrian had the legal right of way. In another study which directly observed drivers, it was found that 22% of drivers in the city of Tel Aviv (Israel) cut off other vehicles in order to pass, 5% honked horns at other drivers, and 3% cut across multiple lanes or drove on the shoulder of the road in order to pass other vehicles on the road (Shinar & Compton, 2004).

More than 40 years of descriptive and experimental studies alike indicate a solid association between aggressive driving and increased risk of motor vehicle accidents (Galovski, Malta, & Blanchard, 2006). Driving in an aggressive and competitive fashion is associated with both receiving a traffic violations and causing motor vehicle accidents. In Hemenway and Solnick's (1993) study, these researchers found that the following behaviors were significantly correlated with motor vehicle accidents — speeding and running red lights; engaging in arguments with other drivers; and having ever made obscene gestures at other drivers. More recent studies (e.g., Blanchard, Barton, & Malta, 2000; Chliaoutakis, et al., 2002; Dula & Ballard, 2003; Wells-Parker, et al., 2002) have all found that self-report aggressive driving was significantly correlated with motor vehicle accidents even though each of these studies employed a somewhat different measure of aggressive driving. Cook, Knight, & Olson (2005) analyzed

621,451 motor vehicle crash records in Utah for the period 1992 to 2003, and they found that the crashes caused by aggressive driving increased in the 2000's compared to observed rates registered in the 1990's.

Public Perception of the Problem

Based upon a study of Washington D.C. Beltway drivers, some researchers concluded that in recent years more drivers have come to believe that crashes are frequently related to driver aggression (Preusser Research Group, 1998). In 1994, only 2% of Beltway drivers cited driver aggression as one of the top three causes of automobile crashes; in contrast, 38% of the drivers surveyed in 1997 believed this was the case. Within this group, survey participants were divided into categories — general drivers and aggressive drivers based on their survey responses. Among general drivers, 53% believe driver aggression was a main cause of crashes; this figure compared to 15% of the aggressive drivers grouping. The general drivers surveyed also expressed the view that driver aggression is their **primary roadway safety concern** (Preusser Research Group, 1998).

Rathbone and Huckabee (1999) conducted a survey study of law enforcement agencies from 504 randomly selected jurisdictions in the 50 largest metropolitan areas in the United States. Among the 139 responses collected from police agencies, 39% of the survey respondents indicated that road rage is "definitely a problem" in their area, and another 15 % believe that it likely is a problem. Only 14% of the law enforcement agency spokesperson respondents did not think road rage was a problem at all in their jurisdiction (Rathbone & Huckabee, 1999). In a more recent survey study targeted at

drivers in the state of Washington, more than 70% of the citizens taking part in the survey have the perception that aggressive driving is either a problem or a serious problem in their state. The survey results indicated that 61.5% of the respondents feel that road rage is either a problem or a serious problem for public safety in state of Washington (Division of Governmental Studies and Services, 2007).

The public concern for aggressive driving and road rage behaviors has been translated into targeted legislation in 14 American states, those being: California, Arizona, Delaware, Florida, Georgia, Indiana, Maryland, Nevada, New Jersey, North Carolina, Pennsylvania, Rhode Island, Utah, and Virginia (The Governors Highway Safety Association, 2009). Several other U.S. states (including Massachusetts, Michigan, New Hampshire, and New York) introduced legislation but did not pass new statutes into law relating to aggressive driving in 2008. The bills in general define the specific offense of aggressive driving, and typically outline the penalties and/or fines associated with the driving offense.

The penalties for aggressive driving vary by state, and they tend to range from points assessed against driver's licenses to criminalizing the offense as a misdemeanor (Teigen, 2007). Delaware's statute requires the first time aggressive drivers to be fined no less than $100 and no more than $300, or to be imprisoned no less than 10 days and no more than 30 days, or both. For a second offense occurring within three years, fines jump to a maximum of $1,000, jail time increases to a maximum of 60 days, and licenses can be suspended for up to 30 days. The aggressive driver offender is required to complete a behavior modification course featuring a focus on attitudinal reorientation and

driving skills education. On the other hand, Indiana's statute on aggressive driving makes it a Class A misdemeanor if the driver is driving aggressively with the intent to intimidate. Indiana's Class A misdemeanor offenders can be assessed a maximum fine of $5,000 and a maximum jail time of one year. North Carolina not only criminalizes (Class 1 misdemeanor) aggressive driving, but the state also assesses 5 points (demerits) against the driver's license. As in most states, an accumulation of points by a driver could result in suspension or revocation of the driver's license for an extended period.

Although the state of Washington has not enacted legislation in this area as of October of 2008, the Washington State Patrol started its aggressive driving enforcement and prevention program on Memorial Day weekend, 1998. The agency's Aggressive Driving Apprehension Team (ADAT) program uses unmarked police vehicles equipped with mobile video cameras to detect, document the driving behavior of, and apprehend aggressive drivers. The Commercial Vehicle Division (CVD) also uses unmarked patrol vehicles to combat aggressively driven commercial vehicles and cars driving dangerously around commercial vehicles. The Washington State Patrol also encourages citizens to report any aggressive driving behavior, and relies on this input to locate the ADAT vehicles. In addition to the traditional 911 phone line, the WSP established a website to which citizens can report the observance of aggressive driving.

Definitions of Aggressive Driving

Similar to the phenomenon of general aggression, there is no clear and consistent definition of either aggressive driving or road rage (e.g., Dula & Geller, 2003; Ellison-Potter, Bell, & Deffenbacher, 2001; Sarkar, Martineau, Emami, Khatib, &

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Wallace, 2000; Tasca, 2000).   Based on the reports collected from news media and based on the review of the systematic research done this area of traffic safety, these two terms are used synonymously in some contexts (e.g., Britt & Garrity, 2003, 2006; Hemenway, et al., 2006; Mizell, 1997) and are used as distinct types of behavior in other contexts (e.g., Dula & Geller, 2003; Goehring, 2000; Tasca, 2000).

In congressional testimony, Martinez (1997) stated that the National Highway Traffic Safety Administration (NHTSA) defined aggressive driving as "driving behavior that endangers or is likely to endanger people or property."   This may include a wide variety of driving behaviors.   These behaviors range from moving violations such as speeding, weaving, unsafe lane changes, reckless passing, running stop signs and traffic lights, failure to yield, and tailgating, to hostile hand and facial gestures, screaming, and honking — all the way to the extreme of violent confrontations.

This definition includes all the possible dangerous behaviors within driving context, which fits the popular notion of aggressive driving, but this broad of a range of behaviors could be problematic for empirical research.   For example, in one NHTSA publication, speeding, tailgating, and weaving are given as examples of aggressive driving.   However, the author of the publication also stated that, "Unfortunately, there is no general agreement among traffic safety experts as to what constitutes aggressive driving.   Consequently, the survey focused more on specific unsafe driving acts rather than on aggressive driving" (National Highway Traffic Safety Administration, 1998).   In order to clearly understand and/or measure a social phenomenon, it is necessary to have a

precise definition of what constitutes the issue under study.   Unfortunately, the problem of the imprecise definition of aggressive driving is not limited to NHTSA.

The problem of an imprecise definition can be traced back to the first quasi-experimental study done on aggressive driving.   Doob and Gross (1968) examined the effect of an unresponsive driver's social status on the reactions of target drivers. They hypothesized that the drivers, whose progress was blocked at a traffic light by a confederate car, would provoke aggressive reactions.   Horn-honking latency was the operational definition of aggression in the study.   The researchers found that drivers waited longer before honking at newer cars (higher status), and males honked faster than females.   Chase and Mills (1973) replicated this study a few years later, but their findings did not confirm the results of the Doob and Gross' study.   They found that drivers honked more readily at high status than at low status cars.   Both studies considered horn-honking to be a form of aggressive driving, but neither of the studies provided a clear general definition of aggressive driving.

More recently, a number of additional studies have used horn-honking latency as a measure of aggression reaction within the driving context, but none of these studies provided an explicit definition of aggression (Diekmann, Jungbauer-Gans, Krassnig, & Lorenz, 1996; McGarva, Ramsey, & Shear, 2006; Shinar, 1998).   Operational definitions alone in the absence of a theoretical framework do not allow for the specification of testable hypotheses nor the development of explanatory theory. Horn-honking indeed can be an aggressive reaction of annoyance or irritation; however, it can also simply be a reminding signal used to alert the driver in front of you that the light

had changed. In the latter case, few would consider this to be aggression behind the wheel.

Even in those cases wherein some researchers provided a working definition for aggressive driving or road rage, there was not much agreement across studies on what behavior to include and what behavior to exclude from those definitions. For instance, Rathbone and Huckabee (1999) argued that the definitions found in the literature on road rage and aggressive driving are variant and often loosely stated and overlapping, and they emphasized in their work that road rage and aggressive driving should not be treated as synonymous terms. According to them, aggressive driving may include tailgating, abrupt lane changes, and speeding, either as separate acts or occurring in combination. They defined road rage as involving an identifiable incident where "an angry or impatient motorist or passenger intentionally injures or kills another motorist, passenger, or pedestrian, or attempts or threatens to injure or kill another motorist, passenger or pedestrian" (Rathbone & Huckabee, 1999, p. 4).

Rathbone and Hunkabee's definition of road rage is largely the same as Mizell's (1997) definition of aggressive driving, which he defines as "an incident in which an angry or impatient motorist or passenger intentionally injures or kills another motorist, passenger, or pedestrian, or attempts to injure or kill another motorist, passenger, or pedestrian, in response to a traffic dispute, altercation, or grievance." While Rathbone and Huckabee (1999) maintained that the term aggressive driving should include the behaviors of tailgating, abrupt lane changes, and speeding, other researchers have referred to such behaviors as "risky driving" without making any mention of driver

aggression (e.g., Jonah, 1997; Jonah, Thiessen, & Au-Yeung, 2001; Parker, et al., 1998; Zimbardo, Keough, & Boyd, 1997).   More recently, Goehring (2000) noted that NHTSA considers aggressive driving to be a traffic offense, and considers road rage to be a criminal offense.   The agency defines road rage as "an assault with a motor vehicle or other dangerous weapon by the operator or passenger(s) of one motor vehicle on the operator or passenger(s) of another motor vehicle or vehicles precipitated by an incident which occurred on a roadway" (Goehring, 2000).

In the search for a common definition Tasca (2000) assembled several definitions of aggressive driving offered in the literature.   1) Hauber (1980) defined aggressive driving as an action where the intention was to do physical or psychological harm to a target and where the target perceived the act as aggressive.   2) Mizell (1997) posited that aggressive driving entails a driver intentionally injuring or killing another driver, passenger, or pedestrian.   3) Martinez (1997), an administrator at NHTSA, defined aggressive driving as the operation of a motor vehicle in a manner which endangers or is likely to endanger people or property.   4) The American Automobile Association's (AAA) definition, which viewed aggressive driving as the "operation of a motor vehicle without regard to others' safety" (Tasca, 2000, p. 4).   5) Shinar's (1998) definition of aggressive driving is based on the frustration-aggression model whereby aggressive driving can be defined as instrumental behavior manifested as inconsiderate or annoying acts directed at others, and/or deliberately driving dangerously in order to save time at the expense of other road user.

Tasca (2000) observed that both the NHTSA and AAA definitions differentiate between road rage and aggressive driving, but the definitions of aggressive driving by

both major traffic safety organizations are somewhat ambiguous.   In order to bring order

to the formal study of these phenomena Tasca suggested that three guiding principles can

be used to define aggressive driving in a precise way: 1) the definition should **not be too

general**; 2) the definition should **not include behaviors associated with road rage**; and

3) the behaviors included in the definition should be **intentional in nature**.   Tasca then

proposed a definition of aggressive driving as follows: "a driving behavior is aggressive

if it is deliberate, likely to increase the risk of a collision, and is motivated by impatience,

annoyance, hostility, and/or an attempt to save time" (Tasca, 2000, p. 8).

Tasca also listed the observable driving behaviors that should be included, such as

tailgating, weaving in and out of traffic, passing on the road shoulder, flashing headlights,

sustained horn-honking, yelling, and gesturing.   Tasca explicitly excluded road rage

from the definition of aggressive driving, but he did not separate the behaviors involving

intention from the behaviors without intention.   Risk-taking driving behavior should

differ from aggressive driving because risk-taking behaviors (e.g., speeding, not wearing

a seatbelt, driving while intoxicated) do not involve the intentional component that one

would find with aggressive driving (Ellison-Potter, et al., 2001).

A similar definition of aggressive driving was proposed by Ellison-Potter et al.

(2001, p. 432), who suggest the following: "any driving behavior that intentionally

(whether fueled by anger or frustration or as a calculated means to an end) endangers

others psychologically, physically, or both."   Examples of aggressive driving include

behaviors such as tailgating, horn honking, traffic weaving, excessive speeding, profanity,

obscene gestures, headlight flashing, red-light running, and blocking the passing lane.

Ellison-Potter et al. (2001) made distinction between aggressive driving, road rage, and risk-taking driving behavior. This definition of aggressive driving will be employed in the current study.

Factors that Contribute to Aggressive Driving

Several factors have been identified in empirical studies that may contribute to aggressive driving. These factors can be divided into three distinct categories: 1) situation and/or environmental conditions; 2) personality or dispositional factors; and 3) demographic or personal background variables.

Situational/Environmental Conditions

Traffic Congestion and Time Urgency. Daily driving, especially, in conditions of high traffic congestion, could be a source of annoyance and stress. Some studies (Hennessy & Wiesenthal, 1999; Shinar, 1998) have found that driving anger and aggression are positively correlated with traffic congestion, but other studies (Lajunen, Parker, & Summala, 1999) have found no relationship between congestion and reports of driving anger and aggression. Shinar and Compton (2004) argued that the frequency of aggressive driving behaviors was related to the density of vehicles on the road, noting that an increase in aggressive driving was caused by the greater number of drivers rather than any increase of incidents taking place during times of traffic congestion. However, the relationship between time urgency and aggressive driving remained significant even controlling for the number of cars on the road. Time urgency cannot predict the incidence of aggressive driving under conditions of low congestion (Hennessy &

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Wiesenthal, 1999), which indicates that the effects of time pressure on aggressive driving are moderated by traffic. Some other variables also interact with congestion and time pressure to increase aggressive driving, such as locale, behaviors of other drivers on the road, and the presence of traffic lights (Shinar, 1998; Shinar & Compton, 2004).

Anonymity. Similar to other forms of aggression, aggressive driving is more likely to occur in situations of anonymity. Doob and Gross's (1968) paradigm have been used to investigate the effects of driver anonymity on aggressive driving behaviors. Ellison et al. (1995) conducted a field study which compared the aggressiveness of drivers in an anonymous condition (i.e. drivers of convertibles with the tops up) with that the drivers in an identifiable condition (i.e. drivers of convertibles with the tops down). Statistically significant differences between the anonymous and identifiable conditions were observed. Drivers in the anonymous condition did honk sooner, they honked for longer durations, and they honked more frequently. Ellison-Potter et al. (2001) randomly assigned subjects to anonymous or identifiable driving conditions using a computer-based program that assesses simulated driving behaviors. Participants in the anonymous group were told to imagine driving in a convertible with the top up, and the anonymous group participants were instructed to image driving in a convertible with the top down. The anonymous group displayed greater speed, more running of red lights, more collisions, and more hitting of pedestrians than the identifiable group.

Other Environmental Factors. Doob and Gross's (1968) paradigm also has been used to examine other environmental factors which may lead to drivers' aggressive reactions. In Ellison-Potter et al.'s (2001) study, the presence of aggressive cues were manipulated by displaying aggressive text or neutral text on the computer screen in the

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form of billboards and building signs. The researchers observed more aggressive driving behaviors from the group with aggressive text on the screen than the other group. McGarva et al. (2006) found that compared to the non-cell phone condition, male drivers honked their horn more quickly and frequently to the drivers using cell phone, and female drivers were more angry according to blind judgments of videotaped facial expressions, which suggested that driver cell phone use could contribute to the growing problem of roadway aggression. Kenrick & MacFarlane (1986) found that a direct linear increase in horn honking with increasing ambient air temperature. Perceiving the driver as distracted, short green light phases, and drivers in low-income neighborhoods were also identified as factors associated with increased the rates of honking (Shinar, 1998).

<center>Personality/Dispositional Factors</center>

Sensation Seeking. According to Zuckerman (1994, p. 27), sensation seeking "is a trait defined by the seeking of varied, novel, complex, and intense sensations and experiences and the willingness to take physical, social, legal, and financial risks for the sake of such experiences." Sensation seeking has been identified as one of the risk factors associated with drunk driving, exceeding the speed limit, racing other drivers, passing in no-passing zones, and a variety of other risky driving behaviors (e.g., Arnett, 1990, 1994, 1996; Arnett, Offer, & Fine, 1997; Burns & Wilde, 1995; Greene, Krcmar, Walters, Rubin, & Hale, 2000). Jonah (1997) reviewed 38 separate studies which focused on the sensation seeking phenomenon in traffic safety research. He reported that only four out the 38 studies failed to report a positive relationship between sensation seeking and risky driving, and sensation seeking predisposition accounted for between

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10% and 15% of the variance in that behavior.   Jonah also pointed out that the majority of studies reviewed reported a positive relationship between sensation seeking and collision involvement.

In a later study Jonah et al. (2001) studied the relationship between sensation seeking and risky driving, aggressive driving, and behavioral adaptation.   The participants with total Form V of Zuckerman's SSS [Sensation Seeking Scale] below a score of 20 were classified as low sensation seekers and those with scores 20 and higher were classified as high sensation seekers.   Compared to low sensation seekers, those scoring high on the SSS test were more likely to speed, not use a seatbelt, drink frequently, drive after having consumed alcohol, and believe that they could drink more beer than others before becoming impaired.   For aggressive driving behaviors, high sensation seekers were more likely than low sensation seekers to swear at other drivers, to beat other drivers at the getaway, to think it is fun to weave in and out through traffic, to enjoy passing other cars, to believe that driving at high speed is exciting, to like to outsmart other drivers, and to often lose their temper while behind the driver's wheel. They also found evidence of an interaction effect between sensation seeking and gender on aggressive passing and on the making of rude signs to other drivers.   High sensation seekers were more likely than their low sensation seeking counterparts to report aggressive passing among female drivers, but this was not the case among male drivers. For making rude signs, there was no difference between high and low sensation seeking female drivers, but high sensation seeking male reported more of this behavior than did low sensation seeking males.

Consistent results with respect to sensation seeking were also found in a more recent study (Dahlen, Martin, Ragan, & Kuhlman, 2005). The 20-item Arnett inventory of sensation seeking (AISS, Arnett, 1994) was used to measure sensation seeking predisposition. After controlling for gender, age, and the trait of driving anger, sensation seeking still predicted lapses in concentration, minor losses of vehicular control, aggressive driving, risky driving, physically and verbally aggressive driving anger expression, use of the vehicle to express anger, and constructive/adaptive driving anger expression. The AISS score accounts for about 2 to 5% of the unique variance in these outcomes. Dahlen and his colleagues also found that sensation seeking was unrelated to driving anger, and that it was only modestly related to impulsiveness and boredom proneness. People with high sensation seeking may perceive less risk under high-risk driving situations (Arnett, 1990) than others, or they may be more willing to accept the potential risk in order to experience the thrill associated with engaging in the risky behavior (Jonah, 1997).

Impulsiveness. Impulsiveness is another personal factor which contributes to engaging in aggressive driving behaviors. Impulsiveness is a concept which is similar to sensation seeking, but impulsiveness deals with one's degree of control over one's thoughts and behaviors (Barratt, 1972). The reason that impulsiveness may cause risk taking is that the individual may simply lack the self-control required to refrain from engaging in it. Because sensation seeking and impulsivity are related, some researchers believe these two concepts belong to a single construct (e.g., Zuckerman, 1996). Other researchers, however, consider impulsiveness to be a distinct construct and report that there are different effects resulting from these two predispositions on aggression-related

behaviors (e.g., Joireman, Anderson, & Strathman, 2003; Patton, Stanford, & Barratt, 1995).

Impulsiveness has been found to be associated with risky driving (Dahlen, et al., 2005), driving anger (Dahlen, et al., 2005; Deffenbacher, Deffenbacher, & Lynch, 2003; Deffenbacher, Lynch, & Filetti, 2003), and aggressive driving (Dahlen, et al., 2005). On the other hand, Lajunen and Parker (2001) did not find a significant relationship between impulsiveness and either driving anger or reactions to provocations experienced while driving. DePasquale et al. (2001) argued that the relationship between aggressive driving and impulsiveness might be moderated by the relationship between impulsiveness and anger. DePasquale and his colleagues found a significant correlation between impulsiveness and self-reported aggressive driving, but that association was not as strong as the relationships between impulsiveness and anger, and the relationship between anger and aggressive driving.

Consideration of Future Consequences (CFC). Individual differences in CFC reflect "the extent to which people consider the potential distant outcomes of their current behaviors and the extent to which they are influenced by these potential outcomes" (Strathman, Gleicher, Boninger, & Edwards, 1994, p. 743). Low CFC people focus on the immediate consequences of their actions, and pay less attention to the delayed consequences of their actions. High CFC people rate the delayed consequences of their actions as being more important than the immediate consequences. A number of empirical studies have associated CFC with numerous important behaviors, such as fiscal responsibility (Joireman, Sprott, & Spangenberg, 2005), health behavior (Orbell, Perugini,

& Rakow, 2004; Sirois, 2004), environmental concern (Joireman, Van Lange, & Van Vugt, 2004), anger (Joireman, et al., 2003), and general aggression (Joireman, et al., 2003). A driver who tends to consider future behavioral consequences more fully may drive less aggressively because the consequences of aggressive driving would be more salient. Moore and Dahlen (2008) found CFC was negatively related to aggressive and risky driving behavior, physically aggressive driving anger expression, and use of one's vehicle to express anger, and it was positively related to constructive driving anger expression.

Stress. A high level of general stress during driving is one potential factor that could lead to driving anger and aggression. Hennessy and Wiesenthal (2001) found that drivers with a disposition to view driving as generally stressful are more likely to engage in driving aggression than do drivers who consider driving to be less stressful. This could be caused by the perceptions or appraisals of driving situation. For example, the drivers with high stress were more like to perceive other drivers as a source of frustration, and to display aggressive driving behaviors (Hennessy & Wiesenthal, 1999). Research also found driver stress interacted with other factors (e.g., condition of high congestion) to stimulate aggressive driving (Hennessy & Wiesenthal, 1999).

Cognitive Behaviors. How people process the information they take in while driving may also affect the manifestation of aggressive driving behaviors. Pejorative labeling, thoughts of revenge, retaliation, and aggression were found associated with aggressive driving and risky driving (Deffenbacher, Petrilli, Lynch, Oetting, & Swaim, 2003; Deffenbacher, White, & Lynch, 2004). Studies also associated positive attitudes

toward committing violations with reckless driving (Ulleberg & Rundmo, 2003; R. West & Hall, 1997) and less responsiveness to a traffic safety campaign (Ulleberg, 2002). Parker et al. (1998) found that beliefs about the reactions of others, anticipated regret, and a sense of personal responsibility significantly correlate with self-reported likelihood of committing driving violations and aggressive driving.

Matthews and Norris (2002) examined the hostile attribution bias phenomenon in the context of driving. Study participants were given a set of scenarios depicting everyday driving situations that could be construed as benign, malign, or ambiguous provocation. They found that there was no difference between participants' attributions in the benign or malign conditions. However, when the conditions of the provocation were ambiguous, drivers high in trait aggression attributed greater hostility to the other driver than did those who were low in trait aggression. The results observed in this study indicated that when situational conditions are unclear, high aggressive individuals may be inclined to perceive the actions of other drivers as hostile, whereas low aggressive individuals may be more inclined to view the actions of others as justifiable — or at least accidental.

Knee, Neighbors, and Vietor (2001) investigated how beliefs about self-determination contribute to aggressive driving. They found that self-reported driving violations and aggression were affected by vulnerability to external pressure and sensitivity to perceived attacks on self-esteem. The finding of a relationship between self-esteem and driving aggression is consistent with empirical evidence of an association between narcissistic tendencies and aggressive driving (Galovski, Blanchard, & Veazey,

2002; Schreer, 2002).   It also confirmed the findings of Bushman and Baumeister (1998) regarding general aggression – namely, that individuals who exhibit high levels of narcissism respond more aggressively to perceived attacks on their self-esteem compared to those individuals with low narcissism.

General Aggression.   A number of empirical studies have demonstrated that general aggression is associated with self-reported aggressive driving (Dula & Ballard, 2003; Fong, Frost, & Stansfeld, 2001; Lajunen & Parker, 2001; Malta, Blanchard, & Freidenberg, 2005), reckless driving, and driving violations (Ulleberg & Rundmo, 2003). However, general aggression is not always associated with risky driving (Deery & Fildes, 1999), and some drivers with high rates of motor vehicle accidents and traffic violations do not have high levels of aggression (Ulleberg, 2002).   These finding imply that general aggression may be neither necessary nor sufficient for risky and aggressive driving to occur.   As is the case with impulsiveness, aggression may be moderated by other variables (e.g., sensation seeking) to influence driving behaviors (Arnett, et al., 1997).

Driving Anger.   Deffenbacher and his colleagues have provided evidence in support of their *state-trait model* of driving anger: trait (general) driving anger predicts situation-specific driving anger and aggressive driving (Deffenbacher, Deffenbacher, et al., 2003; Deffenbacher, Filetti, & Richards, 2003; Deffenbacher, Huff, & Lynch, 2000; Deffenbacher, Oetting, & Lynch, 1994).   Research has also demonstrated that aggressive drivers are high in general anger (Deffenbacher, Deffenbacher, et al., 2003; Deffenbacher, Filetti, et al., 2003; Deffenbacher, Lynch, Oetting, & Swaim, 2002;

Deffenbacher, et al., 1994; Deffenbacher, et al., 2004; Dula & Ballard, 2003; Lawton & Nutter, 2002; Malta, et al., 2005).

Similar to the construct of general aggression, driving anger does not always predict aggressive responses (Dukes, Clayton, Jenkins, Miller, & Rodgers, 2001; Parker, Lajunen, & Summala, 2002), and high-anger drivers do not necessarily drive more aggressively than low-anger drivers (Ellison-Potter, et al., 2001). Besides, driving anger only partially mediates the relationship between aggressive driving and characteristics such as aggression, impulsiveness, and sensation seeking (Lajunen & Parker, 2001; Malta, et al., 2005). Some types of driving aggression do not appear to be related to driving anger (Deffenbacher, Deffenbacher, et al., 2003; Matthews & Norris, 2002; Ulleberg & Rundmo, 2003).

Demographic/Personal Background Variables

Age and gender are the two demographic background variables that have been examined the most with respect to the phenomenon of aggressive driving. Research has consistently indicated that young drivers are more likely to engage in aggressive and risky driving than their more mature counterparts (e.g., Cooper, Wood, Orcutt, & Albino, 2003; Davey, Wishart, Freeman, & Watson, 2007; Hennessy & Wiesenthal, 2004; Krahé, 2005; Krahé & Fenske, 2002; Özkan & Lajunen, 2005; Shinar & Compton, 2004), but individuals of all ages may drive aggressively (Mizell, 1997). Generally, male drivers exhibit more aggressive and risky driving behavior than female drivers (e.g., Cooper, et al., 2003; Deery & Fildes, 1999; Özkan & Lajunen, 2005; Shinar & Compton, 2004). However, some studies did not find the gender difference when data were collected on a

simulator (Ellison-Potter, et al., 2001) or when self-reported aggressive and risk driving behaviors were documented (Hennessy & Wiesenthal, 2001; Szlemko, Benfield, Bell, Deffenbacher, & Troup, 2008). Some studies found that both males and females reported similar levels of driving anger (Deffenbacher, et al., 2000). Moreover, Ulleberg (2002) found that one high-risk driving group identified by a cluster analysis was predominantly female, and that high-risk trait profiles were similar across gender. Also, Lonczak, Neighbors, and Donovan (2007) demonstrated that the effects of gender on driving behaviors were moderated by other variables such as sensation seeking.

Purpose of the Study

Aggressive driving is a salient public safety issue, as evidenced by the frequency of aggressive incidents as well as the enactment of legislation designed to address the problem of aggressive driving. Societies often react to social problems they acknowledge by enacting legislation, and if the problems relate to undesirable private behaviors affecting public health and safety they typically exact punishment in the form of fines and/or incarceration on offenders who have violated societal norms and laws. This course of action is intended to both punish known offenders AND deter future violations of norms and laws, but the deterrence message is typically either not effectively disseminated or not internalized by those who are most likely to offend. Although the criminal justice system has historically adopted such a reactive stance to public safety concerns, this study aims to adopt a ***proactive*** approach by searching out greater understanding of aggressive driving behaviors so that more effective preventive measures can be taken.

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Although there is ample evidence in the form of academic studies, governmental reports and official statistics demonstrating the scale and ubiquitous nature of the problem, the phenomenon of aggressive driving remains poorly understood and the most effective countermeasures needed to address it remain largely unknown.   As early as the late 1940's traffic safety researchers tried to understand why some individuals engage in aggressive driving, but most of the early studies into the subject approached this type of high risk behavior from a narrow psychological perspective (e.g., Björklund, 2008; Deffenbacher, et al., 2000; Dula & Ballard, 2003; Ellison-Potter, et al., 2001; Galovski & Blanchard, 2002b; Galovski, Blanchard, & Malta, 2003; Schreer, 2002; Van Rooy, Rotton, & Burns, 2006; Yazawa, 2004).   The literature on the matter in psychology features considerable focus upon the question of why otherwise normal and socially functional individuals may engage in aggressive driving.   The categories identified as pertinent to answering this question were as follows: 1) certain situational and/or environmental conditions make aggressive driving more likely to occur; 2) certain personality or dispositional factors are associated with aggressive driving; and 3) certain demographic background traits are associated with aggressive driving.   Unfortunately, aggressive driving has not been addressed very widely in the criminological literature, although there has been some path breaking work done in recent years involving the testing of criminological theory in the context of risk-taking, distraction, and frustration related to traffic violation, collisions, and aggressive driving (Ellwanger, 2006, 2007; Garase, 2006).   For the most part, however, most studies undertaken in this area have not been couched within a comprehensive theory which could be tested against empirical evidence.

In an attempt to address these shortcomings in the existing literature, this study makes use of **self-control theory.** The analytical framework set forth in this dissertation reflects one of the leading contemporary theories of criminal/deviant behaviors, one which was introduced into the criminology research community in 1990 (see Pratt & Cullen, 2000; Pratt, Turner, & Piquero, 2004; Tittle, Ward, & Grasmick, 2003b; Unnever, Cullen, & Pratt, 2003; Vazsonyi, Pickering, Junger, & Hessing, 2001). Gottfredson and Hirschi (1990, p. 90) argued in an early publication on this subject that the personal traits associated with insufficient self-control are those of being "impulsive, insensitive, physical (as opposed to mental), risk taking, short-sighted, and non-verbal." The connection of these traits to aggression and aggressiveness in driving would seem to be clear, hence the interest in applying the self-control theory perspective to the search for understanding about aggressive driving.

Recent research on the General Aggression Model (GAM) (Craig A. Anderson & Bushman, 2002) suggests that aggression is predicted by three interconnected personality traits which may be considered to be among the core characteristics of low self-control – namely, *impulsivity*, *sensation seeking*, and *consideration of future consequences (CFC)*. These traits are likely to elicit aggression through the experiencing of hostile cognitions and the arousal of anger. To date, however, no research has explored how this hypothetical model might be able to account for the initiation of risky and/or aggressive driving behaviors. The present study attempts to understand aggressive driving seen as a criminological issue, and it explores the utility of Gottfredson and Hirschi's Self-Control Theory (1990) as applied within the framework of the General Aggression Model.

CHAPTER TWO

THEORICAL FRAMEWORK FOR THE STUDY OF AGGRESSIVE DRIVING

Previous studies have pointed out the importance of personality factors in the study of driving behaviors. Among these personality factors, some are associated with the concepts of low self-control (Gottfredson & Hirschi, 1990) and could be considered to be sub-dimensions of low self-control; examples of these sub-dimensions would be impulsiveness, sensation seeking, consideration of future consequences, and rapid anger arousal. Unfortunately, there is no general agreement whether low self-control constitute a sole latent trait (Arneklev, Grasmick, & Bursik, 1999; C. Gibson & Wright, 2001; Piquero & Rosay, 1998), second-order factor structure (Ellwanger, 2006; Longshore, Stein, & Turner, 1998; Longshore & Turner, 1998; Longshore, Turner, & Stein, 1996), or a six-factor structure (S. W. Baron, Forde, & Kay, 2007; DeLisi, Hochstetler, & Murphy, 2003). Regardless of the structure of low self-control, the majority of studies employing the construct associate low self-control and criminal/deviant behaviors with direct effects. Like the phenomenon of general aggression, aggressive driving is caused by a complex interaction among personal and environmental factors, frustration, negative affect, learned behaviors, and biased infromation processing (for review, see Craig A. Anderson & Bushman, 2002; Geen, 1998; Huesmann, 1994). The General Aggression Model (Craig A. Anderson & Bushman, 2002) could be a fruitful framework to refine Low Self-control Theory within the traffic context.

Low Self-Control Theory

Classical and Positivist Criminology

According to the dictates of classical school criminology, there is no essential difference between people committing crime and people who did not commit crime. All persons have free will, and all human behaviors are guided principally by hedonism. Based on this traditional view, all human behaviors can be explained primarily as the self-interested pursuit of pleasure or the avoidance of pain. By definition, therefore, crimes are just another type of behavior which satisfies these basic tendencies. In 1764, Cesare Bonesana, *Marchese de Beccaria*, published his influential book on penal reforms, ***On Crimes and Punishments***. According to Beccaria, the purpose of punishments is to deter crime, and to do so they should be prompt, certain, and proportionate to the seriousness of the crime. Beccaria (as he became known) argued that excessive severity of punishment is not only unjust, but often occasions more crime (for review, see Vold, Bernard, & Snipes, 2002).

The influence of the classical school was far greater than that of the passage of specific laws. The idea of the exercise of free will inspired revolutions in religion, and the creation of entirely new legal codes. For example, the French Revolution of 1789 and its famous Code of 1791 and the U.S. Constitution were all strongly influenced by the ideas of free will and the need for public institutions to sanction behaviors inimical to public health and safety (Lilly, Cullen, & Ball, 2002). In the American setting, however, by the 1820s crime was rampant and recidivism was commonplace, conditions which occasioned criticism of Beccaria's argument that adjustments in punishment polices alone could reduce crime. This failure of the classical approach to explain and manage crime

and criminal conduct gave rise the positivist school of criminology as an alternate. This approach emphasized the idea that crime is caused by social conditions instead of being the result of the exercise of mankind's free will.

The positivist school searches for empirical evidence which can be used to confirm the idea that crime was determined by multiple factors, including biological, psychological, and sociological factors. The father of positivist criminology, Cesare Lombroso (1835-1909), was strongly influenced by Charles Darwin's (1859) *The Origin Species*; he was deeply interested in identifying biological explanations of criminal behavior. In 1876, Lombroso published his influential *On Criminal Man*. Lombroso proposed that criminals were biological throwbacks to an earlier evolutionary stage, creatures he called "atavists." For example, he argued that ears of unusual size, sloping foreheads, excessively long arms, receding chins, and twisted noses were indicative of physical characteristics of criminals. Later, Lombroso modified his theory throughout five editions of *On Criminal Man*, with each new edition giving attention to more and more environmental explanations – including in time climate, rainfall, sex, marriage customs, laws, the structure of government, church organization, and the effects of other factors (Lilly, et al., 2002). Although Lombroso's biological explanation of crime is considered too simple and even naïve today, he made significant contributions that continue to have an impact on criminology. The most important impact on the discipline is that he developed a multiple-factor explanation of crime that included not only heredity but also, social, cultural, and economic variables.

Psychology, sociology, economics, and even classical approaches to the study of crime and criminality are influenced by Lombroso's "multiple factor" explanation. Psychologists added personality traits to supplement the list of factors which could determine criminal behaviors. Psychologists in time demonstrated how the constructs of aggression and intelligence could be reliably measured, and various correlated cognate concepts in time could be developed to measure an individual's criminal propensity. Economists associated crime with poverty, economic conditions and levels of unemployment. Sociologists developed theories featuring numerous factors to explain crimes, such as *differential association* (Sutherland & Cressey, 1970), *strain theory* (Farnworth & Leiber, 1989; Merton, 1957), *social disorganization* (Shaw & McKay, 1969), and routine activities (Cohen & Felson, 1979).

Integrating Classical and Positivist Conceptions of Crime

Gottfredson and Hirschi (1990) argued rather convincingly that despite the progress toward understanding crime made by positivist scholars, as a group they did not have a shared conception of crime that was derived from a single general theory of behavior. Without such a theory they were forced to accept the definition of criminals provided by the state, and then merely defined criminal behavior as acts in violation of the law. An unfortunate consequence of this situation is that it produces endless distinctions among behavioral categories. Traditionally, this chaos was dealt with by dividing the domain of science among "disciplines," and investigating the variables within the area of each discipline largely unaware of developments in other disciplines. However, the disciplinary-centered organization of scientific research is not only unlikely

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to solve the problem of understanding crime, but it also creates difficulty in and the effective sharing of knowledge between and among academic disciplines.

An alternative to dealing with this conceptual and informational chaos is to focus on the acts or behaviors of interest and ask what they might have in common. If commonality is revealed, this may lead to conclusions about causal mechanisms rather different from those generated by adherence to the notion that each different behavior has unique causes to be found within the territory of the discipline owning it. Gottfredson and Hirschi (1990) claimed that examination of the acts that cluster together around crime and deviance reveals that they share a common structure, and therefore the distinct possibility of a common causation.

The theoretic simplicity and parsimony inherited from the classical choice theory, and the positivists' complexity (which recognizes relatively stable yet individual differences in propensity) were synthesized by Gottfredson and Hirschi in the influential *A General Theory of Crime* (1990) along with the key concept of self-control. The Gottfredson and Hirschi theory provides conceptual clarity to the essence of crime and criminality, an the theory accounts for individual differences in criminal and deviant behavior. Gottfredson and Hirschi argued in their grand *magnum opus* that the parsimonious classical theory, with its dual emphasis on social and external control, can and should be completely integrated with the positivists' collection of tendencies which recognize differences in individual propensities.

A General Theory of Crime and Delinquency

Gottfredson and Hirschi' (1990) Self-Control Theory is one of the leading contemporary theories of criminal/deviant behaviors, and their book ranks as the second most cited book in criminal journal in the 1990s (Cohn & Farrington, 1999; Pratt & Cullen, 2000; Tittle, et al., 2003b; Unnever, et al., 2003; Vazsonyi, et al., 2001). The core of their theory is that individuals differ in their ability to exercise control over their emotions in the face of temptation, and these differences largely account for observable individual differences in criminal/deviant behavior. Self-control, a factor presumably affecting all humans wherever they might reside, could be the single most important variable which determines individual propensities to engage in crime/delinquency. People with low self-control are theorized to be unable to resist the temptations of the moment, largely because they have difficulty in fully considering the future consequences of their behavior. Gottfredson and Hirschi (1990) argued that the pleasures associated with a criminal act are typically direct, obvious, and immediate, so that individual differences on the ability to calculate the pleasures associated with crime should be narrow. On the contrary, the social, legal, and/or natural pains risked by it are not obvious, or direct. Unfortunately, however, there should be considerable variability in individual ability to calculate the potential pains associated with crime or delinquent acts.

Gottfredson and Hirschi (1990) argue forcefully that Self-Control Theory is conceptually superior to traditional positivist approaches. Because the positivistic approaches fail to articulate a theory on the nature of crime and delinquency, they must create unnecessarily complex explanations for why people are motivated to commit crime. Gottfredson and Hirschi argued that crime and "analogous" behaviors tend to

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entail simple choices and provide immediate pleasures. With the nature of crime specified, the theory provides a conceptual framework capable of predicting a broad range of behaviors across groups that is not is not constrained by context (i.e., political systems or sub-groupings of crimes and/or offenders).

Moreover, Gottfredson and Hirschi (1990) emphasized the observation that crime is not an automatic or necessary consequence of low self-control, and many noncriminal behaviors are analogous to crime (e.g., accidents, smoking, and alcohol use); they argue that these behaviors are also the consequences of low self-control. However, they argued that no specific act, type of crime, or form of deviance is uniquely required by the absence of self-control. Because both crime and analogous behaviors are manifestations of low self-control, they will be engaged in by a large proportion of people afflicted by the low self-control personality trait.

The Elements of Self-Control

By defining crime as acts of force or fraud undertaken in pursuit of self-interest, Gottfredson and Hirschi (1990) stressed that it is misleading to distinguish between trivial and serious crime (e.g., Elliott, Huizinga, & Ageton, 1985; Wilson & Herrnstein, 1985), between instrumental and expressive crimes (Chambliss, 1968), between victim and victimless crimes (Morris & Hawkins, 1970), between crimes *mala in se* and crimes *mala prohibita*, and between crimes against persons and crimes against property. The assumption of the self-control paradigm is that the motivation to commit crime is not variable, and all individuals are rational and motivated to pursue their self-interest, including with respect to the commission of crime. What does vary among individuals is

their **level of self-control**, a trait which consists of several distinct and discernable elements.

First, Gottfredson and Hirschi (1990) pointed out that criminal acts can be a source of *immediate gratification* of desires. A major characteristic of people with low self-control is that they tend to be highly responsive to tangible stimuli in the immediate environment, and to have a concrete "here and now" orientation to their thinking. In contrast, people with high self-control are more likely to consider and/or accurately calculate the consequences associated with their behaviors and/or defer gratification.

Second, criminal acts can provide *easy or simple* gratification of desires, such as money without work, sex without courtship, revenge without court delays. Individuals with low self-control are more likely than others to lack the traits of diligence, tenacity, or persistence in the course of action. They tend to lose interest in tasks requiring prolonged effort and persistence.

Third, criminal acts tend to be *risky, exciting, or thrilling* and involve stealth, danger, speed, agility, deception, or power. Those who are low in self-control tend to be adventuresome, active, daring and physical; in contrast, those persons who are high in self-control as Gottfredson and Hirschi use the term tend to be cautious, cognitive, "level-headed" and verbal.

Fourth, the *long term benefits* provided by crimes are *few or meager*, and they are not equivalent to a job or career. Also, crimes interfere with long-term commitments to jobs, marriages, family, or friends. Low self-control people are more likely to have

unstable marriages, transitory friendships, and job profiles featuring frequent changes. They are not interested in and prepared for long-term occupational devotion.

The fifth characteristic of crimes is that they require *little skill or planning,* and the cognitive requirements for crimes are minimal. It is not necessary to have complex cognitive faculties or high level manual skills for the commission of most crimes. This means that those low in self-control do not need possess or value cognitive or academic skills or seek to develop advanced manual skills in order to commit crimes.

Sixth, crime often results in *pain or discomfort for the victim* inasmuch as property is lost, bodies are injured, privacy is violated, and trust is broken. It follows that those low in self-control tend to be self-centered, indifferent, or insensitive to the suffering and needs of others. Lastly, the major benefit of many crimes is not pleasure, but rather relief from momentary irritation. Those persons who are low in self-control tend to have minimal tolerance for frustration and limited ability to respond to conflict through verbal rather than physical means (Gottfredson & Hirschi, 1990, p. 90).

In sum, individuals who lack self-control tend to be impulsive (here and now orientation), to prefer simple tasks (easy or simple gratification), to be risk-seeking (adventuresome as opposed to cautious), to enjoy physical activity (as opposed to cognitive or mental activity), to be self-centered (insensitive to the needs of others), and to possess a temper (little ability to respond to conflict through verbal rather than physical means) (Gottfredson & Hirschi, 1990, p. 90). Gottfredson and Hirschi believed that these traits: 1) can be identified in the individual's earlier life; 2) tend to be found in the same people; and 3) tend to remain stable through a person's life. If these assumptions

about these several discernable traits hold, it can be concluded that these traits do comprise a stable contruct useful for explaining the commission of crimes.

Sources of Self-Control

The sources of low self-control are less clear than the consequences of its presence. However, Gottfredson and Hirschi (1990) argured that while the sources of these traits remain subject to speculation there is at least one thing that is fairly certain--namely, low self-control is not a product of training, tutelage, or socialization. In fact, the characteristics of low self-control tend to be observed in the **absence** of normal nurturance, discipline, or training. That is, the causes of low self-control are *negative rather than positive*; self-control is unlikely to develop in the absence of effort, intended or unintended, to create and sustain it (Gottfredson & Hirschi, 1990, pp. 94-95).

Gottfredson and Hirschi (1990) argue that the primary source of low self-control is ineffective child-rearing.   In other words, in their view several conditions are required to raise a well-socialized child.   For the effective development of self-control to occur, they suggest that at a minimum parental management should include: (1) consistent monitoring or tracking of the child's behavior; (2) recognition of deviant behavior when it occurs; and, (3) consistent and proportionate punishment of the deviant behavior when it is recognized.   All parents (or guardians) should monitor the behavior of children under their care, recognize deviant behavior when it takes place, and sanction and correct such behavior when it occurs.   Through the consistent observance these practices, most children will become more capable of delaying gratification, more sensitive to the

interests, desires and needs of others, more independent, more willing to accept legitimate restraints on one's activity, and less likely to use force or violence to attain their ends.

Gottfredson and Hirschi (1990) argued that the early childhood experience is the most critical period to develop self-control, and that individual differences emerging then tend to persist over time. To be clear, Gottfredson and Hirschi maintain that absolute levels of self-control may change over time, but one's self-control relative to similarly-aged others should be seen as a stable trait. Hirschi and Gottfredson (2001, p. 90) stated in this regard that: "the differences observed at ages 8 to 10 tend to persist.... Good children [those with self-control] remain good. Not so good children remain a source of concern to their parents, teachers, and eventually to the criminal justice system."

To date, only a handful of studies have examined the thesis of the role of patenting in the self-control development process (e.g., Feldman & Weinberger, 1994; Gibbs, Giever, & Martin, 1998; Hay, 2001; Hay & Forrest, 2006; Meldrum, 2008; Pratt, et al., 2004). A majority of these studies indicate that parenting is an important factor, but that it is not the sole determinant of the development of self-control in children. The other factors identified which may also influence a children's level of self-control are anti-sociality (Hay, 2001), peer pressure (Meldrum, 2008), community context (Pratt, et al., 2004; Turner, Piquero, & Pratt, 2005), and school-based factors (Meldrum, 2008; Turner, et al., 2005).

Moreover, Beaver, Wright, & Delisi (2007) used data on approximately 3,000 children to examine whether *neuropsychological deficits* are predictive of child's self-control level. The results revealed that most of the effects of parenting measures

were relatively weak and inconsistent with respect to observed levels of self-control. Overall, the neuropsychological measures were the most consistent predictors of childhood levels of self-control. These effects held for both genders, even after controlling for effects of parental practices, neighborhood characteristics, and prior levels of low self-control.

Measuring Self-Control

The strongest criticism made of Gottfredson and Hirschi's (1990) *A General Theory of Crime* is that the theory is tautological. The authors claimed that individuals commit crime because they have "low self-control." However, there was no operational definition for low self-control advanced in their influential 1990's work. Because of this, researchers could not determine if an individual had this characteristic unless they committed crime. It is argued that the theory, given the lack of precise definition of the conditioned trait in question, becomes tautological when involvement in crime is used as an indicator of low self-control and is used to predict involvement in other crimes. In other words, "involvement in crime" predicts "involvement in crime." Thus, critics of the self-control approach to criminology argued that the theory does not say anything more than that an individual who commits crime exhibits low self-control by committing crime, and it is low self-control which causes an individual to commit crime (Akers, 1991; Geis, 2000; Marcus, 2004).

In order to resolve the criticism of tautology in the theory, Grasmick and his colleagues (1993) (see Table 2.1) developed an attitudinal scale of low self-control based on theoretical discussions of the construct. Gottfredson and Hirschi responded to these

criticisms and argued that analogous behavioral measures which are independent of crime are preferable for tests of the theory. Those behaviors can be whining, pushing, and shoving (as a child), and for adults smoking and drinking to excess, television watching in lieu of other activities, and experiencing difficulties in interpersonal relationships (Hirschi & Gottfredson, 1993). Both types of measures have been used in empirical studies of the theory (for review, see Pratt & Cullen, 2000), and a handful of studies have employed both kinds of indicators in their analyses (e.g., Arneklev, Elis, & Medlicott, 2006; LaGrange & Silverman, 1999; Tittle, et al., 2003b).

Table 2.1
Grasmick et al. Low Self-Control Scale Items

Impulsivity

I often act on the spur of the moment without stopping to think.
I don't devote much thought and effort to preparing for the future.
I often do whatever brings me pleasure here and now, even at the cost of some distant goal.
I'm more concerned with what happens to me in the short run than in the long run.

Simple Tasks

I frequently try to avoid projects that I know will be difficult.
When things get complicated, I tend to quit or withdraw.
The things in life that are easiest to do bring me the most pleasure.
I dislike really hard tasks that stretch my abilities to the limit.

Risk Seeking

I like to test myself every now and then by doing something a little risky.
Sometimes I will take a risk just for the fun of it.
I sometimes find it exciting to do things for which I might get in trouble.
Excitement and adventure are more important to me than security.

Physical Activities

If I had a choice, I would almost always rather do something physical than something mental.
I almost always feel better when I am on the move than when I am sitting and thinking.
I like to get out and do things more than I like to read or contemplate ideas.
I seem to have more energy and a greater need for activity than most other people my age.

Self-Centered
　　I try to look out for myself first, even if it means making things difficult for other people.
　　I'm not very sympathetic to other people when they are having problems.
　　If things I do upset people, it's their problem not mine.
　　I will try to get the things I want even when I know it's causing problems for other people.

Temper
　　I lose my temper pretty easily.
　　Often, when I'm angry at people I feel more like hurting them than talking to them about why I am angry.
　　When I'm really angry, other people better stay away from me.
　　When I have a serious disagreement with someone, it's usually hard for me to talk calmly about it without getting upset.

The low self-control scale developed by Grasmick et al. (1993) consists of six components which were identified through the interpretation of Gottfredson and Hieschi's (1990) difinition of core traits: *impulsivity, simple tasks, risk-seeking, physical activities, self-centered, and temper*. Grasmick et al. (1993) administered this 24-item scale (four items for each component) to a sample of adults in Oklahoma City. The respondents rate their level of agreement to each question with a four-point Likert-type scale. A principal components factor analysis with latent root criterion and scree discontiunity criterion was employed for data reduction and assessment of the clustering of items. The results indicated that the best factor structure is a **unidimensional structure**. The internal consistency reliability for this 24-item scale for self-control is .805. Corrected-item total correlations suggest that the reliability coefficient could be increased by deleting one item in the physical activities component, increasing the alpha coefficient to .812 upon this item deletion.

Many studies have used the Grasmick et al. (1993) low self-control scale to measure the presence of the trait low self-control (for review, see Pratt & Cullen, 2000; Tittle & Botchkovar, 2005). Other studies (e.g., Piquero & Rosay, 1998), which employed exploratory factor analyses, confirmed the uni-dimensionality of the construct. In this regard, Arneklev, et al. (1999) argued that self-control is likely comprised of multiple dimensions, and these dimensions come together to represent one invariant latent trait (see also Ellwanger, 2006; C. Gibson & Wright, 2001). Other scholars have arued that a six-factor model is a more accurate representation of the trait (S. W. Baron, et al., 2007; DeLisi, et al., 2003; Piquero, MacIntosh, & Hickman, 2000; Ribeaud & Eisner, 2006; Vazsonyi, et al., 2001).

The validity of self-control scale as a unidimensional construct was challenged by researchers who argued that some sub-scales have stronger predicting power than the whole self-control construct. Some researchers (Longshore, et al., 1996; Piquero & Rosay, 1998) have produced evidence indicating that risk seeking and temper were as strong predictors of crimes of force as the overall self-control scale, and impulsiveness and risk seeking were even better in predicting the crime of fraud than the unidimensional construct. Other researchers have found that the risk seeking dimension is the most predictive component of low self-control across deviant behaviors (Arneklev, Grasmick, Tittle, & Bursik, 1993; LaGrange & Silverman, 1999; Longshore, et al., 1996; Ribeaud & Eisner, 2006), while others have argued that their studies indicate that the predictive power of temper (DeLisi, et al., 2003) and impulsivity (Ribeaud & Eisner, 2006) are central to our understanding of what elements of low self-control lead to criminality. This line of research has led some scholars to suggest that the most "efficient form" of

low self-control may be risk seeking (Arneklev, et al., 1993; LaGrange & Silverman, 1999; Longshore, et al., 1996; Ribeaud & Eisner, 2006), temper (DeLisi, et al., 2003; Longshore, et al., 1996), or impulsivity (Longshore, et al., 1996; Ribeaud & Eisner, 2006). Moreover, Arneklev et al. (1999) argued that low self-control may simply be a manifestation of impulsivity, and impulsivity manifests itself through each of the other dimensions and in the presence of opportunity of action.

Other works carried out in the low self-control area have pointed out that certain elements of the self-control construct did not work in the predicted fashion. Longshore et al. (1996) reported the efficacy of the simple tasks sub-scale in some of their empirical studies. In their studies DeLisi and his colleagues (2003) found that only temper predicted crime commission among their subjects. Arneklev et al.'s (1993) study indicated that the relationship between the simple tasks measure and imprudent behavior was in the opposite direction to that predicted in the theory.

Imprudent Behavior versus Attitudnal Indicator

Whether "attitudinal" or "behavioral" are better measures to access low self-control is another issue which has arisen among researchers working in this area (Evans, Cullen, Burton Jr., Dunaway, & Benson, 1997; Grasmick, et al., 1993; Hirschi & Gottfredson, 1993; Keane, Maxim, & Teevan, 1993; Tittle, Ward, & Grasmick, 2003a; Tittle, et al., 2003b). Hirschi and Gottfredson (1993) did not reject the value of attitudial measures, but they stressed the imporance of also creating valid and reliable behavioral measures of the low self-control trait construct.

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Evans et al. (1997) used survey data from a mid-western city to examine the predictive power of an 11-item, self-reported cognitive scale and an 18-item, self-reported behavioral measure of self-control (e.g., smoking, having accidents, and urinating in public) on a 17-item self-reported criminal behavior scale. They reported that larger coefficients were attained for the behavioral measure than for the cognitive scale with respect to the prediction of crime. The weak effect of the cognitive scale could be explained by its low reliability and incomplete (it did not include all of the elements of low self-control specified by Gottfredson and Hirschi). Pratt and Cullen's (2000) meta-analysis on low self-control research suggested that the effect size of analogous behaviors on crime is larger, but not significantly so, than the effect size of attitudinal measures with respect to the wide range of studies included in the meta-analysis.

Tittle et al. (2003b) also examined the relative predictive power of cognitive and behavioral indicators of low self-control, but their results indicated that that the measures are *equally effective* in predicting criminal involvement. Arneklev et al. (2006) compared the efficacy of two such measures in predicting involvement in crime and other social outcome variables. They emphasized that they excluded illegal conduct in the behavioral measure of "imprudent behavior," and demonstrated that the attitudinal indicator of low self-control is a relatively stronger predictor of crime than imprudent behavior.

In the preceding decade, perhaps no other criminological theory has received as much attention as that proposed in *A General Theory of Crime*. This fact can be attributed to both the prominence of the authors and the clear, parsimonious, and testable nature of the theory set forth in that influential work. Regardless the form, method, and representation of the measurement model, difference in the choice of dependent variables (e.g., crimes of force, fraud, or juvenile delinquency), the role of self-control as an underlying propensity on committing criminal/delinquent acts has been well documented regardless of it source or social setting.

Vazsonyi et al. (2001) performed a large-scale (N = 8,417) examination of self-control theory employing representative samples of youth from four separate nations (the Netherlands, Hungary, Sweden, and the United States), and produced several noteworthy findings that supported the theory. For example, low self-control was associated with deviant behavior for males, females, and five different age groups of adolescents from each of the four nations. In addition, the effects of self-control were **invariant across national and cultural contexts**. Winfree, Taylor, He, & Esbensen (2006) conducted a 5-year longitudinal study of self-control theory based on data from 965 youths from six U.S. cities: Philadelphia, Pennsylvania; Lincoln and Omaha, Nebraska; Las Cruces, New Mexico; Portland, Oregon; and Phoenix, Arizona. They found offenders tended to exhibit low self-control, demonstrate more impulsivity, and manifest greater risk taking than non-offenders; moreover, the slopes of the group differences were relatively stable (also see Turner & Piquero, 2002).

Evans and his colleagues (1997) reported that self-control was related to quality of family relationships, attachment to church, having criminal associates and values, educational attainment and occupational status, and residing in a disorderly neighborhood perceived to be experiencing disorder. They also found self-control was associated with quality of friendships and marriage. Similar results were found by other researchers: low self-control was related to multiple dimensions of school failure, poor family relations, limited career goals, associating with delinquent peers, and delinquent behavior (C. L. Gibson, Wright, & Tibbetts, 2000).

Self-control has been linked to problematic outcomes under a variety of specific contexts. For instance, in the traffic context, people with low self-control are more likely to exhibit risky and aggressive driving behaviors (Ellwanger, 2006), more likely to be involved in traffic accidents (Junger & Tremblay, 1999; Junger, West, & Timman, 2001), less likely to wear seat belts (Keane, et al., 1993), and more likely to be driving under the influence (Keane, et al., 1993). In terms of school-based outcomes, self-control significantly predicted academic cheating, cutting class, truancy, and academic suspension or expulsion (Gibbs, et al., 1998). Individual who are low in self-control are more likely to engage in criminal acts of force and fraud, such as violent, property, and public-order crimes, imprudent behaviors, and various forms of victimization (for review see Pratt & Cullen, 2000).

In Pratt and Cullen's (2000) meta-analysis of the empirical tests of self-control theory, 21 studies that included 17 independent datasets and 49,727 individual cases were reviewed. They assessed the relationships of the effect-size estimates of 126

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self-control measures to crime-related dependent variables, and concluded that self-control, with an effect size over .20, was one of the strongest known correlates of crime.

General Aggression Model (GAM)

The commonly accepted contemporary definition of aggression is any behavior intended to cause harm to another individual, and the perpetrator believes that the target is motivated to avoid the behavior (Craig A. Anderson & Bushman, 2002; Craig A. Anderson & Carnagey, 2004; Bushman & Anderson, 2001). A majority of researchers agree that aggression is often the result of a complex interplay among personal and environmental factors, including frustration, negative affect, learning, and biased information processing (for review, see Craig A. Anderson & Bushman, 2002). The complex nature of aggressive behavior has been studied by many researchers, and they have been guided in their work by a number of different theories of aggression. Although domain-specific theories have improved our understanding of aggressive behaviors, the narrow focus and the loose connections among disparate empirical findings in separate domains have heightened the importance of an integrative framework for understanding aggression (Craig A. Anderson, 1997; Craig A. Anderson, Anderson, & Deuser, 1996; Craig A. Anderson, Deuser, & DeNeve, 1995).

Anderson and Bushman (2002) proposed such an integrate framework, calling it the General Aggression Model [GAM] (see Figure 2.1). This model incorporates the most prominent theories employed to explain aggressive behavior, including cognitive neo-association theory (Berkowitz, 1990), social learning theory (Bandura, 2001),

script theory (Huesmann, 1986, 1998), social-information processing theory (Crick & Dodge, 1994; Dodge & Crick, 1990), excitation transfer theory (Zillmann, 1983), and social interaction theory (Tedeschi & Felson, 1994). GAM represents an attempt to establish a parsimonious conceptualization of aggressive behavior that can explain the variety of motives for engaging in aggressive behavior (Craig A. Anderson & Bushman, 2002).

Single Episode Cycle

The GAM is a mediational model of aggression, and as such it focuses on how individuals act in a social interaction referred to as an *episode*. An episode is composed of inputs, routes, and outcomes (see Figure 2.1).
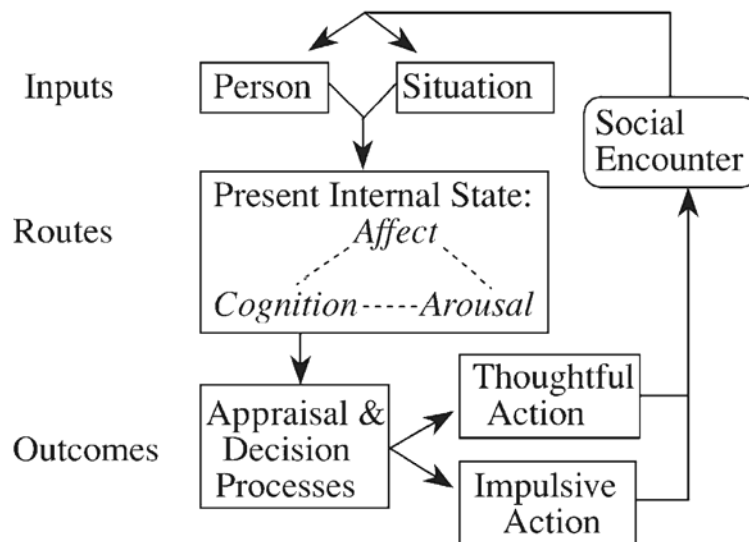
Figure 2.1 The general aggression model: Episodic Process. From Anderson and Bushman (2002). Reprinted, with permission © 2002 by Annual Reviews www.annualreviews.org

Inputs. Extant research has indicated how various biological, environmental, psychological, and social factors affect aggressive behavior. These factors can be categorized as being of two principal types of *proximate* causes occurring at the input level. Personological causes describe the factors which the person brings to the situation, such as personality traits, gender, attitudes, and genetic predispositions. These personal factors are consistency across time or/and situations, and influence what situations an individual will look for or tend to avoid. In other words, person factors "comprise an individual's preparedness to aggress" (Craig A. Anderson & Bushman, 2002, p. 35). Situational causes include important features of the situations, such as presence of a provocation or an aggressive cue, such as an insult or experiencing an uncomfortable temperature. Depending on the nature of a particular input variable, an individual may be more or less likely to act with aggressive behavior.

Routes. Personological and situational causes influence behavior via present internal state, which consists three different but interrelated routes*: cognition* (e.g., hostile thoughts, script), *affect* (mood and emotion, expressive motor responses), and *arousal*. An input variable may affect aggression through one, two, or all three routes. Moreover, these three routes may influence the others, such that initial activation of one pathway (e.g., angry affect) increases the accessibility of other pathway (e.g., hostile cognition). For instance, hot temperatures can directly increase hostile affect and physiological arousal, and indirectly increase hostile cognition (Craig A. Anderson, et al., 1996; Craig A. Anderson & Dill, 2000).

Person and situation variables may affect present internal state either separately or interactively. Anderson et al. (1998) found an interaction effect between pain and trait hostility on aggression cognitions: Pain only increased aggressive cognitions in trait hostile people. Anderson's (1997) studies indicated that exposure to media violence and trait hostility both increased feelings of state hostility, but the two factors did not interact.

Outcomes. The last stage of a single episode GAM includes several complex appraisal and information processes. These processes can range from relatively automatic to the heavily controlled. Results from the person and situation factors enter into the appraisal and decision processes via their effects on cognition, affect, and arousal. Figure 2.2 shows the details of the appraisal and decision processes. The "immediate appraisal" represents the more automatic process, and "reappraisal" represents the more controlled process. The final action of the episode is determined by the outcomes of these decision processes. In the end, the action influences the nature of the social encounter, and then shapes both the person and situation as part of the inputs for the future episode.

Immediate appraisal is relatively effortless, spontaneous, and tends to occur without awareness. The information processing during immediate appraisals include affective, goal, and intention information. Different individuals may react differently based on their social learning history (i.e., personality) and which knowledge structures are most accessible at this given time. Two factors decide what happens after immediate appraisal: 1) does the person have enough resource? and 2) is the outcome of immediate appraisal both important and unsatisfying? If resources are insufficient or if

the outcome is trivial or satisfactory, the person will react with impulsive action. Depending on the content of the immediate appraisal, the impulsive action could be either aggressive or non-aggressive.

During reappraisal, different knowledge structures may be recruited and testing may occur to form an alternative view of the situation. The reappraisal cycle could occur more than once. The thoughtful action could be nonaggressive, but it also could be highly aggressive (coldly calculating or still hot affective characteristics). The double arrow displayed in Figure 2.2 indicates that the appraisals are influenced by present internal state, and also influence the present internal state.
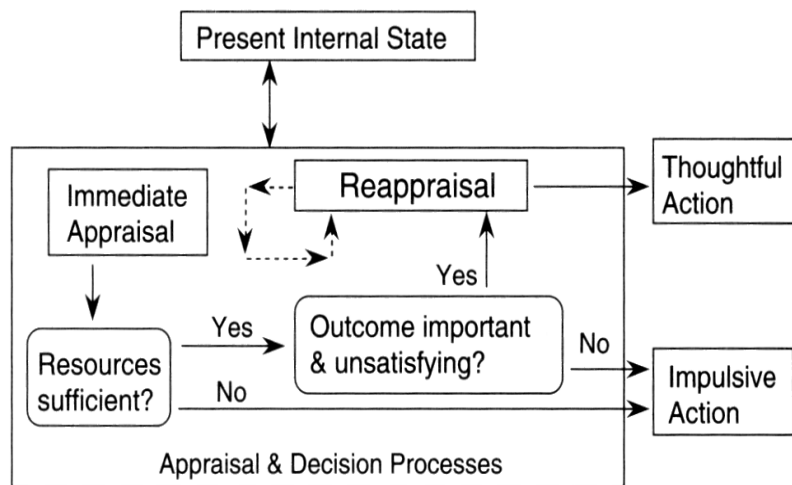
Figure 2.2 Appraisal and decision processes: Expended view. From Anderson and Bushman (2002). Reprinted, with permission © 2002 by Annual Reviews www.annualreviews.org

Developmental Cycle

Each episode can be considered to be a learning trial which develops, automatizes, and reinforces aggression-related knowledge structures. As depicted by

Figure 2.3, five types of such knowledge structures were identified for inclusion in the model: attitudes, perceptual schemata, expectation schemata, behavior scripts, and desensitization (Craig A. Anderson & Bushman, 2002; Craig A. Anderson & Carnagey, 2004). An aggressive personality is the result of a series of learning episodes that prepare a person to react aggressively or violently in different situations.
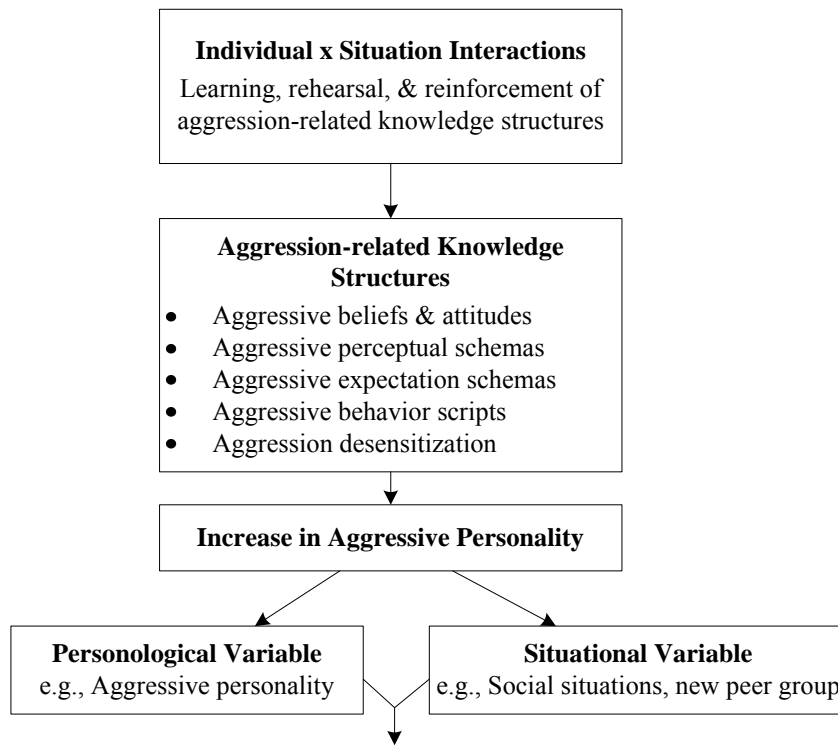
Figure 2.3 The General Aggression Model: Developmental/personality processes in relation to five categories of aggressive-related variables (Anderson & Bushman 2002).

Although the GAM focuses on how personal and situational factors influence outcome behaviors via the present internal state, it also stresses the importance of the past and future in our understanding of aggression. The bottom half of Figure 2.3 demonstrates how the past and future influence an individual's behavior in the present

situation by the link between the developmental-personality portion and the single episode portion. The past experiences determine what people bring with them to the present episode. Expectations about the future also influence the individual's appraisals at the current episode. Personality influences the construal of, and reaction to, new social encounters, thus bringing both the past and the future into the present social episode. In addition, changes in personality can change both the quantity and quality of the situations that the person will encounter in the future. For example, a child who becomes more aggressive over time will change his friendship patterns and relationships with teachers and family members. Over time, this child tends to become a social outcast, associating increasingly with other aggressive children and being disconnected with more socially adept peers. Interactions with teachers and parents tend to deteriorate as well for this child. The child's environment becomes more aggressive and confrontational in both qualitative and quantitative ways, reinforcing the tendency toward aggressive reactions in future episodes.

Violence Escalation Cycle

Most acts of violence are the result of a series of conflict-based interactions between two (or more) parties trading retaliatory behaviors in an escalating cycle. C. A. Anderson and Carnagey (2004) proposed a violence escalation cycle to explain this phenomenon using the GAM framework (see Figure 2.4).

The cycle can be triggered by either a relatively minor or major event. One person's "appropriate and justified" reactions can be explained by another person as an "inappropriate and unjustified" retaliation to provoke the following aggressive reactions. Once the cycle has started, it tends to be persistent regardless if the initial triggering event remains present or is lost in the distant past. The conflict between Israelis and Palestinians, Serbs and Croats and Turks and Armenians, for example, are illustrations of distant past conflict that are relived in contemporary episodes of aggressive behaviors.
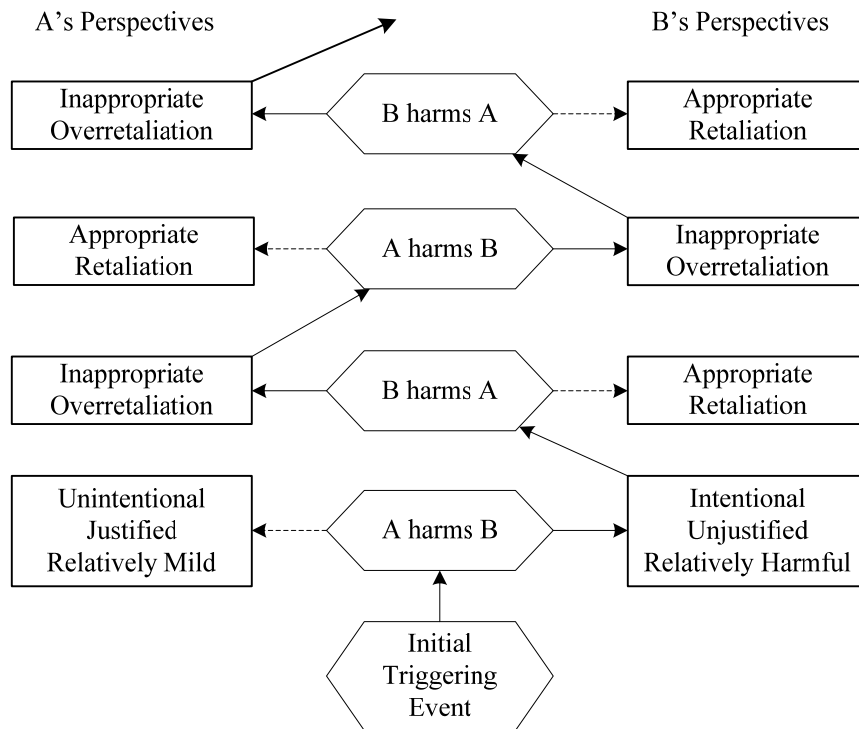
Figure 2.4 The violence escalation cycle. From Anderson and Carnagey (2004).

C. A. Anderson and Carnagey (2004) mentioned several key points about the violence escalation cycle. First, "violence begets violence." This cyclical nature of violent behaviors can be observed in everyday interaction among persons as well as

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among nations. However, people involved in these cycles unusually cannot perceive aspects of the situation that seem apparent to outside observers. One of the important reasons for this predictable myopia is that people tend to attribute others' behaviors their own dispositions, but attribute their own behaviors to the situation (e.g., Lassiter, Geers, Munhall, Ploutz-Snyder, & Breitenbecher, 2002).

Second, the retaliations observed in these cycles of escalating violence tend to absolutely or relatively escalate over time in highly predictable ways. Third, the violence could be brought to the highest level ever by the perspective biases in which the most recent perpetrator perceives his harmful act as appropriate and justified, whereas the victim perceives this harmful act as an inappropriate overreaction. Forth, what is important is how people respond to the situation and respond to change the situation, not how or whether an individual gets into the initial conflict situation.

The Implications of GAM

Since its introduction in 2002, the GAM has been employed as a framework to direct numerous studies on various aggressive behaviors, such as consumption of media violence (e.g., C. A. Anderson, Carnagey, & Eubanks, 2003; Coyne, et al., 2008), violent video game playing (Barlett, Harris, & Bruey, 2008; Bushman & Anderson, 2002; Kirsh & Mounts, 2007; Wallenius, Punamaki, & Rimpela, 2007), intimate partner violence (Clements & Holtzworth-Munroe, 2008; Wesley & Craig-Henderson, 2006), indirect aggression (Coyne & Whitehead, 2008; Wallenius, et al., 2007), alcohol-related aggression (Bartholow & Heinz, 2006; Borders, Barnwell, & Earleywine, 2007), aggressive driving (Nesbit, Conger, & Conger, 2007), and anti-gay aggression [hate

crimes] (Dominic J. Parrott, 2008; D. J. Parrott & Zeichner, 2008).   Some studies also

have examined the assumptions and features of the GAM, such as the indirect effects of

input factors on aggression (Joireman, et al., 2003; Wittmann, Arce, & Santisteban,

2008), interactions between Person and Situation (Joireman, et al., 2003), development

cycle (Carnagey, Anderson, & Bushman, 2007), and the violence escalation cycle (Craig

A. Anderson & Anderson, 2008; Geiger & Fischer, 2006).

Besides its implications for conducting research on aggression, the GAM has also

generated some noteworthy social, political and cultural implications (Craig A. Anderson

& Carnagey, 2004).   The GAM tells us how to raise children who will not resort to the

use of violence to resolve conflicts.   Based on the GAM, we can acquire the knowledge

about how to construct successful prevention programs, why prevention is easier than

intervention, why intervention is easier for younger children than adolescents or adults,

and why some programs "work" and others do not in the area of social violence

abatement (e.g., Craig A. Anderson & Bushman, 2002).   The GAM and the related

research can also provide some useful guidelines for interactional political action in the

face of conflicts between and among nations.

As for cultural implications, the GAM points out that modern society should be

more aware of cultural shifts toward a greater social acceptance of violence in everyday

life.   When a society becomes more tolerant of violence in everyday life, both the

immediate price for public safety and long-term risks for social civility are clear.   More

crimes can be expected in the immediate timeframe, and the next generation will create a

more aggression-tolerant norm in the future.   Such tolerance of violence may increase a

nation's willingness to go to war to further its political aims.   Carnagey and Anderson

(2007) have argued in their recent work that changes in the framing of news reports about 9/11 events and the "war on terrorism" may or time cause system changes in attitudes toward violence in this country. This attitudes change may make the U.S. population more likely to accept the wars in Afghanistan and Iraq as legitimate, situationally appropriate, and even commendable foreign policy.

Conclusion

Gottfredson and Hirschi (1990) proposed a general theory of crime, with the concept of low self-control as its center-piece, to explain why an individual engages in criminal and analogous behaviors. According to the authors, low self-control comprises six essential elements: impulsivity, preference for simple tasks, risk-seeking potential, preference for physical (as opposed to mental) activities, self-centeredness, and the possession of a volatile temper.

Low self-control is described as a characteristic that is established early in life and remains relatively stable across the life-course. Individuals with low self-control will engage in a wide range of criminal and analogous behaviors when they have the opportunity to do so. Gottfredson and Hirschi (1990, p. 15) defined crime as "acts of force or fraud undertaken in pursuit of self-interest." They also described "analogous behaviors" as acts similar to crime in that they also have immediate benefits and long-term negative consequences. Gottfredson and Hirschi (1990, p. 90) pointed out in their work that people with low self-control "will also tend to pursue immediate pleasures that are not criminal: they will tend to smoke, drink, use drugs, gamble, have children out of wedlock, and engage in illicit sex." Finally, Gottfredson and Hirschi also argued that

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self-control acts as a "self-selection" mechanism in that individuals are "sorted into a variety of circumstances that are as a result correlated with crime" (1990, p. 119).

The low self-control scale developed by Grasmick et al. (1993) is the most widely used instrument employed to measure low self-control. However, the validity of the self-control scale as a unidimensional construct has been challenged by a number of researchers. In recent years, some researchers have suggested that the structure of this scale should be conceived of as involving a first- or second-order multidimensional construct (S. W. Baron, et al., 2007; DeLisi, et al., 2003; C. Gibson & Wright, 2001; Piquero, et al., 2000; Ribeaud & Eisner, 2006; Vazsonyi, et al., 2001), and each sub-scale may have different effects on different crimes/delinquent behaviors (Arneklev, et al., 1999; Arneklev, et al., 1993; LaGrange & Silverman, 1999; Longshore, et al., 1996; Piquero & Rosay, 1998).

The GAM represents a mediational model of aggression which posits that person factors (attitudes toward violence, trait aggression) and situational factors (exposure to real-life violence or media violence) interact to influence the components of an individual's current internal state (affect, arousal, and cognition). These routes each may interact with one another. That appraisal process leads to either impulsive or thoughtful behaviors. Both impulsive and thoughtful behaviors can be either aggressive or nonaggressive. The GAM incorporates a feedback loop in which the behaviors shape an individuals' person and situation factors via the influence of repeated social encounters.

Clearly, self-control theory and the GAM proposed several similar explanations of aggressive behaviors. The GAM could provide an integrative framework to refine

self-control theory.   The next chapter will discuss the methodology and hypotheses developed under the framework of GAM to examine the effects of self-control within the traffic context.   Specifically, both mediational and moderated effects of three interconnected personality traits (impulsiveness, temper, and risk seeking) will be examined.

CHAPTER THREE

HYPOTHESES AND METHOLOGY

Gottfredson and Hirschi (1990) proposed the term "low self-control" to describe the enduring trait of "criminality" or "criminal propensity" which an individual might possess who could not resist the immediate gratification provided by the commission of a crime or analogous behavior resulting in a tangible personal benefit. According to Gottfredson and Hirschi, persons who are low in self-control tend to be "impulsive, insensitive, physical (as opposed to mental), risk taking, short-sighted, and non-verbal" (1990, p. 90). These researchers saw these elements as combining to form a single, underlying propensity. They also argued that a lack of self-control is neither a sufficient nor a necessary condition for crime to occur; that is, they maintained that other properties of the individual or the situational circumstances would interact with level of self-control to determine the character of a person's behavior. Even though Gottfredson and Hirschi recognized the importance of situational factors, the logic of their theory accords the factor of self-control a role of principal importance in accounting for individual differences in the commission of crime and engaging in analogous behaviors.

The research conducted to date tends to focus on the effects of low self-control on various specific types of delinquent and criminal behaviors, and on the negative social consequences of those actions; this literature features strong evidence to support the claim that low self-control is a critically important aspect of criminal behavior and juvenile delinquency alike (e.g., S. W. Baron, 2003; DeLisi, Hochstetler, Higgins, Beaver, & Graeve, 2008; Ellwanger, 2006; Evans, et al., 1997; Grasmick, et al., 1993; Higgins, Wolfe, & Marcum, 2008; Piquero, MacDonald, & Dobrin, 2005). However, it

is equally clear that the researchers producing reports of their work in this area tend to either downplay or completely ignore the situational circumstances side of the general theory of low self-control as a criminological core theory.   Only a handful of these many studies conducted on low self-control have discussed how the situational factors influence the effects of level of self-control on crime commission or delinquent behaviors; these would include some studies on lifestyle (S. W. Baron, 2003; Stewart, Elifson, & Sterk, 2004), some studies on supervision for juveniles (Cretacci, 2008; LaGrange & Silverman, 1999), some studies featuring research on perceptions of opportunities to commit offenses over a certain time period (Arneklev, et al., 1999; Grasmick, et al., 1993), and some studies on the opportunity to grade one's own exam and to then raise the grade recorded on that exam (Smith, 2004).   These various studies investigated some effects of situational factors, but they focused exclusively on measures of extent of opportunity. Based on studies of this type, Gibbs, et al. (1998, p. 43) argued that self-control should be considered as reflective of both the person's character and the situational context in which a decision is being carried out; they noted in this regard that "a broad disposition that has to do with individual assessments of consequences of actions *and interpretations of situations* (emphasis not in the orginial text)."

Polakowski (1994) argued that the general theory could be enhanced by incorporating theories of offenses to uncover the genuine and irreducible complexity of "person × situation" interactions (also see Hirschi, 1986).   Similarly, Forde and Kennedy (1997) argued that it is necessary to take into account the more proximate factors affecting criminality that may moderate or mediate the relationships between self-control, and criminal behaviors (also see Arneklev, et al., 1993).   Low self-control

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will change the type of lifestyle one will lead, which will affect how one approaches criminal events and affect one's propensity to get involved in these events (Schreck, Wright, & Miller, 2002). Also, this propensity will be modified by the situational factors of the criminal event (Luckenbill & Doyle, 1989) and their experiences in past events (Paternoster & Brame, 1997).

The GAM provides a virtually ideal framework to understand the complexity and the geographic distribution of crimes. The GAM represents a *mediational model of aggression* which posits that *person factors* (e.g., attitudes toward violence, the trait of aggression) and *situational factors* (e.g., exposure to real-life violence or media violence) interact to influence the components of an individual's current internal state (affect, arousal, and cognition). These routes each may interact with one another. That appraisal process leads to behaviors being classified as either "impulsive" or "thoughtful" activities. Impulsive behaviors and thoughtful behaviors alike can be either aggressive or nonaggressive in intent. The GAM integrates a feedback loop in which the behaviors shape an individuals' person and situation factors via the influence of repeated social encounters.

In this study, the GAM is employed as the analytical framework in an attempt to enhance our understanding of self-control theory in several important ways. Figure 3.1 represents a conceptual overview of the application of the GAM on aggressive driving.
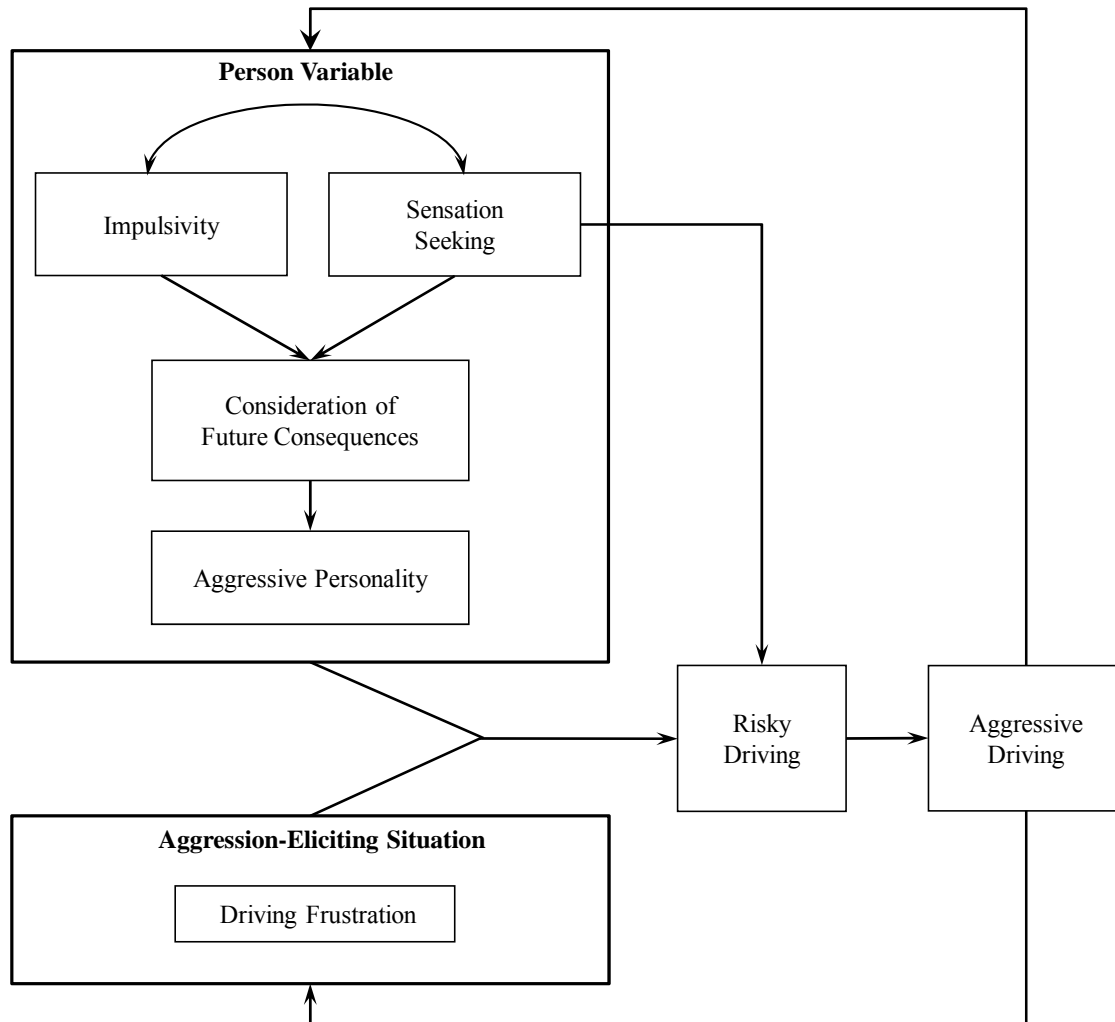
Figure 3.1 General aggression model applied to the aggressive driving, denoting three major goals of the present study.

Hypotheses

Three major empirically testable hypotheses are assessed in this study of aggressive driving:

Hypothesis 1: **Individual differences in *aggressive personality* mediate the relationship between sensation seeking, impulsivity, CFC and the commission of aggressive driving behaviors.**

Although some preceding studies suggest strongly that low self-control is associated with crimes and analogous behaviors, previous research has only attempted to examine the direct effects of low self-control on these deviant behaviors. Once this connection is established, the question then becomes -- *how is it that low self-control is related to crimes and analogous behaviors?* In response to this question Gottfredson and Hirschi (1990) have argued that level of self-control directly affects an individual's ability to calculate the consequences of one's acts correctly. They described that "the impulsive or shortsighted person fails to consider the negative or painful consequences of his acts; the insensitive person has fewer negative consequences to consider; the less intelligent person also has fewer negative consequences to consider (has less to lose)" (Gottfredson & Hirschi, 1990, p. 95). It is possible that rather than low self-control being the "driver" of deviant behavior the degree of "consideration of future consequences" is actually more central to the issue. Unfortunately, Gottfredson and Hirschi did not devote much attention to or expend much effort on the other elements of low self-control, such as preference for simple tasks, enjoyment of risk-seeking, preference for physical as opposed to mental activities, self-centeredness, and easy arousal of temper.

In this study, the focus of attention lies on examining the following possibilities. First, sensation seekers are more likely to engage in aggressive driving behaviors than non-sensation seekers via the association of this trait with consider the future consequences (CFC) and aggressive personality (Hypothesis 1a). Second, persons high in impulsivity are less likely than persons low in impulsivity to CFC of their behavior. As such, they are more likely to drive aggressively than persons lacking this combination

of traits (Hypothesis 1b).   Third, the relationship between impulsivity and aggressive driving may also be mediated by aggressive personality (Hypothesis 1c).   Fourth, the effects of CFC on aggressive driving are mediated by aggressive personality (Hypothesis 1c).

Hypothesis 2: An individual's traits affect the situations in which this person places himself, and they also affect how these situations are interpreted by the individual in question.

A number of studies have been published which document the fact that the sensation seeking trait predicts a variety of risky behaviors, including engaging in risky sex, drug use, and gambling (for reviews, see Zuckerman, 1979; Zuckerman, 1994), and risky driving is also included as a related behavior (e.g., Arnett, 1990, 1994, 1996; Arnett, et al., 1997; Burns & Wilde, 1995; Greene, et al., 2000).   These studies suggest that sensation seekers are more likely to engage in risky driving behaviors (Hypothesis 2a). These risky driving behaviors will mediate the relationship between sensation seeking and aggressive driving (Hypothesis 2b).

It is well known that how an individual interprets the situation in which they find themselves is influenced by his/her personality.   Impulsive people and sensation seekers may be frustrated by different driving conditions, while persons who are not impulsive and are not sensation seekers will find the same situations as absent any frustration (Hypothesis 2c).   Additionally, the level of frustration experienced may mediate the effects of impulsivity and sensation seeking on aggressive driving behaviors (Hypothesis 2d).

*Hypothesis 3*__:__ **The features of the person and situation interact to determine whether or not an individual will drive aggressively.** Frustration is commonly defined as the blockage of goal attainment (e.g., Craig A. Anderson & Carnagey, 2004; Berkowitz, 1989)**.** Prior research indicates rather convincingly that the relationship between frustration and aggression is mediated by various factors (e.g., Agnew, 1992; Craig A. Anderson & Bushman, 2002; Berkowitz, 1989, 1990). Frustrations do not always lead to aggression, and the effects of frustration likely vary by individual and by situation alike (Berkowitz, 1989). In this study, we focus on the seldom studied interaction effects of aggressive personality and level of frustration on engagement in aggressive driving behaviors. Specifically, the hypothesis is tested that the effects of frustration on aggressive driving are stronger for the people who are high in the aggressive personality trait than others who are low on the aggressive personality characteristic.

Study 1

Sample

Data for this study were extracted from two principal sources, and these data will permit the empirical testing of the hypotheses set out above. The first data source was collected in a university located in the Pacific Northwest region of the United States during the Winter Quarter of 2001 (Appendix 1). The participants in the study in question were introductory psychology students who took part in the study in exchange for extra credit, and they were debriefed at the end of the quarter as to the questions being addressed by the study. There were 45 (30.2%) males and 103 (69.1%) females in the

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subject pool.   The average age for the entire sample was 19.06 years (range 18-28, SD=1.43), 19.56 (SD = 1.88) and 18.85 (SD = 1.11) for the males and for the females, respectively.

Measures

Participants were asked to complete a survey package which included the following elements: 1) the Consideration of Future Consequences Scale [CFC] (Strathman, et al., 1994); 2) the Buss-Perry Aggression Questionnaire (PBAQ, Buss & Perry, 1992); 3) Zuckerman's (1979) Sensation Seeking Scale [form V] (SSS-V); 4) the eight-item Impulsivity scale (Zuckerman, Kuhlman, Joireman, Teta, & Kraft, 1993); and 5) the Driving Behavior Questionnaire.

The first part of the survey package contains the CFC scale (Strathman, et al., 1994).   This 12-item measure assesses individual differences in the extent to which immediate versus distant consequences of behavior is considered.   Participants rated the extent to which each statement described them on a 7-point Likert-type scale ranging from 1 (extremely uncharacteristic) to 7 (extremely characteristic).   High CFC individuals consider the future consequences of their behavior and endorse statements such as "I consider how things might be in the future, and try to influence those things with my day-to-day behavior" and "I am willing to sacrifice my immediate happiness or well being in order to achieve future outcomes."   In contrast, individuals with low CFC scores are more likely to focus on immediate concerns and needs and endorse statements such as "My convenience is a big factor in the decisions I make or the actions I take" and "I only act to satisfy immediate concerns, figuring the future will take care of itself."

The CFC scale has demonstrated good internal consistency and good test-retest reliability, and it has shown good convergent and discriminate validity in psychometric assessments (Joireman, et al., 2003; Strathman, et al., 1994).

Petrocelli (2003) employed a series of factor analyses and indicated that the CFC scale consisted of two underlying sub-factors — an immediate and a future sub-factor. Moreover, Joireman and his colleagues (2008) reported the results of confirmatory factor analysis that support the same two-factor structure. They also found that the CFC-Immediate (CFC-I) and CFC-Future (CFC-F) are highly correlated to each other, but have different prediction power on lower levels of trait self-control, which are predicted by higher levels of CFC-I rather than CFC-F. Therefore, the 12-item CFC scale was divided into a CFC-I scale (7 items) and a CFC-F scale (5 items), each with acceptable internal consistence — .778 (CFC-I) and .652 (CFC-F), respectively.

The second part of the package measured individual difference in aggressive personality with the BPAQ (1992). The BPAQ represents a revision of the Buss-Durkee Hostility Inventory (BDHI, Buss & Durkee, 1957), including revisions of the response format and item content made to improve clarity and focus. The BPAQ consists of four subscales derived from a 29-item, 7-point Likert scale ranging from 1 (extremely uncharacteristic of me) to 7 (extremely characteristic of me). The four subscales are as follows: 1) *Anger* (e.g., "I have trouble controlling my temper"); 2) *Hostility* (e.g., "I am suspicious of overly friendly strangers"); 3) *Physical Aggression* (e.g., "There are people who have pushed me so far we have come to blows"); and 4) *Verbal Aggression* (e.g., "I often find myself disagreeing with people").

Construct validity for the Buss-Perry subscales is supported by their relatively strong associations with other self-report measures of personality traits (Buss & Perry, 1992). Internal consistency for the four subscales and total score range from .72 (Verbal Aggression) to .89 (Total BPAQ score). Test-retest reliability for the BPAQ over nine weeks is also satisfactory, with correlations ranging from .72 for Anger to .80 for Physical Aggression and for the total score (Buss & Perry, 1992). In this study the four subscales were combined to serve as an index of *aggressive personality*, and this summative index was highly internally consistent ($\alpha = .895$).

The Sensation Seeking Scale (SSS) was first published in 1964 by Zuckerman and his colleagues (Zuckerman, Kolin, Price, & Zoob, 1964). The SSS has been revised several times in order to develop a total sensation seeking score with contemporary relevance, to reduce the degree of correlation among the subscales, and to reduce its length to promote easier use and replication. The SSS-V is presently the most commonly used measure of sensation seeking (Zuckerman, 1994). It contains four subscales, each of which consists of 10 forced-choice items which require subjects to choose between a statement which reflects a desire for sensation and one that reflects a more cautious predilection.

The SSS-V subscales include the following: 1) *Boredom Susceptibility* (BS, e.g., "There are some movies I enjoy seeing a second or even a third time" vs. "I can't stand watching a movie that I've seen before"); 2) *Disinhibition* (DIS, e.g., "I like 'wild' uninhibited parties" vs. "I prefer quiet parties with good conversation"); 3) *Experience Seeking* (ES, e.g., "I like to explore a strange city or section of town by myself, even if it

means getting lost" vs. "I prefer a guide when I am in a place I don't know well"); and

4) *Thrill and Adventure Seeking* (TAS, e.g., "I often wish I could be a mountain climber" vs. "I can't understand people who risk their necks climbing mountains"). It is important to note for this study that there are no items on the SSS-V which refer to driving behavior. Internal reliabilities for the total SSS range between .83 and .86, while the reliabilities for the subscales are: BS, .56 - .65; DIS, .74 - .78; ES, .61 - .67; and TAS, .77 - .82 (Zuckerman, 1994). Test-retest reliability over a 3-week period is 0.94 for the total score (Zuckerman, 1994). In this study, the total score of SSS-V will be used as the index of sensation seeking ($\alpha = .790$).

The Zuckerman–Kuhlman Personality Questionnaire (ZKPQ, Zuckerman, et al., 1993) consists of 99 items measuring five basic dimensions of personality, and participants are asked to answer True or False on each statement. The five personality dimensions measured by this instrument are as follows: 1) *Neuroticism-Anxiety* (e.g., "I am not very confident about myself or my abilities"); 2) *Activity* (e.g., "I do not like to waste time just sitting around and relaxing"): 3) *Sociability* (e.g., "I spend as much time with my friends as I can"): 4) *Impulsive Sensation Seeking* (e.g., "I often do things on impulse"): and 5) *Aggression-Hostility* (e.g., "I enjoy seeing someone I don't care for humiliated before other people").

Two subscales, featuring 19 items, compose the Impulsive Sensation-Seeking dimension. The first subscale, *Impulsivity* (containing 8 items), involves a lack of planning and the tendency to act quickly without much thinking. The second subscale, *Sensation Seeking* (entailing 11 items), describes the seeking of excitement, novel

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experiences, and the willingness to take risks for the sake of having these types of experiences. The items are general in content and do not describe specific activities such as drinking, sex, or driving-related behavior. In this study, the 8-item Impulsivity subscale were used to measure individual differences in impulsivity, and the scale achieved an acceptable level of reliability ($\alpha = .694$) with the study population.

The final part of the survey package was the Driving Questionnaire measuring study participants' driving behaviors. Subject in the study were asked to indicate the extent to which they engage in 21 driving behaviors, with 5-point Likert-type scales being offered as response categories ranging from 1 (Never) to 5 (Always). Two subscales were used to indicate the *risky driving* (8 items) and *aggressive driving* (5 items). Both measures are internally consistent, with alpha values of .908 and .760 for risky driving and aggressive driving, respectively. Four additional questions relating driving history were asked to collect the following types of driving-related information: 1) the number of speeding tickets received; 2) number of moving violations aside from speeding tickets; 3) the number of hospitalized occasioned by an automobile accident; and, 4) the number of automobile accidents the person has been involved in since they began driving.

Study 2

Sample

The second data source used for this study was the Washington Driver's Experience Survey (Appendix 2, Ellwanger, 2006). A sample of 2,000 licensed drivers aged 16 to 24 years were randomly selected by the Washington State Department of

Licensing.   This survey was mailed to these novice drivers during the months of October to December, 2004 in two waves.   The dataset developed from this survey contains 366 respondents, 156 (42.6%) of whom are males and 210 (57.4%) of whom are females. The average age for the entire sample was 19.3 years (SD=2.67), 19.15 (SD = 2.63) and 19.41 (SD = 2.69) for males and females, respectively.

Measures

Three scales were included in the Washington Driver's Experience Survey – namely, the *Driving Frustration Scale* (Ellwanger, 2006), the *Low Self-Control Scale* (Grasmick, et al., 1993), and the *Traffic Delinquency Scale* (Ellwanger, 2006).   In addition, several important demographic background variables shown in previous studies to be related to driver accidents and citations were measured.   Survey items for documenting factors such as amount and type of driving instruction prior to licensing, participation in the state's Graduated Licensing Program (featuring progression from limited driving privileges such as daytime only and no juvenile passengers to full privileges), gender, ethnicity, post-licensing driving experience, vehicle type, and vehicle ownership of vehicle

The first part of the Washington Driver's Experience Survey contains the 28-item Driving Frustration Scale developed by Ellwanger (2006).   Participants rated the extent to which each statement described them on a 7-point Likert-type scale ranging from 1 (extremely uncharacteristic) to 7 (extremely characteristic).   This scale consists of six distinct dimensions: 1) *progress impeded* (e.g., "I don't get frustrated when another driver will not heed my attempt to merge into traffic"); 2) *irregular traffic flow* (e.g., "I get

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frustrated when someone runs a red light"); 3) *law enforcement presence* (e.g., "I get frustrated when a law enforcement official pulls me over); 4) *road construction* (e.g., "I don't get frustrated when I encounter road construction with detours"); 5) *discourteous driving behavior* (e.g., "I get frustrated when someone backs out in front of me without looking"); and 6) *restricted field of vision* (e.g., "I get frustrated when it is raining so heavily that it is difficult to see"). The internal reliability for the total scale is relatively high (α = .81), but the six sub-scales possess only modest reliability estimates, ranging from .61 (restricted field of vision) to .71 (law enforcement presence) (Ellwanger, 2006). A confirmatory factor analysis indicated that six factors were present among the items, but a second-order factor analysis revealed that these factors were associated with two higher order dimensions -- one dimension appearing to be related to other road users and the other to environmental conditions (Ellwanger, 2007).

The second part of the Washington Driver's Experience Survey consists of a 24-item Low Self-Control Scale (Grasmick, et al., 1993). As described in considerable detail in the previous chapter, this attitudinal scale contains six sub-scales -- namely, Impulsivity, Preference for Simple Tasks, Risk Seeking Proclivity, Preference for Physical vs. Mental Activities, Self-Centered Focus, and Easy Arousal of Temper. The overall scale is internally consistent (α = .81) (Grasmick, et al., 1993). Survey participants were asked to indicate their level of agreement with each statement on 5-point Likert-type scales ranging from 1 (strongly disagree) to 5 (strongly disagree). This study focuses on three of the six sub-scales: impulsivity, risk seeking, and temper; the internal reliability coefficients for these scales were .67, .79, and .71 for impulsivity, risk seeking, and temper, respectively.

The last part of the Washington Driver's Experience Survey was the Driving Delinquency Scale measuring individual differences in driving behaviors. Survey participants were asked to indicate the extent to which they engage in 18 specific driving behaviors with 5-point Likert-type scales ranging from 1 (Never) to 5 (Always). Selected items from this set of questions were combined to form two scales: risky driving (6 items) and aggressive driving (5 items). Both measures are internally consistent, with alpha values of .90 and .74 for risky and aggressive driving, respectively. Three additional questions from the survey pertaining to driving history were collected for the current study, those being: 1) the number of speeding tickets received; 2) the number of moving violations other than speeding violations; and 3) number of automobile accidents in which the respondent has been involved as a driver

Structural Equation Modeling

Structural Equation Modeling (SEM) is a comprehensive statistical technique used in the social sciences to test theories relating to complex, multivariate phenomena. Typically, a theory posits "causal" processes that generate systematic effects on multiple variables. Compared to traditional general linear modeling approaches (e.g., zero-order correlation, Analysis of Variance (ANOVA), Exploratory Factor Analysis (EFA), and Multiple Regression), SEM is capable of handling the testing of hypotheses featuring two distinct procedures: 1) a series of structural (i.e., regression) equations representing the causal processes; and 2) these structural relations can be visually displayed in a model diagram to facilitate a clearer conceptualization of the theory. The hypothesized model can be tested statistically in a simultaneous analysis of the whole set of variables to

determine the extent to which the hypothesized model is consistent with the observed data. If adequate goodness of fit is achieved in these statistical analyses, the model argues for the plausibility of the hypothesized relations among variables; if it is not achieved, the hypothesized relations are rejected.

There are several advantages of SEM over classical linear models (Byrne, 2001). First, instead of an exploratory approach, it takes a confirmatory approach to the data analysis. Classical multivariate procedures (e.g., Exploratory Factor Analysis) are essentially descriptive by nature, so that hypothesis testing is difficult, if not impossible (Byrne, 2001; Raykov & Marcoulides, 2000). Conversely, the SEM process specifies a model — that is, precise statements regarding the relationships presumed to exist among variables — and then assesses the plausibility of the specified relations established within the model against the observed data (variance/covariance matrix). This approach to statistical analysis makes it possible to use the SEM process to analyze empirical data for inferential purposes.

Second, SEM estimates degree of error in the estimation of explanatory (i.e., independent) variables, a feature of analysis which cannot be done by traditional multivariate procedures. For classical linear modeling techniques, the absence of error in the explanatory (i.e., independent) variables is an important assumption. Thus, applying those methods when there is error present in the estimation of explanatory variables is equivalent to ignoring known error, a action which may cause serious inaccuracies, especially when the errors in question are non-trivial. This kind of mistake can be avoided by using the SEM approach.

Third, SEM procedures can incorporate both unobserved and observed variables while the classical linear model-based methods are based on available measurements exclusively. Lastly, it is difficult to investigate multivariate relations and assess the mediational relationships obtaining among variables using the classical linear model-based statistical analyses, while these important features are available using SEM methodology. Baron and Kenny (1986) and Judd and Kenny (1981) have discussed a 4-step approach to documenting the presence of a mediated effect with multiple regression models. They maintain that a mediator variable has to meet four specific conditions: 1) the independent variable is correlated with the outcome variable; 2) the independent variable is correlated with the mediator variable; 3) the mediator variable affects the outcome variable; and 4) the effect of the independent variable on the outcome variable is no longer significant when introducing the mediator variable into the regression model. Unlike the SEM procedure, this 4-step approach cannot estimate the mediator effect simultaneously and directly.

Unfortunately, one of the major disadvantages of the SEM process is the difficulty of handling interaction terms in the modeling process. When researchers create an interaction term by cross-multiplying raw scores of two original variables, two problems can be observed after doing this operation (Ping, 1996; Schumacker & Marcoulides, 1998). First, the interactions are highly correlated with the raw score terms, resulting in a collinearity problem; secondly, the resulting matrix of covariances or correlations among the variables is singular (linear dependency in the variables). As a result data analyses cannot proceed in such cases because the matrix is not positive and definite.

Another problem confronted in the cross-multiplication process is that whatever measurement error is present may be substantially inflated.

Fortunately, several procedures have been proposed and are used by scholars to estimate interaction effects in SEM (e.g., Kenny & Judd, 1984; T. J. B. Kline & Dunn, 2000; Ping, 1996). In this study, the ***deviation score approach*** (T. J. B. Kline & Dunn, 2000) will be used to analyze the interaction terms hypothesized in the SEM analyses to follow in the next chapter. In the deviation score approach the interaction term is created by using the deviation-score (centered) of two original variables, and these two original variables are left in their raw-score form. When the use of this interaction term procedure is added to the SEM analysis, it is clear that the SEM approach offers several advantages not associated with classical linear models, making it the most appropriate statistical technique for the current study.

CHAPTER FOUR

FINDINGS

This chapter starts with the analysis of the results of an exploratory factor analysis (EFA) conducted for the Driving Questionnaires developed for Study 1. Next, descriptive analyses are conducted on the measures used in Study 1 to examine extent of normality in the distributions of the independent and dependent variables involved in that study. After that, bivariate correlations among the variables used in this study are investigated. The information provided from the bivariate correlation matrices is important to investigate as a preliminary step in the analysis set forth here; however, to fulfill the purposes of this study Structural Equation Modeling is required. The core research questions and major hypotheses to be studied are examined with the technique of path analysis, which represents a subset of the Structural Equation Modeling statistical techniques.

The presentation of findings for Study 2 also begins with descriptive analyses examining the extent of normality in the distributions of the independent and dependent variables involved in that study. Next, measurement models using confirmatory factor analysis are developed and performed to fit the data. In a critical test of the model developed for risky driving and for aggressive driving, the results from Study 1 are cross-validated using the independently collected data source employed in Study 2. Due to limitations of sample size, the key research questions and principal hypotheses being tested will be examined by the following SEM and path models: 1) effects of self-control on driving frustrations; 2) interaction effects between temper and frustrations on driving behavior; and 3) the full path analysis.

Exploratory Factor Analysis

The Driving Questionnaire used in Study 1 and the Driving Delinquency Survey used in Study 2 consist of a number of highly similar items documenting survey respondents' driving behaviors. The sole difference between the two is that the following three questions were asked only in Study 1: 1) I smoke and drive at the same time; 2) I take risks while bicycling; and 3) I drive under the influence of alcohol. Bicycling and smoking may not apply to everyone, and DUI should be considered as a separate category from general risky driving behaviors. Based on these reasons, these three items will be excluded from the analyses in this study.

Unlike the other instruments used in these two datasets (e.g., SSS-V, CFC scale, and low self-control scale), the driving behavior measure is not as well developed; it lacks clearly identified and psychometrically specified sub-scales. As a consequence, an exploratory factor analysis was preformed with the 18 items pertaining to driving behavior featured in the Study 1 dataset. The factor structure emerging from this analysis is then validated with Study 2 data using confirmatory factor analysis.

Factor Extraction

There are several factor extraction methods available from which to choose in social science statistical software packages; these include principal components analysis (PCA), unweighted least squares, generalized least squares, maximum likelihood, principal axis factoring, alpha factoring, and image factoring. The default method of

extraction featured in many popular statistical software packages is PCA (including SPSS and SAS).   However, PCA is primarily a convenient data reduction method rather than a comprehensive application of factor analysis to be used to identify structures within complex sets of related variables (e.g., Bentler & Kano, 1990; Loehlin, 1990; Widaman, 1990, 1993).   PCA has served researchers as a quicker, cheaper alternative factor extraction method to a full factor analysis when computers were relatively slow and rather expensive to use (Gorsuch, 1990).

The aim of a true factor analysis is to document any latent variables that cause the observed variables to covary.   During factor extraction the shared variance of a variable is partitioned from its unique variance and error variance to reveal the underlying factor structure; only shared variance appears in the solution.   In contrast, PCA does not discriminate between shared and unique variance.   When the factors are uncorrelated and communalities are moderate, PCA can produce inflated values of variance accounted for by the components (Gorsuch, 1997).

With respect to the factor extraction methods available for use, Fabrigar, et al. (1999) suggest that if the data involved are relatively normally distributed, maximum likelihood is the best choice for factor extraction because "it allows for the computation of a wide range of indexes of the goodness of fit of the model [and] permits statistical significance testing of factor loadings and correlations among factors and the computation of confidence intervals" (p. 277).   However, it is noted that if the assumption of multivariate normality is "severely violated," Fabrigar and his colleagues recommend one of the principal factor methods (1999).

In the case of the 18 items relating to driver behavior featured in Study 1, the assumption of multivariate normality is severely violated (Mardia's multivariate kurtosis = 11.82; p <.001) (DeCarlo, 1997; Mardia, 1970, 1974). Consequently, responses to the 18 items were subjected to a principal factor method; in the SPSS software this procedure is labeled the "principal axis factors" option. After five iterations, four common factors with eigenvalues > 1 were revealed that cumulatively explained 62.85% of the variance (see Appendix 3). However, the criteria of eigenvalues > 1 is *among the least accurate methods* for selecting the number of factors to retain, and using this approach for factor identification may lead to the retention of too many factors (Velicer & Jackson, 1990). In this study, the *scree test* rule was employed to determine how many factors were to be retained. The scree plot showed that there are two datapoints above the break, a finding suggesting that only two factors should be retained (48.68% variance explained).

Rotation

Unless there is only one factor retained, the rotation of axes should be performed to simplify and clarify the data structure. There are two groups of rotation methods available — namely, orthogonal rotations and oblique rotations. Orthogonal rotations generate factors that are uncorrelated and consequently produce more easily interpretable results. In contrast, the oblique rotation methods allow the factors identified to correlate. In the social sciences, it is common for the factors being sought to be correlated since human behaviors are rarely partitioned into neatly packaged elements that function entirely independently of one another. Given this fact, using orthogonal rotation may result in a loss of valuable information if the factors are in reality correlated; it follows,

therefore, that oblique rotation should produce a more accurate, and perhaps more reproducible, solution. Moreover, if the factors in question are truly uncorrelated, the orthogonal rotation and the oblique rotation produce nearly identical results.

There is no widely preferred method of oblique rotation, and all available methods tend to produce similar results (Fabrigar, et al., 1999). Consequently, an oblique rotation known as the Promax rotation with Kappa 4 was employed to clarify the data structure. After rotation, with a criterion of factor loadings > .4, eight items loaded on factor 1 representing risky driving (α = .908), and five items loaded on factor 2 representing aggressive driving (α = .760) (see Table 4.1). A factor correlation matrix was computed which indicated that the correlation coefficient between these two factors is .474.

Table 4.1 Driving Behavior Scales Items

Item by Factor	Structure Element	Pattern Element
Factor 1: Risk Driving		
Eigenvalue = 6.678		
1. I speed up to turn on a yellow light	0.635	0.694
2. I drive 5 to 10 mph over the speed limit	0.848	0.808
3. I take risks when driving	0.551	0.662
4. I do things against the law when it is safe	0.581	0.655
5. I drive over the speed limit in clear weather	0.863	0.826
7. I drive over the speed limit at night	0.792	0.788
16. I speed up to get through a yellow light	0.695	0.694
19. I drive over the speed limit	0.948	0.811
Factor 2: Aggressive Driving		
Eigenvalue = 2.084		
9. I drive on people's bumpers	0.636	0.723
10. I get back at people with my car	0.728	0.726
11. I let people know when I am unhappy with their driving	0.673	0.654
12. I give other drivers a nonverbal gesture	0.617	0.584
15. I use my horn a lot	0.461	0.428

Extraction Method: Principal Axis Factoring.
Rotation Method: Promax with Kaiser Normalization.

Study 1

Data Screening

Because some participants did not provide complete responses to each item on the scales, the scale scores were computed by taking a mean across the items for each participant who either answered all questions or only missed one item in that scale. Following this scale composition strategy, the percentage of missing cases was relatively small (3.2%; 6 participants); given this small proportion of cases with missing data the decision to exclude these cases from the analyses can be fully justified (cf. Tabachnick & Fidell, 2001). Without these six observations, the final sample size for Study 1 was 149.

Table 4.2 Descriptive Statistics

Variables	Min	Max	Mean	SD	Skewness		Kurtosis	
					Value	C.R.	Value	C.R.
Impulsivity	1.000	2.000	1.376	0.268	0.503	**2.533**	-0.613	-1.552
Impulsivity (Ln)	0.000	0.693	0.301	0.192	0.192	0.964	-0.891	-2.257
CFC-F	2.200	7.000	5.012	0.858	-0.278	-1.402	0.204	0.517
CFC-I	1.000	5.714	3.335	0.948	0.158	0.793	-0.119	-0.302
Aggressive Personality	1.500	5.429	3.013	0.889	0.606	**3.049**	-0.183	-0.464
Aggressive Personality (Ln)	0.405	1.692	1.060	0.293	0.003	0.016	-0.610	-1.545
Sensation Seeking	1.150	1.900	1.435	0.144	0.221	1.110	-0.065	-0.164
Aggressive Driving	1.000	4.400	1.803	0.629	1.090	**5.488**	1.575	**3.988**
Aggressive Driving (Ln)	0.000	1.482	0.534	0.331	0.239	1.203	-0.449	-1.137
Risky Driving	1.000	6.250	3.534	0.799	-0.334	-1.683	0.921	2.333

$N = 149$
CFC-F: consideration of future consequences-future
CFC-I: consideration of future consequences-immediate
C.R.: critical ratio (skewness/kurtosis over its standard error)

In accord with the theoretical framework outlined in Chapter Three, two dependent variables and four independent variables were included in Study 1: impulsivity,

consideration of future consequences, sensation seeking, and aggressive personality are the independent variables, and risky driving and aggressive driving are the dependent variables. A summary of the descriptive statistics is set forth in Table 4.2. This table presents the mean, standard deviation, minimum and maximum scores, skewness and kurtosis for the independent and dependent variables. It is noteworthy that the values for skewness and kurtosis provided by SPSS have little inherent meaning, other than that larger values indicate greater asymmetry. A rule of thumb commonly followed is that the absolute value of the ratio of skewness to its standard error and of kurtosis to its standard error, which can be considered as equivalent to a z score, should be less than 2 ($\sim p < .05$). A ratio greater than 2.5 is considered to represent a severe departure from normality. It should be noted that the impulsivity scores ($z = 2.53$, $p < .05$, two tailed), the aggressive personality scores ($z = 3.05$, $p < .01$, two-tailed), and the aggressive driving scores ($z = 5.49$, $p < .001$, two-tailed) are indeed severely skewed. Following a natural logarithmic transformation, scores on these three measures were no longer severely different from normality. Additional screening of the data supported the assumptions of multivariate normality (Mardia's multivariate kurtosis = 1.13; p =.26).

Zero-Order Correlations

Table 4.3 summarizes the zero-order correlations between each pairing of variables. Generally speaking, the zero-order correlations indicated the presence of many associations between the two driving measures and the four independent variables. As previous studies have suggested, sensation seeking is significantly correlated with risky driving ($r = .312$; $p < .001$) and with aggressive driving ($r = .328$; $p < .001$).

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Impulsivity is significantly associated with risky driving ($r = .214$; $p < .01$). For CFC-I, this trait is positively correlated with aggressive driving ($r = .202$; $p < .05$). The aggressive personality is associated with risky driving ($r = .227$; $p < .01$) and with aggressive driving ($r = .380$; $p < .001$). The correlation between impulsivity and aggressive driving ($r = .157$; $n.s.$) and the correlation between CFC-I and risky driving ($r = .102$; $n.s.$) had the same direction of effect with previous studies, but these correlations were not statistically significant. The CFC-F related to neither risky driving ($r = -.054$; $n.s.$) nor aggressive driving ($r = -.090$; $n.s.$).

Table 4.3 Correlations between Impulsivity, Sensation Seeking, Consideration of Future Consequences, Aggressive Driving, and Risky Driving

	IMP	SS	CFC-F	CFC-I	Agg	RskDrv
IMP	-					
SS	0.406***	-				
CFC-F	-0.106	-0.114	-			
CFC-I	0.285***	0.191*	-0.526***	-		
Agg	0.201*	0.244**	-0.145	0.318***	-	
RskDrv	0.214**	0.312***	-0.054	0.102	0.227**	-
AggDrv	0.157	0.328***	-0.090	0.202*	0.380***	0.408***

Note. N = 149. IMP = Impulsivity; SS = Sensation Seeking; CFC-F = Consideration of Future Consequences-Future; CFC-I = Consideration of Future Consequences-Immediate; Agg = Aggressive Personality; RskDrv = Rsiky Driving; AggDrv = Aggressive Driving.   * $p < .05$; ** $p < .01$; *** $p < .001$

Among the four independent variables, the zero-order correlations indicated relationships similar to those reported in previous studies. Sensation seeking and impulsivity are significantly positively correlated ($r = .406$; $p < .05$) and positively correlated to CFC-I, $r = .285$ ($p < .001$) and .191 ($p < .05$) for impulsivity and sensation seeking, respectively. Aggressive personality is positively associated with both

impulsivity ($r = .201$; $p < .05$) and sensation seeking ($r = .244$; $p < .05$), and positively correlated with CFC-I ($r = .318$; $p < .001$). The CFC-F measures is only highly negatively correlated to CFC-I ($r = .526$; $p < .001$).

Path Analysis

SEM is a large-sample technique. Results derived from larger samples have less sampling error than those derived from smaller samples. Large sample size is critical to maintain power and obtain stable parameter estimates and standard errors. The need for larger samples than required for other kinds of statistical methods is also caused by the SEM software programs' requirements and the multiple observed indicator variables used to define latent variables. SEM software programs estimate coefficients based on three types of models: *implied*, *saturated* and *independence* models. The *implied model* is the theoretical model specified by the researcher. A *saturated model* is the model with all parameters indicated, whereas the *independence model* is the null model or model with no parameters estimated. A saturated model with p variables contains $p(p + 3)/2$ free parameters. For example, with 10 observed variables, $10(10 + 3)/2 = 65$ free parameters need to be estimated. If the sample size is small, then there is not sufficient information to estimate parameters in the saturated model for a large number of variables. Consequently, numerous fit indices cannot be computed, such as Akaike's information criterion (AIC), the root-mean-square error of approximation (RMSEA), comparative fit index (CFI), and the normal fit index (NFI).

Kline (2005) proposed rough guidelines for sample size requirements in order for the results of a SEM analysis to be reasonably stable. With less than 100 cases, almost

any type of SEM analysis may be untenable unless a very simple model is being evaluated. For descriptive purposes, sample sizes less than 100 would be considered "small." Sample size between 100 and 200 are considered to fall in the category of "medium" sample size, and a large sample size contains 200+ observations. This classification is not absolute because model complexity must also be considered in the assessment of sample size for SEM analysis. That is, larger samples are required for more complex models (more parameters) in order for estimates to be comparably stable. Therefore, a sample size of 200 may not be enough for a very complicated model. A desirable goal is to have the ratio of the number of cases to the number of free parameters be in the range of 20:1. However, according to some scholars a 10:1 ratio may be a more realistic target in social science research (cf. R. B. Kline, 2005; Schumacker & Lomax, 2004). Following this logic, a structural equation modeling analysis with 20 parameters should have a minimum sample size of 200 cases. More importantly, if the cases/parameter ratio is less than 5:1, the statistical precision of the results may be rather doubtful.

The dataset for Study 1 contained 149 cases, which can be considered to fall in the medium sample size category. However, it must be recalled that the six scales involved consisted of more than 100 separate survey items. If a full structural model is fitted, the cases/parameter ratio will be far lower than 5:1. Because of this set of circumstances, a subset of SEM, referred to as path analysis, was employed for Study 1. The final model of Study 1 will be cross-validated in Study 2 with an independently collected dataset. The Maximum Likelihood (ML) estimation method was employed to estimate the parameters in this path analysis. Compared to the other estimation

procedures (e.g., unweighted least squares; generalized least squares; and asymptotically distribution free), the ML is often preferred for its relative superiority in generating accurate results for multivariate, normally distributed data (Chou & Bentler, 1995).

Hypothesized model. Figure 4.1 displays the hypothesized path model for Study 1. The effects of impulsivity and sensation seeking on aggressive driving are mediated by two CFC measures (CFC-F and CFC-I) and aggressive personality (Hypothesis 1b). Similarly, aggressive personality and CFC mediates the effects of sensation seeking on aggressive driving (Hypothesis 1a). Also, sensation seekers are more likely than others to engage in risky driving (Hypothesis 2a). Thus, they may encounter more driving situations which could elicit aggressive driving behaviors (Hypothesis 2b).
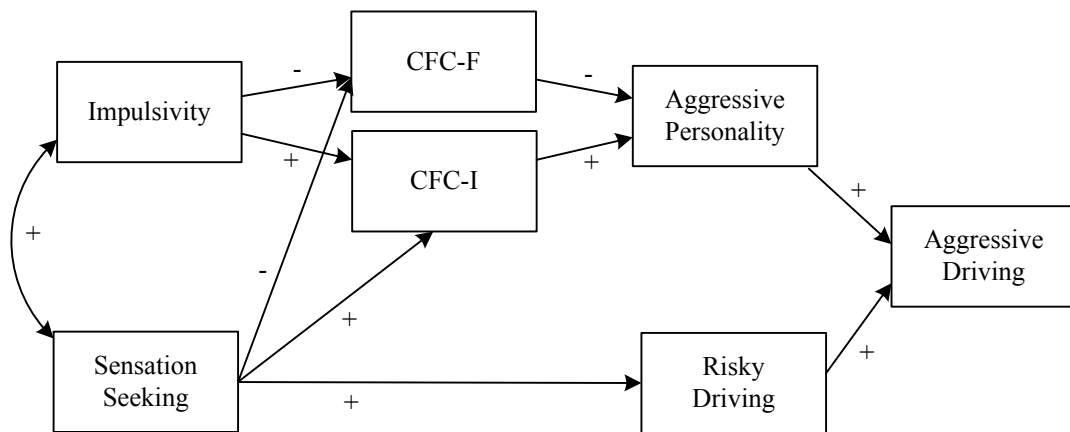
Figure 4.1 Hypothesized Path Model. CFC-F = Consideration of Future Consequences-Future; CFC-I = Consideration of Future Consequences-Immediate.

Model fit. The overall model goodness-of-fit is evaluated by the magnitude of discrepancy between the sample covariance matrix and the covariance matrix created by the model featuring the parameter estimates (also referred to as the minimum of the fit function or F_{min}). One of the most straightforward statistics of model fit is the

chi-square value, which is defined as $(N-1)\, F_{\min}$, where N is the sample size. However useful this statistic might be, it must be recalled that the *chi-square value* is extremely sensitive to sample size; this high sensitivity to sample size may lead to a rejection of the model even when the model fits the data reasonably well.

Given this problem with the chi-squire statistic, a variety of alternative goodness-of fit indices have been proposed to supplement the chi-square statistic; these goodness-of-fit indices can be categorized as either incremental fit or absolute fit indices (e.g., Bollen, 1989; Hu & Bentler, 1999). Incremental fit indices measure the increase in fit compared to a baseline model (typically the independence or null model — a model in which all the observed variables are uncorrelated). Examples of incremental fit indices are the *normed fit index* (NFI), the *Tucker-Lewis index* (TLI), the *relative noncentrality index* (RNI), and the *comparative fit index* (CFI). Higher values of incremental fit indices indicate larger improvement over the baseline model in fit. These goodness-of-fit indices have maximum values of 1.00, and a value $\geq .90$ indicates a good fit.

The absolute fit indices measure how well the model can reproduce the sample covariance. *Goodness-of-fit index* (GFI), *adjusted GFI* (AGFI), *standardized root mean square residual* (SRMR), and the root mean square error of approximation (RMSEA) are examples of the absolute fit indices. Specifically, GFI can be considered to be an analog in the SEM analysis of the R^2 index featured in regression analysis. If the number of parameters is also taken into account in computing the GFI, the resulting index is referred to as the adjusted goodness-of-fit index (AGFI). Its underlying logic is similar to that underlying the adjusted R^2 index featured in regression analysis. Similar to incremental

fit indices, the GFI and the AGFI statistics have a maximum value of 1.00, and a value $\geq$ .90 indicates a good fit.   For SRMR and RESEA, values less than .05 indicate a good fit, and values up to .10 indicate a reasonable fit.

Most scholars (e.g., Hoyle, 1995; Hu & Bentler, 1999) are in agreement that multiple indices should be considered simultaneously to evaluate overall model fit.   In line with this reasoning, in addition to the chi-square test, the GFI, the AGFI, and the CFI were all employed to access the goodness-of-fit in the current study.

The results of the initial model yielded a statistically insignificant chi-square, X^2(10, N = 149) = 17.650, p < .1, and acceptable fit indices (GFI = .968, AGFI = .911, CFI = .952).   However, the RMSEA = .072, with upper bound .126, indicated that this model did not fit the sample very well.   Three paths associated with CFC-F and the path from sensation seeking to CFC-I are not statistically significant.   Two modifications were suggested by the modification indices to improve the model fit.   First, the path from sensation seeking to aggressive driving was freed.   Next, the path from aggressive
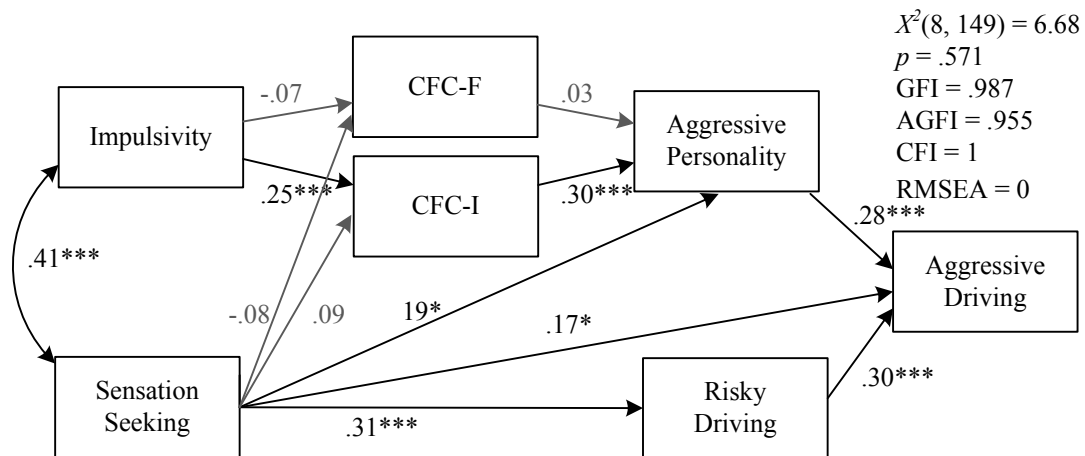

Figure 4.2 Final Path Model. CFC-F = Consideration of Future Consequences-Future;
CFC-I = Consideration of Future Consequences-Immediate.
* p < .05; ** p < .01; *** p < .001

personality to risky driving was freed. The final model with these changes is shown in Figure 4.2. These two modifications yielded an acceptable fit: $X^2(8, N = 149) = 6.683$, *n.s.* (GFI = .987, AGFI = .955, CFI = 1.00, RMSEA < .001 with an upper bound of .085).

Discussion

The Study 1 results provide empirical evidence in support of the hypothesis that the impulsivity trait is related to aggressive driving via its relationship with CFC-I (Hypothesis 1b) and aggressive personality (Hypothesis 1c). On the other hand, the effects of sensation seeking on aggressive driving are partially mediated by aggressive personality (Hypothesis 1a) and risky driving (Hypothesis 2b), but not by CFC-I or CFC-F. It is noteworthy that the results also provided evidence that sensation seekers risky driving situation which feature more chances to elicit aggressive driving than occurs for non-sensation seekers (Hypothesis 2a).

Consistent with Joireman, et al.'s (2008) study, the results confirm that the two CFC sub-scales (CFC-I and CFC-F) are highly correlated, but do not have the same prediction power on aggressive personality and aggressive driving. CFC-I is the better predictor of aggressive personality and aggressive driving. Also, the relationships between impulsivity and aggressive driving are mediated by CFC-I, but not CFC-F.

In this study, two paths were freed based on the suggestions of the modification indices. Even though these two paths can be explained under the low self-control and the GAM theoretical framework, it is possible that the results are an artifact of this particular dataset. Cross-validation or replication using another independent sample, once an acceptable model is achieved, is always recommended to ensure stability of

parameter estimates and contribute to the validity of the model (cf. Cliff, 1983; Raykov & Marcoulides, 2006). In Study 2, the model was cross-validated using an independent sample and somewhat different measures. In addition, the "person × situation" interaction effects on risky driving and on aggressive driving are examined in a dataset featuring a considerably larger sample size and the inclusion of the relevant measures.

Study 2

In Study 2, eight models were fitted with the Washington Young Driver's Experience Survey dataset; that process included the development of three measurements models and five structural regression models. The three measurements models for the scales for *low self-control*, *driving frustration*, and *driving behaviors* were fitted as a set of confirmatory analyses to ensure that the three measures are reliable indicators of the underlying construct. Following the implementation of the measurement models, the theoretical model was tested. Based on low self-control theory, the GAM, and the final model developed in Study 1, a theoretical model for risky and aggressive driving is proposed (see Figure 4.3). This hypothesized model incorporates the model developed in Study 1 and features two additional elements: 1) the effects of impulsivity and risk seeking on risky and aggressive driving are again mediated by driving frustrations (Hypothesis 2d), but impulsivity and risk seeking are mediated by different driving frustration situations (Hypothesis 2c); 2) the effects of driving frustration on risky and aggressive driving are moderated by the trait of temper arousal (Hypothesis 3).

If the full theoretical model were fitted, there would be more than 300 free parameters which would need to be estimated. That is, the minimum required sample

size to avoid doubtful estimation would be approximately 2,000 cases. In order to keep the cases/parameter ratio in the acceptable range of 5:1 and to ensure the generation of stable estimations, the hypotheses were tested by the following models: 1) replicated model of Study 1; 2) effects of impulsivity, consideration of future consequences-Immediate (CFC-I), and risk seeking on driving frustrations; 3) interaction effects between temper arousal and driving frustrations on risky driving and aggressive driving; 4) effects of driving frustrations on driving behaviors; 5) reduced model for effects of driving frustrations on driving behaviors; and 6) the full path analysis.
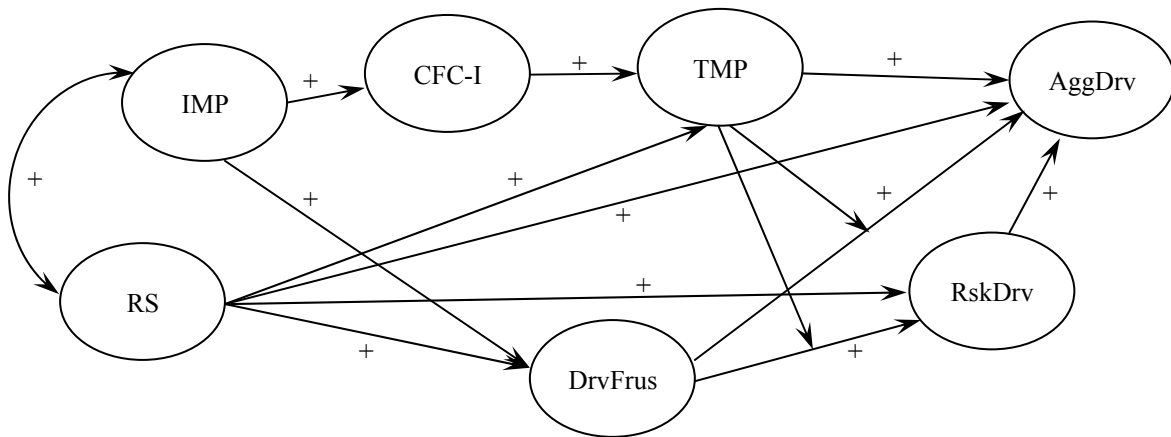
Figure 4.3 Full Theatrical Model in Study 2. Imp = impulsivity; RS = risk seeking; CFC-I = consideration of future consequences-immediate; TMP = temper; DrvFrus = driving frustration (included: discourtesy, slow traffic, police presence, and dangerous condition); RiskDrv = risky driving; AggDrv = aggressive driving.

Data Screening

Fortunately, the observed variables used in Study 2 did not contain any incomplete data. Descriptive statistics for each item were derived and evaluated for univariate and multivariate normality (see Appendix 4). The ratio of the value of an unstandardized skew index or kurtosis index over its standard error is interpreted as equivalent to a z test of the null hypothesis that there is no population skew or kurtosis.

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However, these tests may be statistically significant if only even slight departures from normality are present in large samples (R. B. Kline, 2005), a circumstance which could be a problem for this particular dataset (N = 366). There is an alternative way is to interpret the absolute values of skew and kurtosis not dependant on ratios, and the results of simulation studies provide suitable guidelines for the interpretation of results (e.g., Curran, West, & Finch, 1996). Kline (2005) has summarized these guidelines such that variables with absolute values of the skew index greater than 3.0 should be characterized as being "extremely" skewed. The absolute values of the kurtosis index greater than 10.0 may suggest a possible problem, and values greater than 20.0 may indicate a serious problem. Based on these criteria, the observed variables used in this study did not severely depart from univariate normality. The absolute values of the skewness index ranged from .029 to 2.27, with a mean of .633. The absolute values of the kurtosis index ranged from .018 to 5.128, with a mean of .941.

An examination of the skewness and kurtosis of the univariate distributions provides only partial information on multivariate normality. It is possible that all of the univariate distributions are normal, but the joint distribution could be substantially multivariately nonnormal. Given this fact, it is also important to examine the multivariate measures of skewness and kurtosis developed by Mardia (1970). Similar to the univariate skew index and the univariate kurtosis index, the tests for Marida's multivariate measures of skewness and kurtosis may be statistically significant even if only slight departures from normality are present in the case of studies involving large samples. Because of this consideration, the multivariate kurtosis values were interpreted based on the following general guidelines: multivariate kurtosis values less than one

indicate negligible non-normality, values from 1 to 10 indicate moderate non-normality, and values greater than 10 indicate severe non-normality (Curran, et al., 1996; R. B. Kline, 2005; Lei & Lomax, 2005; S. G. West, Finch, & Curran, 1995). For the models estimated here, the observed variables demonstrate moderate to severe non-normality (see Table 4.4).

Table 4.4 Multivariate Skewness and Kurtosis

Model	Mardia's Multivariate Skew[a]	Mardia Multivariate Kurtosis[a]	Multivariate kurtosis[b]
LSC	10.974***	4.571***	5.049
DrvFrus	28.335***	15.060***	15.686
DrvBeh	24.443***	17.008***	15.630
RepMol	69.866***	14.421***	15.342
LSC to DrvFrus	66.736***	14.425***	15.346
TMPxDrvFrus	576.277***	138.638***	139.965
DrvFrus to DrvBeh	105.667***	19.018***	20.087
Redused DrvFrus to DrvBeh	46.684***	12.940***	13.714
Full Path Model	5.857***	2.611***	2.940

[a] Mardia (1970), computed using an SPSS macro provided by DeCarlo (1997).
[b] Computed by AMOS 16
LSC: Low Self-Control. DrvFrus: Driving Frustration. DrvBeh: Driving Behavior. RepMol: Replicated Model. TMP: Temper
* p < .05; ** p < .01; *** p < .001

When the assumptions of univariate and multivariate normality are violated, the results of SEM analyses may be adversely affected in several ways. West, et al. (1995) summarized four important possible adverse consequences related to violations of normality. First, when data become increasingly nonnormal, the X^2 values computed from both ML and GLS estimations become excessively large. Second, when sample sizes are small (even in the event of multivariate normality), both the ML and GLS estimators yield X^2 values that are somewhat inflated. Furthermore, in cases where non-normality and small sample size are combined, researchers face the problem that

their analyses will either fail to converge or result in improper solutions. Third, when data are nonnormal, the conventional fit indices such as the Tucker-Lewis index (TLI) and the comparative fit index (CFI) are modestly underestimated. Finally, nonnormality can lead to spuriously low standard errors, with degrees of underestimation ranging from moderate to severe. That is, the regression paths and factor/error covariances will be statistically significant, but the relationships modeled may not be present in the population. The first and third problems can be overcome by employing other fit indices to evaluate the model fit, and the small sample size was not an issue for Study 2. However, it is the case that the problem of standard error underestimation may lead the misinterpretations of the results presented here.

One approach available to handling the presence of multivariate nonnormal data is to make use of a "bootstrap" procedure (cf. Byrne, 2001; S. G. West, et al., 1995). The bootstrap procedure entails employing a resampling procedure whereby a sample is treated as the population from which subsamples equal in size are drawn randomly with replacement for × number of times (generally > 1,000 bootstrap samples are suggested for this procedure) to determine parameter estimates under nonnormal conditions. Although traditional ML estimation is subjected to meeting multivariate normality, bootstrapping techniques do not require meeting this particular assumption (Zhu, 1997). Bootstrapping is particularly helpful given that ML underestimates standard errors when population distributions are skewed. Bootstrapping was used throughout the models in Study 2, with a final sample size of 366 cases being available and 2,000 bootstrap subsamples being generated.

Self-Control

Since the study featuring the Low Self-Control Scale was published (Grasmick, et al., 1993), there has been disagreement as to whether low self-control scale constitutes a *sole latent trait* (Arneklev, et al., 1999; C. Gibson & Wright, 2001; Piquero & Rosay, 1998), *a second-order factor structure* (Ellwanger, 2006; Longshore, et al., 1998; Longshore & Turner, 1998; Longshore, et al., 1996), or *a six-factor structure* (S. W. Baron, et al., 2007; DeLisi, et al., 2003). Whatever the true charactor of the measure might be, researchers using the scale items have found that some sub-sacles have stronger predicting power than the whole self-control contruct (e.g., Arneklev, et al., 1993; LaGrange & Silverman, 1999; Longshore, et al., 1996; Piquero & Rosay, 1998; Ribeaud & Eisner, 2006), and some researchers have reported that certain elements of the self-control construct did not work in the predicted fashion (e.g., Arneklev, et al., 1993; DeLisi, et al., 2003; Longshore, et al., 1996). In additional, one of the major purposes for this study is to examine the **mediational effects** between personal traits and aggressive driving. Consequently, the six-factor structure interpretations of the low self-control construct is the best understanding of the concept to carry out this study.

Instead of all six sub-scales of the Low Self-Control Scale, Study 2 uses only three of them — namely *impulsivity*, *risk seeking*, and *temper arousal*. The hypothesized model is graphically represented in Figure 4.4. Each observable item measuring the three constructs would share a significant non-zero relationship with the trait that it was meant to measure, and these three constructs — impulsivity, risk seeking, and temper arousal — are indeed inter-correlated.
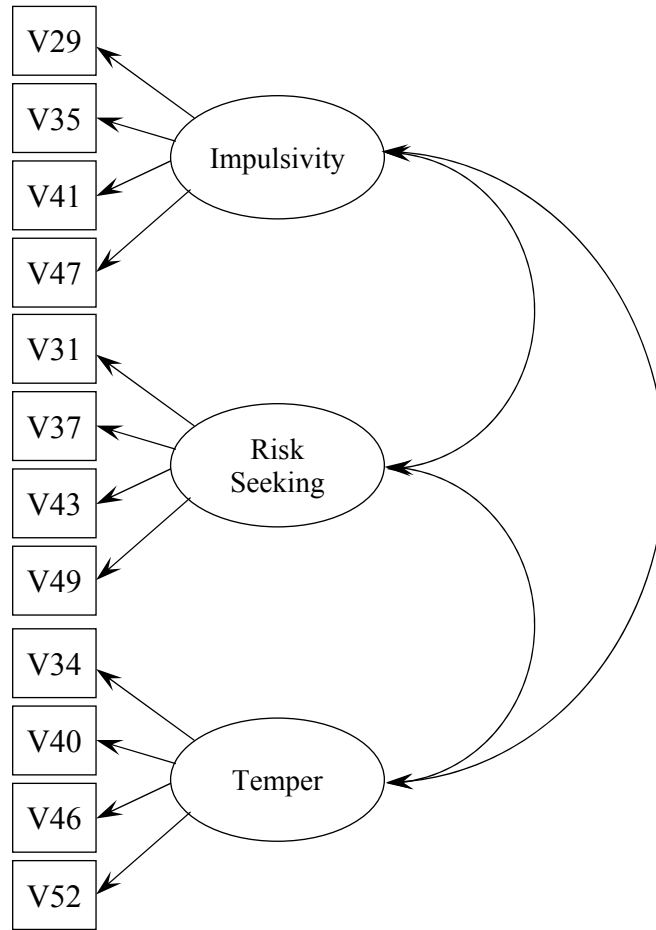
Figure 4.4   Hypothesized Self-Control Measurement Model

The initial model for the self-control measurement model provided a good fit to the data, $X^2(51, N = 366) = 140.198$, $p < .001$ (GFI = .937, AGFI = .904, CFI = .917, RMSEA = .069 with an upper bound of .083), and all hypothesized paths were statistically significant.   In order to prepare the index variables for the last model, the internal consistency reliability for each scale for self-control was computed.   The reliability coefficients were .672, .791, and .711 for impulsivity, risk seeking, and temper arousal, respectively.   The results of a corrected-item total correlations analysis suggest

that the reliability coefficient for impulsivity could be increased by deleting one item, v29 (I often act on the spur of the moment without stopping to think).

Based on the operational definitions of impulsivity and of CFC used in psychological research, the v29 item should be considered a measure of impulsivity, and the other three items relating to immediate consequences should be considered as measures of *consideration of future consequences-immediate* (CFC-I). In accord with this reasoning, the model was modified by deleting v29 and combining the other three items into a measure labeled *CFC-I*. The resutls for the modified model (see Figure 4.5) indicate that the modified model fits better than the initial model, $X^2(49, N = 366) = 116.736, p < .001$ (GFI = .946, AGFI = .914, CFI = .937, RMSEA = .062 with an upper bound of .076). Moreover, complexity is statistically justified with a significant decrement in model fit as evidenced in ΔX^2 (2, $N = 366$) = 23.462, p < .001. The reliability coefficient for CFC-I was an acceptable .677.

Driving Frustration

Based on the scale development samples, Ellwanger (2006, 2007) reported that the six driving frustration sub-scales possessed acceptable reliability estimates, ranging from .61 to .71. However, five out of six sub-scales were not internally consistent for the samples in Study 2. The Cronbach's ahpha statistics were .565, .550, .524, .414, and .569 for progress impeded, irregular traffic flow, road construction, discourteous driving behavior, and restricted field of vision, respectively.
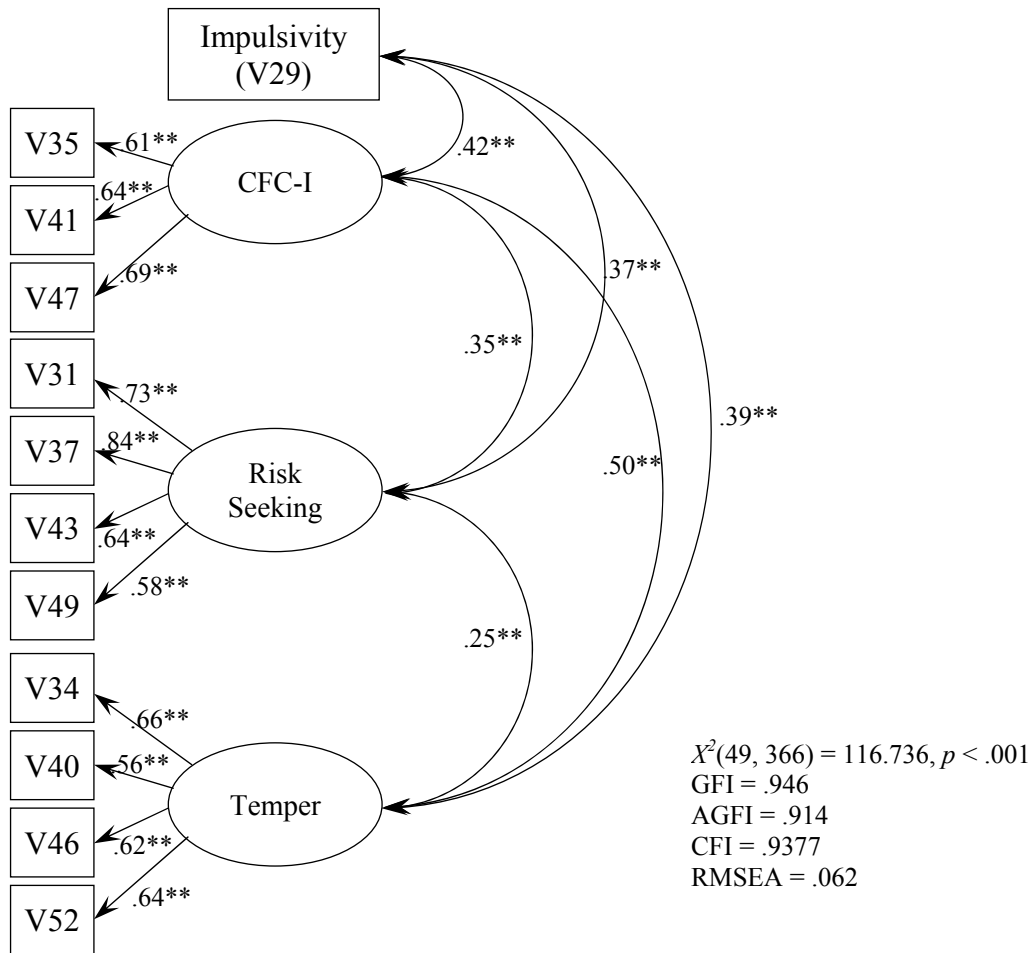
Figure 4.5 Final Self-Control CFA Model. CFC-I: consideration of future consequences- immediate. * *p* < .05; ** *p* < .01; *** *p* < .001

Based on the sub-scales derived from the Driving Anger Scale (Deffenbacher, et al., 1994), a hypothesized measurement model was proposed. This measurement model consisted of four factors: 1) *Discourtesy* (3 items): items involve behaviors of others that are primarily seen as discourteous or rude rather than illegal or impeding progress (e.g., I don't get frustrated when at night, a driver who is approaching does not dim their bright lights.); 2) *Slow Traffic* (5 items): items involve behavior of other drivers or road conditions which slow down or impede the driver's progress (e.g., I don't get frustrated when a driver is holding up traffic by being slow to park.); 3) *Dangerous Condition* (5

items): items involved situations which limit information and make it difficult for the driver to drive safely (e.g., I get frustrated when it is raining so heavily that it is difficult to see.); 4) *Police Presence* (3 items): items involve presence of police involvement in one form or another (e.g., I get frustrated when a law enforcement official pulls me over). These four factors were intercorrelated as a first-order constructs.

$X^2(49, 366) = 116.736, p < .001$
GFI = .946
AGFI = .914
CFI = .937
RMSEA = .062
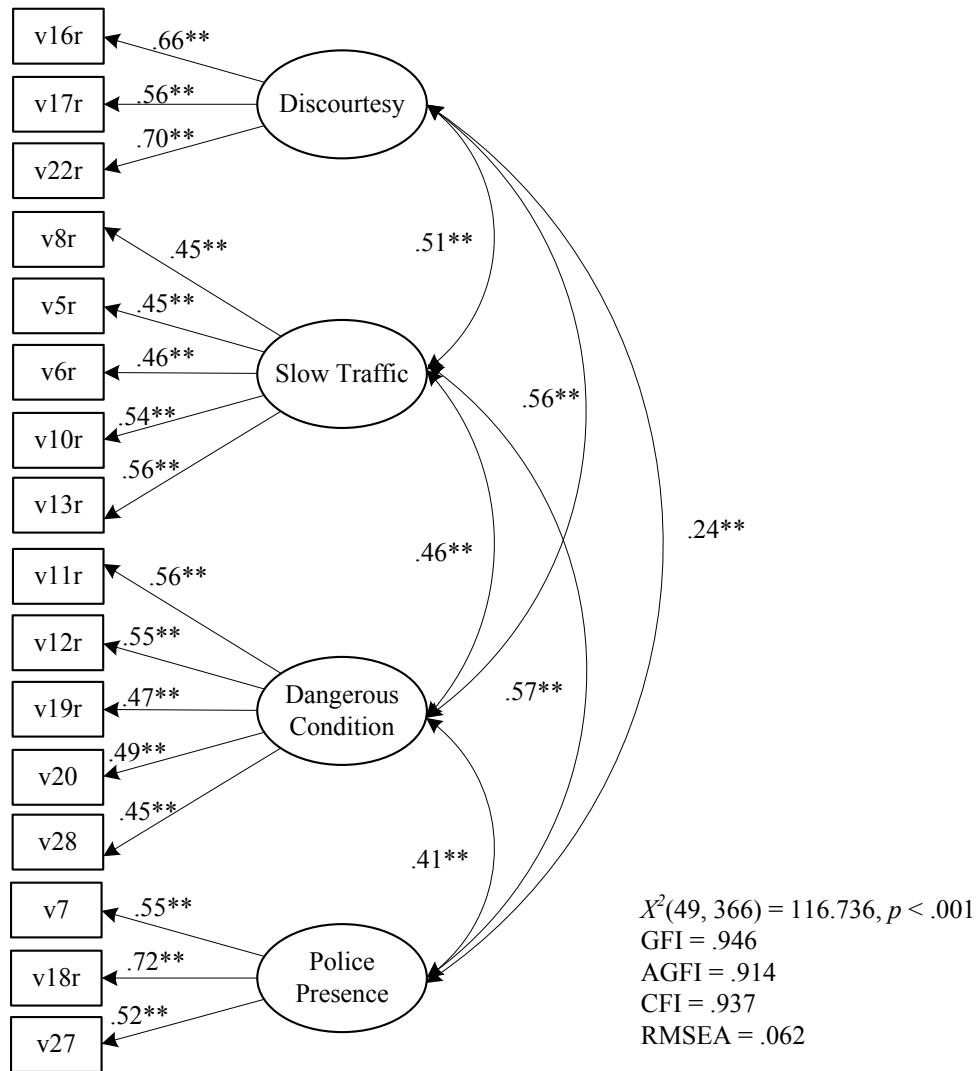
Figure 4.6 Final Driving Frustration CFA Model
* $p < .05$; ** $p < .01$; *** $p < .001$

The results of the initial model indicated that it was a good fit, but that the fit could be improved $X^2(98, N = 366) = 200.764$ (GFI = .934, AGFI = .909, CFI = .886, RMSEA = .054 with an upper bound of .064). The modification indices suggested two correlations between the error terms of v13 and v17, and v27. Correlated error terms are a form of systematic error that often results from a high degree of overlap in item content (Byrne, 2001). After correlating the error terms suggested by the modification indices, a quite well fitting model was achieved with $X^2(96, N = 366) = 173.959$ (GFI = .943, AGFI = .919, CFI = .940, RMSEA = .047 with an upper bound of .058) (see Figure 4.6). The Cronbach's ahpha coefficients indicated that these four subscales were modestly internally consistent — with alphas of .683, .632, .619, and .633 for discourtesy, slow traffic, dangerous condition, and police presence, respectively.

Driving Behavior

Based on the results of the exploratory factor analysis developed in Study 1, the driving behavior index consisted of two factors: risky driving (8 items) and aggressive driving (5 items). These two factors were correlated to each other as a first-order
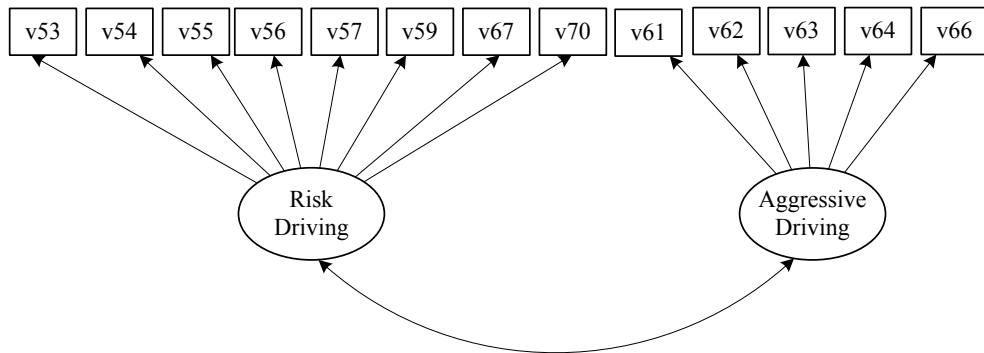
Figure 4.7 Hypothesized Driving Behaviors Measurement Model

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constructs. The Hypothesized driving behaviors measurement model is illustrated in Figure 4.7.

Results of the initial model supported the conclusion that these two factors had a significant non-zero loading on the underlying factor they were meant to measure. However, the fit indices indicated that the model is relatively poor-fitting, GFI = .852, AGFI = .789, CFI = .843, RMSEA = .122 with an upper bound of .133. The modification index indicated that three modifications were advised — namely, the correlation between the error term of v55 and v56, the correlation between the error term of v53 and v67, and v61 should be also loaded to risky driving. Correlated error terms are a form of systematic error that often results from a high degree of overlap in item content (Byrne, 2001). An ideal factor structure should not have cross-loading items, and no factor should emerge with fewer than three items. Since both of these two factor structures contained multiple items, v61 was eliminated in order to produce a clean factor structure. After two correlations between error terms were freed and v61 was dropped, the final fit indices indicate that the final model is well fitting with a GFI, AGFI, CFI, and
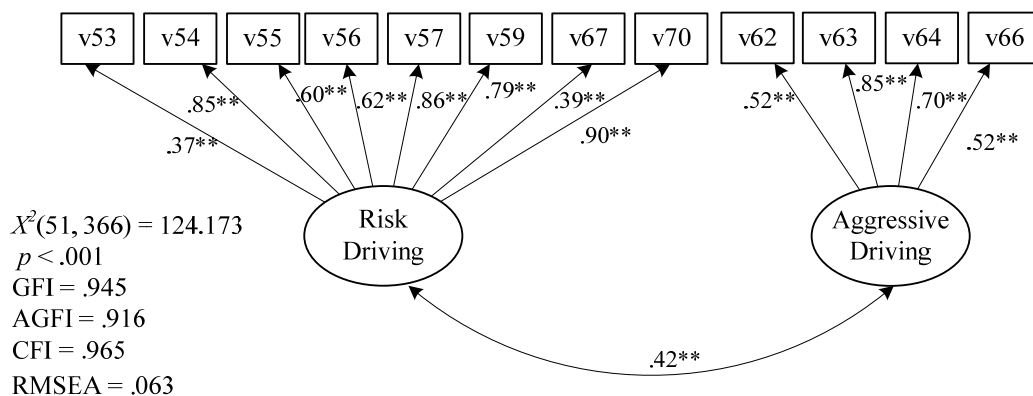
Figure 4.8 Final Driving Behavior CFA Model.
* $p < .05$; ** $p < .01$; *** $p < .001$

RMSEA of .945, .916, and .965, 063, respectively (see Figure 4.8). Moreover, all hypothesized paths were shown to be statistically significant. In addition, the two factors were shown to be internally consistent with Cronbach's alpha equaling .882 for risky driving (8 items) and .740 for aggressive driving (4 items).

Structural Regression Models

Cross validation

The first sub-model derived from the full structural regression model to be tested entails the replication of the results of Study 1 with different but related data. The hypothesized model was adapted slightly from the model developed from Study 1 (see Figure 4.9). The effects of impulsivity on aggressive driving are mediated by CFC-I and temper arousal (Hypothesis 1b). Similarly, temper arousal mediated the effects of risk seeking on aggressive driving (Hypothesis 1a). Also, people who are high in risk seeking are more likely than others to engage in risky driving (Hypothesis 2a). Thus, they may encounter more driving situations which could elicit aggressive driving behaviors than is the case with other drivers (Hypothesis 2b). Additionally, risk seeking also has direct effects on aggressive driving, and temper arousal had positive effects on risky driving.

The goodness-of-fit indices indicated that the initial model tested did not fit the data well, X^2(239, $N = 366$) = 431.234 (GFI = .910, AGFI = .887, CFI = .943, RMSEA = .047 with an upper bound of .054). Two hypothesized paths were not statistically significant; these were the direct effects of risk seeking on temper arousal ($r = .11$, $n.s.$) and aggressive driving ($r = .08$, $n.s.$). The modification indices suggested that four
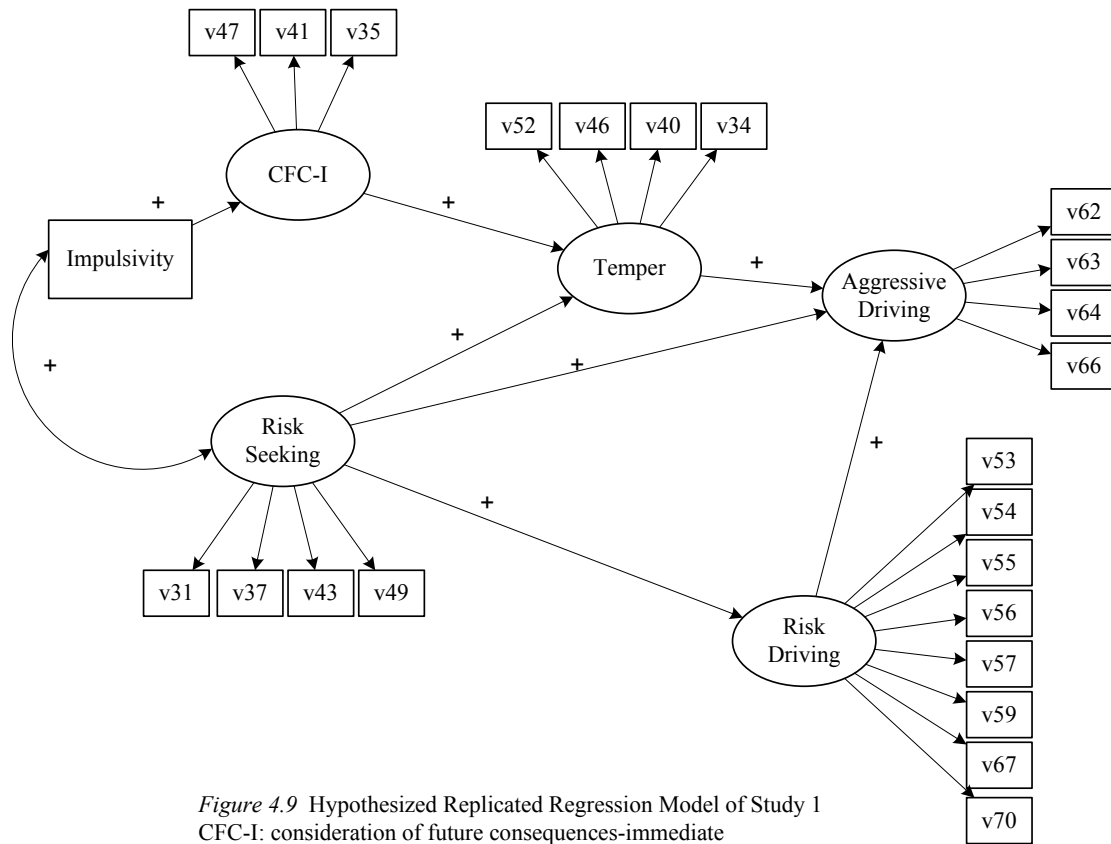
Figure 4.9 Hypothesized Replicated Regression Model of Study 1
CFC-I: consideration of future consequences-immediate

modifications were necessary to achieve an acceptable fit to the data. The path from

risk seeking to CFC-I and the path from impulsivity (v29) to CFC-I were freed. In

addition, v55 and v56 were also loaded on risk seeking which meant that these two

variables were cross-loaded on factors of risk seeking and risky driving.

The results of the final structural regression model estimation are represented in

Figure 4.10. The measurement models graphically represented were entered in their

original hypothesized form—with no correlated errors term or correlated residuals. This

model appears to fit the data quite well, X^2(238, $N = 366$) = 346.234 (GFI = .927, AGFI = .908, CFI = .968, RMSEA = .035 with an upper bound of .043)[1].

X^2(238, 366) = 346.234, $p < .001$
GFI = .927
AGFI = .908
CFI = .968
RMSEA = .043

Figure 4.10 Final Replicated Regression Model. CFC-I: consideration of future consequences-immediate. * $p < .05$; ** $p < .01$; *** $p < .001$
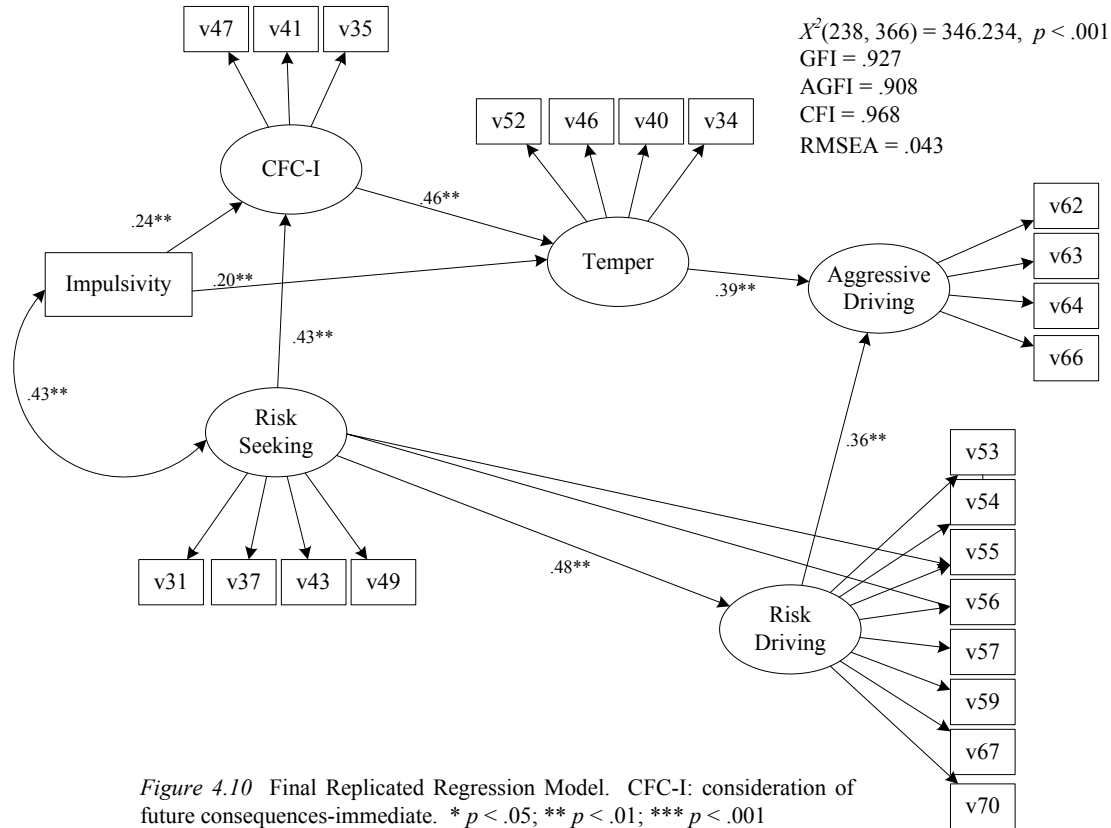
Effects of Impulsivity, CFC-I and Risk Seeking on Driving Frustrations

In this sub-model, the effects of the impulsivity, CFC-I, and risk seeking measures on driving frustration were carefully examined. The initial model provided an acceptable fit to the data, X^2(228, $N = 366$) = 344.581 (GFI = .927, AGFI = .904, CFI = .931, RMSEA = .037 with an upper bound of .045). None of the paths specified from CFC-I can predict driving frustrations to a significant degree. Only one path from

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[1] A structural regression model without these two cross-loading variables was fitted to the data. The fit indices indicated that the model also provides a good fit to the data, X^2(199, $N = 366$) = 273.493 (GFI = .938, AGFI = .921, CFI = .974, RMSEA = .032 (see Appendix 5).

impulsivity to driving frustration was statistically significantly, which was the effect of impulsivity on frustration level attributable to slow traffic ($r = .16$, $p < .05$).   For the effects of risk seeking on driving frustration, only the path to police presence were statistically significant ($r = .20$, $p < .05$).   As shown in Figure 4.11, the other paths were relatively weak.
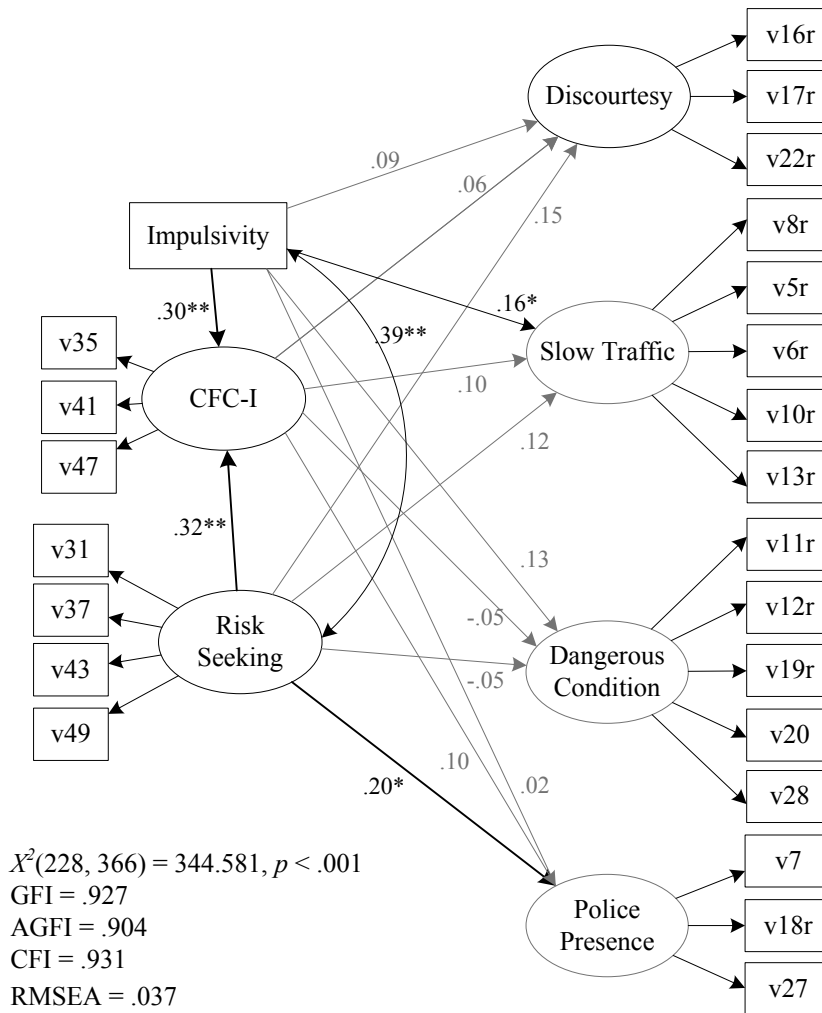
Figure 4.11 Final Regression Model for Effects of Impulsivity, Risk Seeking, and CFC-I on Driving Frustration.   CFC-I: consideration of future consequences-immediate. * $p < .05$; ** $p < .01$; *** $p < .001$

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In this section, the interaction terms of temper arousal and driving frustration were examined carefully making use of the Kline and Dunn (2000) method of employing the deviation scores (centered variables) as the interaction term. Because of the limited sample size involved, some of the latent variables were replaced with the index variables and then treated as observed variables in the modeling process. The three variables involved included temper arousal, risky driving, and aggressive driving. The interaction latent variables, TmpDisc (temper × discourtesy interaction), TmpSlw (temper × slow traffic interaction), TmpDan (temper × dangerous condition interaction), and TmpPol (temper × police presence interaction), consisted of interactions among observed measures. To create these particular variables, the deviation-score vectors for each of the items were created (the deviation scores are calculated around the mean of each item rather than the deviation scores around the mean of the entire scale). Next, the interaction terms were computed by cross-multiplying centered temper scores by centered driving frustration measures scores (e.g., tmp16 = centered temper * centered v16r). These interaction terms which were computed by using the centered variables technique, were introduced to the simple effects structural model consisting of conventional non-centered variables (see Figure 4.12). The matrix was not singular, as the interaction terms for observed variables were not linearly dependent on the original observed variables.

Figure 4.13 displays the final model with interaction terms included. This model did not provide a good fit to the data $X^2(528, N = 366) = 1160.837$ (GFI = .850, AGFI = .821, CFI = .732, RMSEA = .057 with an upper bound of .062). Moreover, the results

generated by the analysis indicated that none of the interaction term structure coefficients were statistically significant. Therefore, the interaction terms were dropped from the hypothesized model. The next model tested was developed to examine the simple direct effects of driving frustration on both of the dependent variables — risky driving and on aggressive driving.
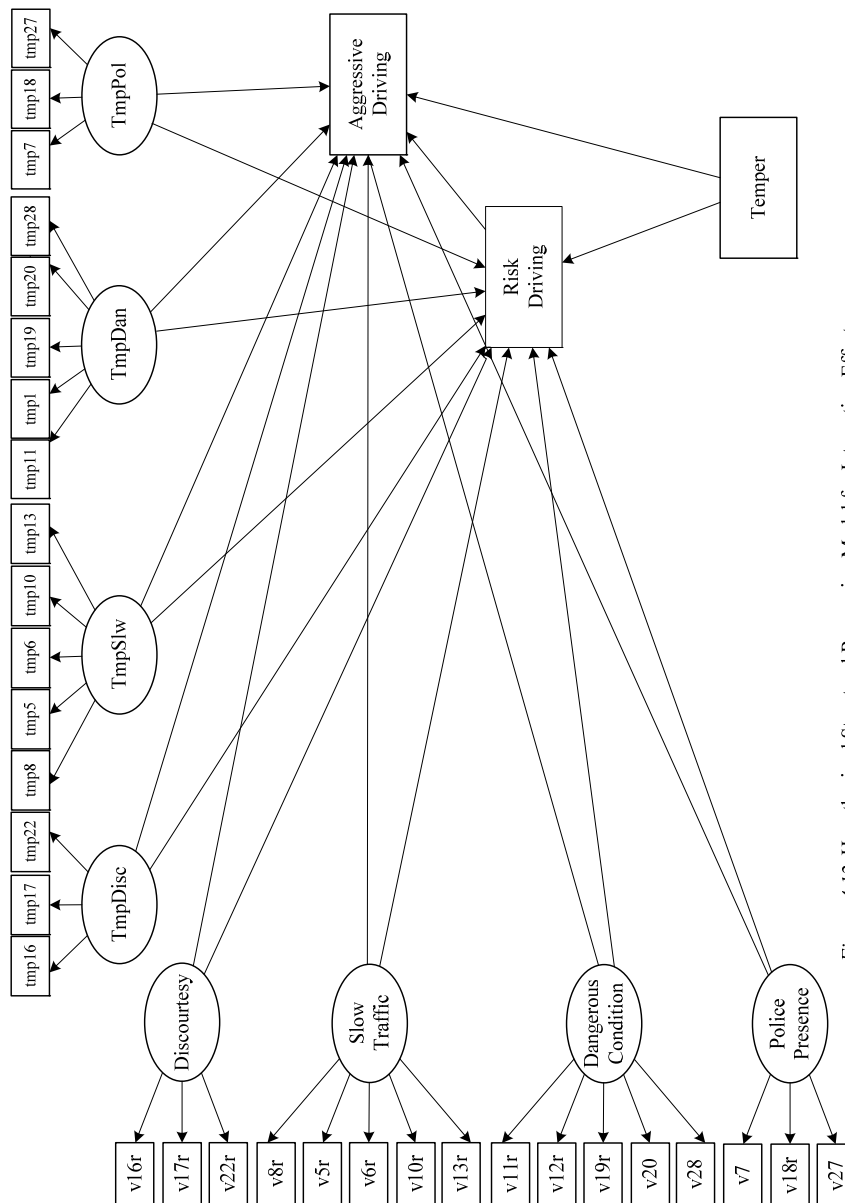
Figure 4.12 Hypothesized Structural Regression Model for Interaction Effects

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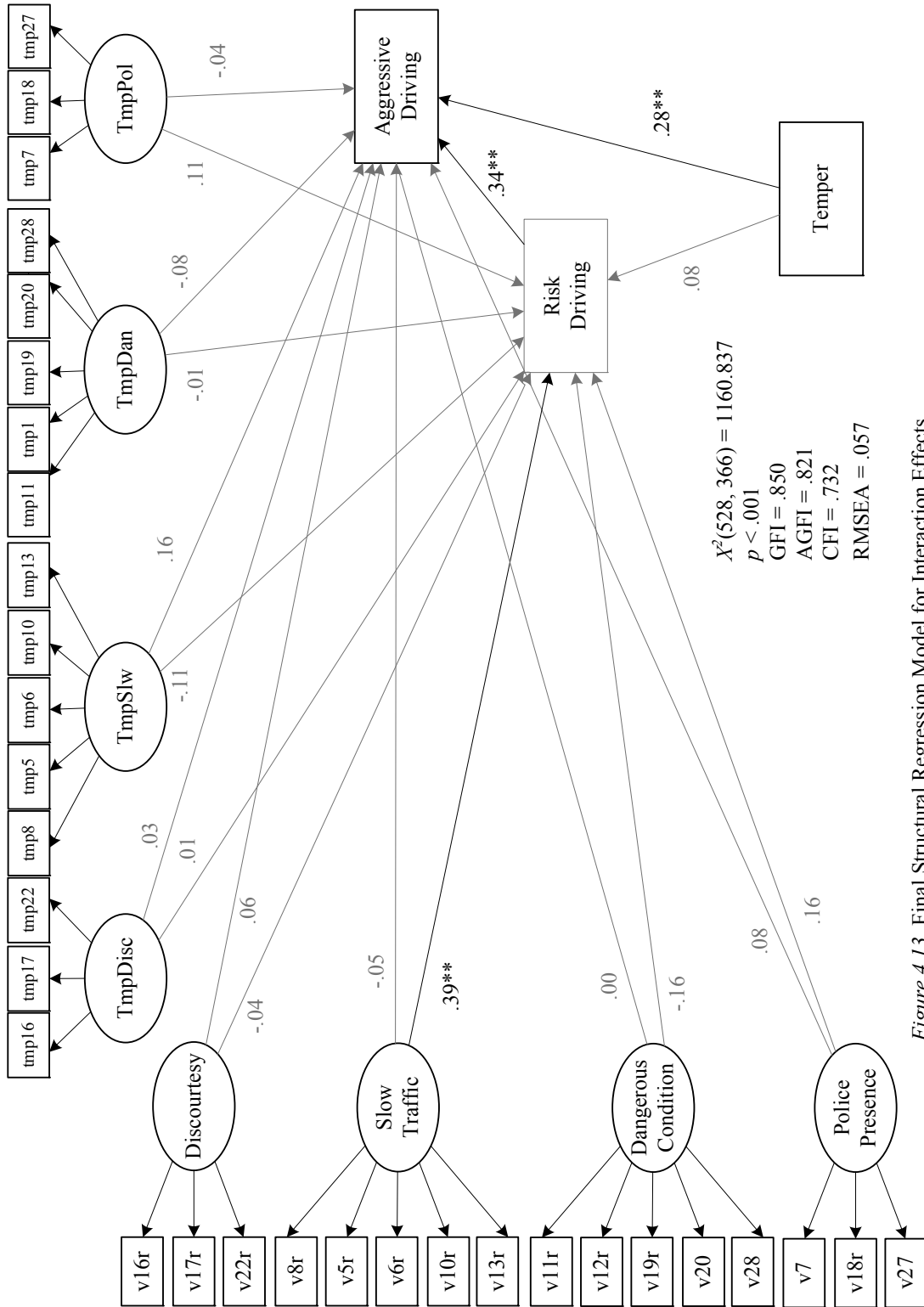
Figure 4.13 Final Structural Regression Model for Interaction Effects.
* $p < .05$; ** $p < .01$; *** $p < .001$

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Effects of Driving Frustrations on Risky and Aggressive Driving

The result of the effects of driving frustrations in risky driving and on aggressive driving in the model indicated that discourtesy by other drivers and dangerous condition (see Figure 4.14) had relatively weak effects on both risky driving and aggressive driving. Only the slow traffic item significantly influenced risky driving ($r = .36$, $p < .05$), but it did not influence aggressive driving ($r = -.15$, *n.s.*). Drivers who get frustrated in circumstance of police presence are more likely than others to engage in aggressive
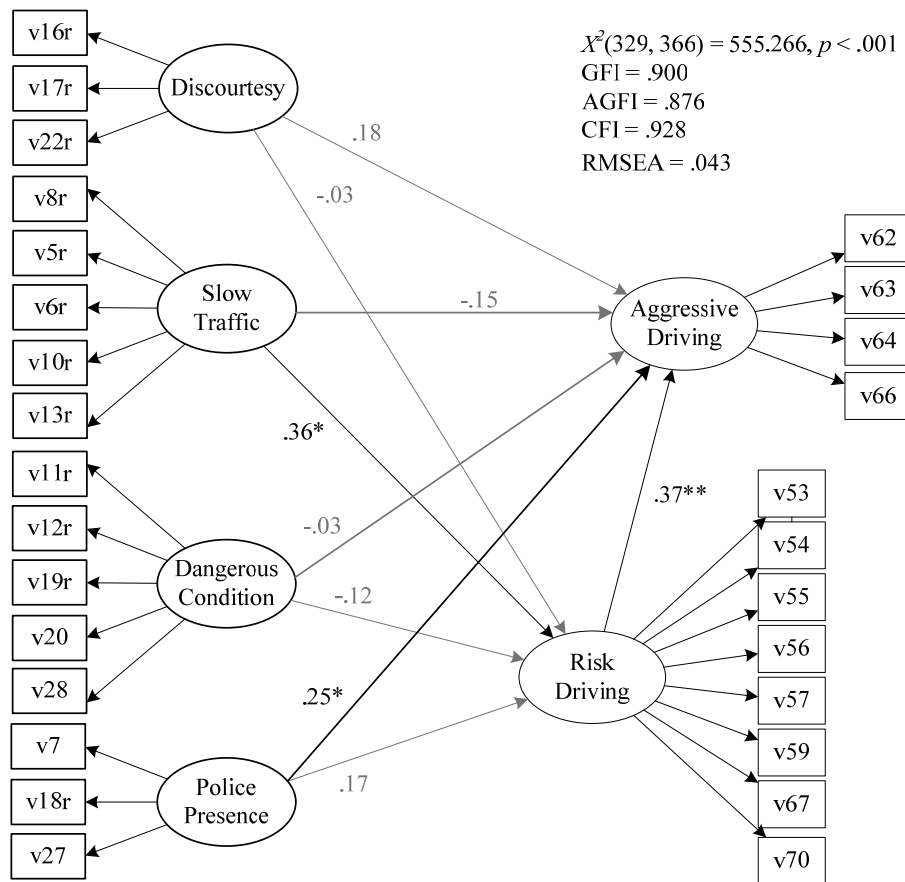
Figure 4.14 Final Structural Regression Model for Effects of Driving Frustration on Driving Behavior. * $p < .05$; ** $p < .01$; *** $p < .001$

driving ($r = .25$, $p < .05$), but this is not the case with risky driving ($r = .17$, *n.s.*).

Compared to the model which included the several interaction terms, this model proved a better fit to the data; however, the goodness-of-fit indices indicated the model could still be improved $X^2(239, N = 366) = 555.266$ (GFI = .900, AGFI = .876, CFI = .928, RMSEA = .043 with an upper bound of .050).

Since discourtesy by other drivers and presence of a dangerous condition were not predicted by self-control measures (impulsivity, CFC-I, and risk seeking), and since they did not show effects on driving behaviors (risky driving and aggressive driving), a reduced model was developed. The hypothesized reduced structural regression model for effects of driving frustration on driving behaviors contained only two driving frustration factors — namely, slow traffic and police presence. The slow traffic measure

$X^2(162, 366) = 288.540$, $p < .001$
GFI = .925
AGFI = .902
CFI = .951
RMSEA = .046
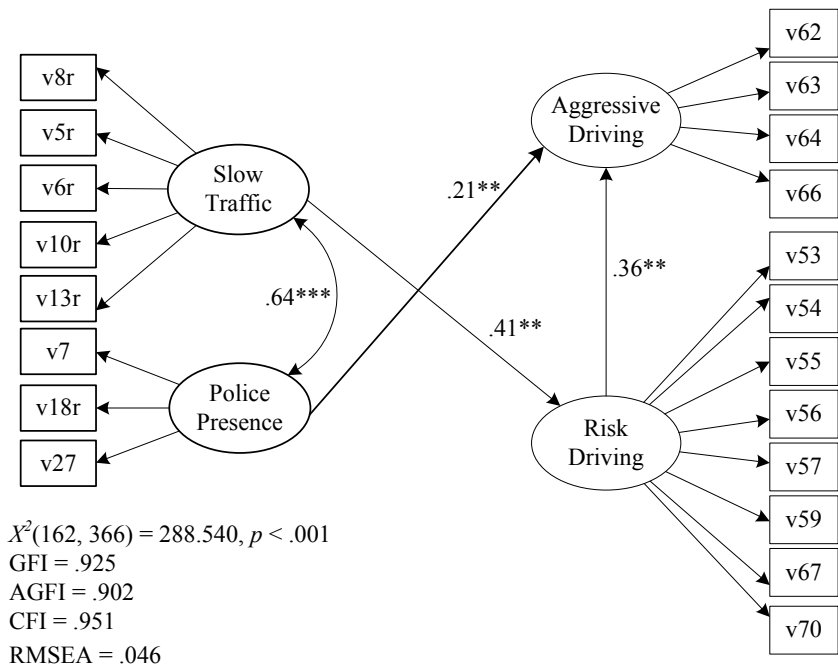
Figure 4.15 Final Reduced Structural Regression Model for Effects of Driving Frustration on Driving Behavior. * $p < .05$; ** $p < .01$; *** $p < .001$

has positive effects on risky driving, and the police presence measure has positive effects on aggressive driving. This reduced model (Figure 4.15) fit the data quite well, X^2(162, $N = 366$) = 288.540 (GFI = .925, AGFI = .902, CFI = .951, RMSEA = .046 with an upper bound of .055).

The finding of frustration level when a police officer is present enhancing the likelihood of engaging in aggressive driving cannot be explained by any reasonable theory. Another model with the path from aggressive driving to police presence was fitted to the data. Because there were only four latent variables included in this model, the parameters and fit indices are identical with the results demonstrated in Figure 4.15. Based on this limited information, it is not possible to examine the relationship between frustration when police presence and aggressive driving is a) police presence to aggressive driving; b) aggressive driving to police presence; or c) both variables are influenced by a another variable. This question will be examined by the full path model in the next section.

Full Path Analysis

Based on the GAM and previous models developed in Study 2, a hypothesized full path model was proposed (Figure 4.16). In addition to the replicated model, two measures of driving frustration, police presence and slow traffic were included in the hypothesized model. The effects of risk seeking on aggressive driving are also mediated by frustration level when police officer presence is a factor in the situation. Similarly, impulsivity affects risky driving via frustration level during slow traffic situations.

The goodness-of-fit measures indicate that the model provides a good fit to the data, $X^2(15, N = 366) = 31.953$, p < .01, (GFI = .978, AGFI = .948, CFI = .962, RMSEA
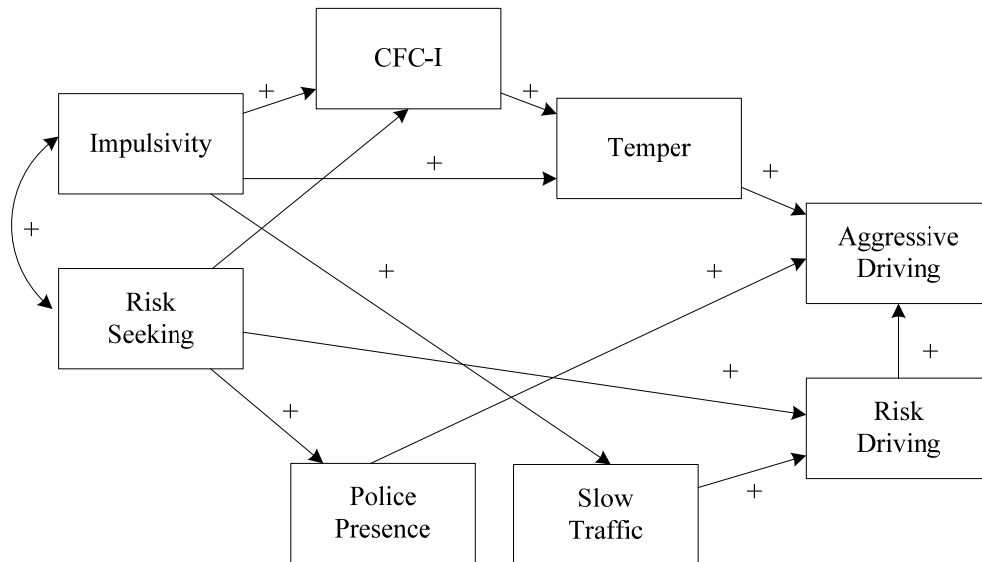
Figure 4.16 Hypothesized Full Path Model. CFC-I: consideration of future consequences-immediate.

= .056 with an upper bound of .082). All paths were statistically significant in the hypothesized direction, with the exception of the path from law officer presence to aggressive driving ($r = .06$, *n.s.*). The modification indices designated the path from impulsivity to risky driving should be freed to improve the model fit. Freeing the path from impulsivity to risky driving resulted in an even better fit, $X^2(14, N = 366) = 20.243$, *n.s.*, (GFI = .987, AGFI = .966, CFI = .986, RMSEA = .035 with an upper bound of .066).

The results of the path model suggested that the relationship between frustration level when a police officer is present and aggressive driving is a *spurious* relationship;

there is a common cause, risk seeking, which influences both the frustration level and aggressive driving. Based on the GAM, how an individual interprets a situation is influenced in part by his or her previous experiences.   Thus, the causal effects between frustration on police presence and aggressive driving could be that the aggressive drivers experience frustration because they cannot drive as they prefer when police officers are part of the situation.   In light of these findings, the path from police presence to aggressive driving was replaced by a path from aggressive driving to police presence as the hypothesized path model for the relationship between these two variables.

The modified model provided an excellent fit to the data, X^2(14, N = 366) = 15.528, *n.s.*, (GFI = .990, AGFI = .973, CFI = .997, RMSEA = .017 with an upper bound of .055) (see Figure 4.17).   The path from aggressive driving to police presence was statistically significant ($r = .13, p < .05$).

X^2(14, 366) = 15.528; $p > .05$
GFI = .990
AGFI = .973
CFI = .997
RMSEA = .017
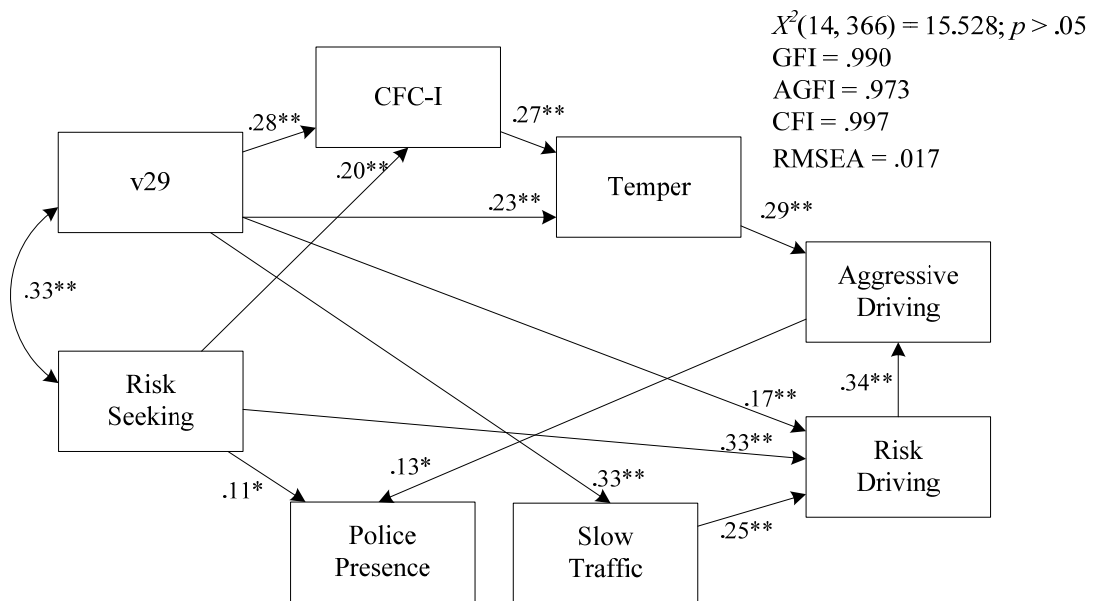
Figure 4.17   Final Full Path Model.   CFC-I: consideration of future consequences-immediate. * $p < .05$; ** $p < .01$; *** $p < .001$

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Discussion

The results of Study 2 provided additional evidence for the relationships among aggressive driving, sensation seeking, impulsivity, and CFC. The replicated model cross-validated the findings of Study 1 with different but related measures and with independent and more representative samples. The effects of the impulsivity on aggressive driving were partially mediated by CFC-I and temper arousal (Hypothesis 1b, 1c). Risk seeking is also mediated by CFC-I and temper arousal to affect aggressive driving (Hypothesis 1a, 1c). Also, evidence is provided that risk seekers are attracted to aggression-eliciting situation; engaging in risky driving activity, increases the risk seekers' likelihood of engaging in aggressive driving (Hypothesis 2a).

In Study 2, the results reported also indicated that impulsive drivers and risk seekers are frustrated by somewhat different driving conditions (Hypothesis 2c). Slow traffic situations lead drivers who are high in impulsivity to experience frustration, while risk seekers do not tend to experience such frustration during slow traffic. Risk seekers are frustrated by the presence of police officers, while impulsive people are inclined to not get frustrated when police officers are present in a situation.

With respect to the effects of temper arousal, the results provide no evidence that the effects of frustration were moderated by temper arousal. The results of the interaction model indicated that none of the "temper × frustration" interaction variables had a significant effect on either risky driving or aggressive driving.

When frustration measures were added into the path model it was shown that the frustration level during slow traffic situations mediated the effects of impulsivity on risky

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driving (Hypothesis 2d). The full path model revealed that the relationship between frustration due to police presence and aggressive driving is likely to be either a spurious relationship, or results from the fact that aggressive driving leads aggressive drivers to experience frustration when a police officer is present in a situation.

CHAPTER FIVE

CONCLUSION

The present study explored how the four personality traits (sensation seeking, impulsivity, consideration of future consequences [CFC] , and anger or temper arousal) are associated with low self-control (Gottfredson & Hirschi, 1990), and how they relate to aggressive driving as seen within the framework of the general aggression model (GAM) (Craig A. Anderson & Bushman, 2002). Four specific research hypotheses were examined: 1) sensation seeking, impulsivity, and CFC might be associated with aggressive driving through their possible relationships with temperamental personality (e.g., trait of anger or temper arousal); 2) sensation seekers might create themselves the situations (risky driving) which have more chances to elicit aggressive driving; and 3) impulsive people and sensation seekers may become frustrated by different driving conditions, and the level of frustration may mediate the effects of impulsivity and sensation seeking on aggressive driving; and 4) the effects of frustration on aggressive driving may be moderated by the trait of anger or temper arousal.

The study made use of two separate studies featuring independent samples and different but related measures of the key concepts under investigation. The application of SEM analytical techniques to two sets of data provided consistent empirical support for all of the hypothesized relationships except for interaction effects between temper arousal and driving frustration. In this final chapter the principal findings of the study are summarized and discussed, and implications of the results for each of the following are explicated: 1) low self-control theory; 2) the GAM; and 3) the public policy and the design of high risk driver intervention programs. Lastly, the principal limitations of the

present study are identified and some possible avenues for future research are identified and briefly discussed.

Low Self-Control and Aggressive Driving

Over the course of more than a decade researchers in Criminology and in Criminal Justice have argued over the question of whether low self-control constitutes a *sole latent trait* (Arneklev, et al., 1999; C. Gibson & Wright, 2001; Piquero & Rosay, 1998), a *second-order factor structure* (Ellwanger, 2006; Longshore, et al., 1998; Longshore & Turner, 1998; Longshore, et al., 1996), or a *six-factor structure* (S. W. Baron, et al., 2007; DeLisi, et al., 2003). Numerous previous studies provide rather solid empirical evidence that some elements of the low self-control construct, when used alone, have the same or better predicting power than when all the elements of the construct are combined together (e.g., Arneklev, et al., 1993; DeLisi, et al., 2003; LaGrange & Silverman, 1999; Longshore, et al., 1996; Piquero & Rosay, 1998; Ribeaud & Eisner, 2006). Yet other research carried out in the low self-control area has produced empirical evidence that certain elements of the self-control construct did not even work in the predicted direction of effect (Arneklev, et al., 1993; DeLisi, et al., 2003; Longshore, et al., 1996). These studies imply that the low self-control construct should not be considered to reflect a unidimensional structure. While these studies are indeed important, the majority of them only focused on the direct effects between the elements of low self-control construct and criminal/deviant behaviors. The research reported here represents the first study to employ a meditational model to assess the effects of low self-control on significant deviant behaviors.

Both the analyses conducted with Study 1 data and analyses conducted with Study 2 data revealed similar evidence that the impulsivity and sensation seeking traits work through different mechanisms to influence aggressive driving. The effects of the sensation seeking trait on aggressive driving are mediated by proclivity for risky driving. Sensation seeking itself is mediated by consideration of future consequences and aggressive personality to influence aggressive driving, though the effects are relatively weak. In contrast, the relationship between impulsivity and aggressive driving is primarily because the impulsivity trait makes impulsive people less likely to consider the future consequences of their conduct and more aggressive in their reactions to perceived obstacles. Only a small portion of the effect takes the route of risky driving leading to aggressive driving. Therefore, the low self-control construct should be considered to reflect a six-factor structure.

This study serves to extend the research of Gottfredson and Hirschi's (1990) low self-control theory by demonstrating how the traits involved in this analytical construct are associated with both criminal and analogue deviant behaviors. The concept low self-control was defined as referring to a group of people who are "impulsive, insensitive, physical (as opposed to mental), risk-taking, shortsighted, and nonverbal" (Gottfredson & Hirschi, 1990, p. 90). The argument is made that these traits tend to coincide and mutually reinforce one another, and when they are present they lead to a high likelihood of criminal conduct. When Gottfredson and Hirschi tried to explain how the level of self-control affects criminal or analogue behaviors, they focused entirely on the inability of these persons to calculate the likely future consequences of their behaviors. However, while the consideration of future consequences is critical to their theory

Gottfredson and Hirschi did not devote any direct attention to this important dimension of their theory. Study 1 reveals that the concern with immediate consequences plays the more important role in predicting deviant behaviors than concern with future consequences. Therefore, the explanation of why an individual is more likely to engage in criminal or analogue behaviors may not be the ability to calculate the future consequences of one's behaviors. In contrast, the explanation should be the individual's believe about how important the immediate consequences are.

Besides, Gottfredson and Hirschi also did not devote much attention to or expend much effort on the other hypothesized elements of low self-control, such as preference for simple tasks, risk-seeking proclivity, preference for physical as opposed to mental activities, self-centeredness as opposed to other-oriented conduct, and easy arousal of temper. The results of this study provide a fair amount of additional empirical evidence regarding how sensation seeking and impulsivity influence the likelihood of engaging in aggressive driving.

General Aggression Model

The General Aggression Model (GAM) represents a significant accomplishment in Psychology. The framework serves to integrate several distinct but related theoretical perspectives on aggression into a single heuristic model. In addition to contributing to our understanding of self-control theory in Criminology and Criminal Justice, this study also provides additional support to the development of the GAM in following ways. First, this study provides evidence that the GAM can be used as an insightful framework

to explain how the personality traits which are related to the low self-control construct influence the deviant behavior of aggressive driving. This finding implies that the GAM could also serve as a useful framework to study the phenomenon of violent crime and property crime in future research. Second, this study demonstrates clearly that the temperamental personality plays as an important mediator role in the observed relationships between three low self-control personality traits (sensation seeking, impulsivity, and CFC) and aggressive driving. Third, this study provides empirical support for the proposition that sensation seekers may create the environments for themselves to act aggressively. In this study, we found evidence that the sensation seekers are more likely than others to engage in risky driving, and by doing so create more opportunities for them to engage in aggressive driving conduct.

Perhaps most importantly, the results of this study suggest that how individuals interpret a driving situation is affected by **both** their personality traits and their previous actions. The results of Study 2 suggest, for example, that the frustration level experienced during police presence may be affected by both sensation seeking and aggressive driving behaviors. However, the hypothesized interaction effects between experiencing driving frustration and the trait of anger arousal on aggressive driving were not supported by the findings reported in this study.

Instead of drawing the conclusion that there is no personal × situation interaction effect on aggressive driving, however, it is important to first discuss the instrument used to measure the level of driving frustration experienced. The driving frustration scale used in Study 2 only documents the final emotional response noted when subjects in the

study encounter a specific situation.   For some driving situations most individuals do get frustrated, but this frustration may elicit anger in only some people.   When people in whom anger is aroused relatively easily were asked to image their reaction to these situations, they may have responded to the questions with answers reflecting anger rather than frustration.   As a consequence, the hypothesized interaction effects were perhaps not documented by this study because the driving frustration scale may only measure accurately the kinds of driving frustrations that are not associated with anger.

<div align="center">Policy and Intervention Programs</div>

According to the logic of low self-control theory (Gottfredson & Hirschi, 1990), early childhood experiences represent the most critical period for the development of self-control in people.   It is further argued that individual differences emerging at this point in the life course tend to persist over time.   When discussing the implications of their theory for prevention and for intervention programs, Gottfredson and Hirschi (1990) proposed the following arguments: 1) intervention programs should teach offenders self-control, but it must be understood from the beginning that these programs are likely to be ineffective unless such teaching of self-control comes early in development; 2) the interventions which reflect their theory should be regarded as prevention rather than post-offending treatment, and activities associated with self-control theory should be focused on parents or other adults with responsibilities for child-rearing; and, 3) no specific interventions are proposed for specific kinds of offenders.   According to the logic of Gottfredson and Hirschi, such countermeasures as formal drivers' education,

graduated licensing policies, large offender fines and penalties, and offender treatment programs cannot produce much of an impact on aggressive driving because the very causes of this undesirable behavior are deeply rooted in patterns of thought and behavior conditioned in early childhood.

The results of this study, however, may offer several actionable implications for the content of driving education, for aggressive driving prevention, and for aggressive driving post-offence treatment programs.   First, the effects of sensation seeking, impulsivity and consideration of future consequences on aggressive driving are **mediated by the trait of anger arousal**.   Given this role for anger arousal, the aggressive driving treatment program for post offense engagement with offenders can focus on helping the aggressive drivers handle their anger arousal more effectively.   Fortunately, a number of researchers have developed a range of targeted programs for this purpose which are considered "evidence-based practice" in the U.S. criminal justice system (e.g., Deffenbacher, Filetti, Lynch, Dahlen, & Oetting, 2002; Deffenbacher, et al., 2000; Galovski & Blanchard, 2002a, 2004).

Second, driving a vehicle safely requires a great deal of cognitive resources, and those resources can be enhanced through practice and informed feedback on that practice. The enhanced use of improved (i.e., more realistic, better programmed, and more audio-visually sophisticated) driving simulators can help novice drivers and poor drivers to practice their driving skills, and in the process they will enhance their cognitive capacity for driving safely.   Third, the driving simulator also can help impulsive drivers to learn how to handle a variety of stressful driving situations and rehearse the

non-aggressive scripts that would be appropriate. When the aggressive driving offenders encounter these situations in the "real world" these non-aggressive scripts will be easier to recall as a consequence of having experienced the simulator training suggested here.

Fourth, it appears that sensation seekers are attracted to the thrill and excitement of risky driving, and as a consequence they have more opportunities than others to encounter situations wherein aggressive driving is a possible option for the individual. The results documented in this study suggest that prevention and intervention program should feature different strategies for sensation seekers as opposed to the impulsive drivers. The sensation seekers might benefit from learning about less dangerous alternative strategies to that of risky driving for experiencing sensation arousal.

In the analysis of the data from Study 2 a significant path was found from aggressive driving to frustration experienced when a police officer is present in a situation. This finding may indicate that aggressive drivers do know full well the quite negative consequences of driving aggressively when police officers are able to document the offense. The investment made by law enforcement in the equipping of unmarked police vehicles with video units capable of documenting aggressive driving is certainly a proper one with respect to addressing the problem of aggressive driving. The greater use of video records and audio scripts recorded by these police car-mounted recording devices in both formal driver education courses and in public service announcements aired on television should provide a good degree of specific deterrence against the dangerous behavior of aggressive driving.

Limitations and Future Studies

It is important to point out the several noteworthy shortcomings of this study, and indicate how future research might proceed and build upon the work reported here. First, only relatively young drivers are included in this study. The effects of impulsivity are relatively weak in this study, and this finding may be the result of the age range limitation of the sample. The average age of the respondents is around 19 years, and most of them are relatively novice drivers who have limited cognitive capacity to perform the task of situation reappraisal to avoid ill-considered impulsive reactions during driving. Future research in this area should expand the study population to the general population of drivers, thereby including a wide range of ages in the study.

Second, the survey instrument used to measure the level of driving frustration was not particularly well developed with respect to psychometric qualities. Even though the results of the CFA indicated the factor structure provided a good fit to the data, the internal reliability coefficients for sub-scales are only closed to an acceptable level (alpha = .619 to .683). The fact that the hypothesized driving frustration × temper interaction effects were not supported by the empirical findings may be a partial consequence of the frustration instrument's weakness. This particular shortcoming in this study may be overcome by the use of either of two possible approaches. The construct of driving anger should be measured independently to see if some driving conditions do provoke the anger of drivers that are not identified as situations involving frustration. Another avenue for future research would be to investigate the personal × situation interactions on aggressive driving in advanced driving simulators. Such state-of-the-art driving

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simulators are now available in the *Sleep and Performance Lab* on the Washington State University Spokane Riverpoint campus.

Third, the dataset developed for Study 2 featured only one survey item to measure the trait of impulsivity. Future research should employ an appropriate multi-item scale for assessing the trait of impulsivity. Fourth, only self-reported aggressive driving and risky driving measures were available to be used as the outcome variables in this study. Future research should also include other measures for outcome variables such as observation-based data derived from simulation studies and official driving records. Both the Washington State Patrol and the Washington Traffic Safety Commission are interested in research on aggressive driving, and both agencies are willing to assist in official driving records-based research in the future.

Besides the research suggestions focused on overcoming the limitations of the current study, three possible future studies are important to extend our knowledge about the utility of self-control theory, the uses to be made of GAM in the testing of theories in Criminology and Criminal Justice, and the reduction of the public safety problem of aggressive driving. First, the psychological mechanisms at play in the relationship between frustration arising from police presence and aggressive driving are still not clearly understood. Future research may investigate the possibility that aggressive driving influences the level of frustration experienced; or sensation seeking affects both aggressive driving and level of frustration experienced. Second, this study only focused on three elements of low self-control — those being impulsivity, risk seeking, and anger arousal (temper). It is also important to explore how the other elements of the

self-control construct influence aggressive driving within the framework of the GAM.
Also, more studies are needed to examine the difference between CFC-I and CFC-F on
deviant and criminal behaviors. Third, the concept of the violence escalation cycle can
be applied to explain how the most extreme form of aggressive driving, **road rage**,
comes into play. Such a future study may employ the driving simulator to investigate
how the violence escalation cycle occurs within the driving context.

Conclusion

Despite the limitations noted, this study has considerable merit because it is one
of the very few empirical analyses carried out employing a meditational model to
examine the effects of low self-control on risky driving and aggressive driving in two
independent samples featuring related but different measures. The analyses of both
Study 1 and Study 2 revealed highly consistent results supporting the research hypotheses
framed within the GAM construct, a fact which lends confidence to the arguments set
forth in this study. Lastly, as other scholars have suggested, it is important to uncover
not only the direct influence of self-control on crime, but also to capture the indirect
effects that may be present and the interaction effects with other personal and situational
factors (e.g., S. W. Baron, et al., 2007). Our understanding of crime will likely remain
limited if we neglect some key psychological and sociological concepts such as
opportunity, risk, consequences, strains, and social bonds (e.g., Cretacci, 2008). The
results of this study indicate quite clearly that the GAM could serve as a valuable
framework for integrating different theories of crime into a comprehensive, heuristic

model leading ultimately to the accomplishment of a deeper and richer understanding of crime and criminal behavior in our society.

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APPENDIX

Aggressive Driving Survey

Informed Consent Form

Overview of the Survey:

In this survey, you will be asked about your experiences and preferences within several different domains. We fully expect that different people will have had different experiences, and will hold different preferences, and we are interested in knowing what you have experience and what you prefer. So, throughout the survey, please make the responses that most accurately reflect your true experiences and preferences.

The survey will likely take about 45 minutes to complete. It is not likely to cause any personal discomfort. However, if you would prefer to not answer a certain question, that is your option. You will not be penalized for failure to complete these tasks. Please note, however, that a complete survey will greatly facilitate our analyses.

Your responses to the survey questions will be kept strictly confidential. Your responses will not be identifiable: Before turning the survey in, you will separate this informed consent form from your responses, thus ensuring that your responses will be totally anonymous.

The data from this survey may be reported and/or published. But again, your individual responses will be anonymous. Your participation is being requested because you are a student who is currently enrolled in General Psychology at Seattle Pacific University.

Questions or Comments?

If you have questions about this research, or if you wish to withdraw at any time, please contact Dr. Jeff Joireman (joireman@spu.edu, or 281-2940). As an alternative, you may also contact Dr. Micheal Roe, Chair of Psychology, with questions or concerns (mroe@spu.edu, or 281-2252).

Willingness to Participate:

If you are willing to participate, please sign and date this form and read the notes below.

Name (please print): _____   **Age:** _____

Name (please sign): _____   **Date:** _____

Gender (circle one):   Female   Male

Ethnicity (circle one):   African   Asian   Caucasian   Hispanic   Native   Other
                                American   American   American

Important Notes:

- Please complete the survey in the order it appears and try to answer each question.

- Different sets of questions may have different rating scales. Please read each set of questions carefully.

- Feedback will be provided in class at the end of the quarter.

- Please return to your General Psychology class by _____.

SGBE

Directions: For each of the statements below, please indicate whether or not the statement is characteristic of you. If the statement is extremely uncharacteristic of you (not at all like you) please write a "1" in the space provided to the right of the statement; if the statement is extremely characteristic of you (very much like you) please write a "7" in the space provided. And, of course, use the numbers in the middle if you fall between the extremes.

1	2	3	4	5	6	7
Extremely Uncharacteristic	Moderately Uncharacteristic	Slightly Uncharacteristic	Uncertain	Slightly Characteristic	Moderately Characteristic	Extremely Characteristic

_____ 1. I consider how things might be in the future, and try to influence those things with my day to day behavior.

_____ 2. Often I engage in a particular behavior in order to achieve outcomes that may not result for many years.

_____ 3. I only act to satisfy immediate concerns, figuring the future will take care of itself.

_____ 4. My behavior is only influenced by the immediate (i.e., a matter of days or weeks) outcomes of my actions.

_____ 5. My convenience is a big factor in the decisions I make or the actions I take.

_____ 6. I am willing to sacrifice my immediate happiness or well-being in order to achieve future outcomes.

_____ 7. I think it is important to take warnings about negative outcomes seriously even if the negative outcome will not occur for many years.

_____ 8. I think it is more important to perform a behavior with important distant consequences than a behavior with less important immediate consequences.

_____ 9. I generally ignore warnings about possible future problems because I think the problems will be resolved before they reach crisis level.

_____ 10. I think that sacrificing now is usually unnecessary since future outcomes can be dealt with at a later time.

_____ 11. I only act to satisfy immediate concerns, figuring that I will take care of future problems that may occur at a later date.

_____ 12. Since my day to day work has specific outcomes, it is more important to me than behavior that has distant outcomes.

BPAC

Directions: For each of the statements below, please indicate whether or not the statement is characteristic of you. If the statement is extremely uncharacteristic of you (not at all like you) please write a "1" in the space provided to the right of the statement; if the statement is extremely characteristic of you (very much like you) please write a "7" in the space provided. And, of course, use the numbers in the middle if you fall between the extremes.

1	2	3	4	5	6	7
Extremely Uncharacteristic	Moderately Uncharacteristic	Slightly Uncharacteristic	Uncertain	Slightly Characteristic	Moderately Characteristic	Extremely Characteristic

_____ 1. I wonder why sometimes I feel so bitter about things

_____ 2. There are people who pushed me so far that we came to blows

_____ 3. I am an even-tempered person

_____ 4. When people are especially nice, I wonder what they want

_____ 5. When people annoy me, I may tell them what I think of them

_____ 6. I have become so mad that I have broken things

_____ 7. Once in a while I can't control the urge to strike another person

_____ 8. I am suspicious of overly friendly strangers

_____ 9. I can think of no good reason for ever hitting a person

_____ 10. Other people always seem to get the breaks

_____ 11. I sometimes feel that people are laughing at me behind my back

_____ 12. If somebody hits me, I hit back

_____ 13. Some of my friends think I'm a hothead

_____ 14. I get into fights a little more than the average person

_____ 15. My friends say that I'm somewhat argumentative

_____ 16. I know that "friends" talk about me behind my back

_____ 17. I often find myself disagreeing with people

_____ 18. At times I feel I have gotten a raw deal out of life

_____ 19. Given enough provocation, I may hit another person

_____ 20. Sometimes I fly off the handle for no good reason

_____ 21. I sometimes feel like a powder keg ready to explode

_____ 22. I can't help getting into arguments when people disagree with me

_____ 23. I have trouble controlling my temper

_____ 24. I am sometimes eaten up with jealousy

_____ 25. I flare up quickly but get over it quickly

_____ 26. If I have to resort to violence to protect my rights, I will

_____ 27. I have threatened people I know

_____ 28. I tell my friends openly when I disagree with them

_____ 29. When frustrated, I let my irritation show

ZTPI

Directions: For each of the statements below, please indicate whether or not the statement is characteristic of you. If the statement is extremely uncharacteristic of you (not at all like you) please write a "1" in the space provided to the right of the statement; if the statement is extremely characteristic of you (very much like you) please write a "7" in the space provided. And, of course, use the numbers in the middle if you fall between the extremes.

1	2	3	4	5	6	7
Extremely Uncharacteristic	Moderately Uncharacteristic	Slightly Uncharacteristic	Uncertain	Slightly Characteristic	Moderately Characteristic	Extremely Characteristic

_____ 1. I believe that getting together with one's friends to party is one of life's important pleasures.

_____ 2. Familiar childhood sights, sounds, smells often bring back a flood of wonderful memories.

_____ 3. Fate determines much in my life.

_____ 4. I often think of what I should have done differently in my life.

_____ 5. My decisions are mostly influenced by people and things around me.

_____ 6. I believe that a person's day should be planned ahead each morning.

_____ 7. It gives me pleasure to think about my past.

_____ 8. I do things impulsively.

_____ 9. If things don't get done on time, I don't worry about it.

_____ 10. When I want to achieve something, I set goals and consider specific means for reaching those goals.

_____ 11. On balance, there is much more good to recall than bad in my past.

_____ 12. When listening to my favorite music, I often lose all track of time.

_____ 13. Meeting tomorrow's deadlines and doing other necessary work comes before tonight's play.

_____ 14. Since whatever will be will be, it doesn't really matter what I do.

_____ 15. I enjoy stories about how things used to be in the "good old times."

_____ 16. Painful past experiences keep being replayed in my mind.

_____ 17. I try to live my life as fully as possible, one day at a time.

_____ 18. It upsets me to be late for appointments.

_____ 19. Ideally, I would live each day as if it were my last.

_____ 20. Happy memories of good times spring readily to mind.

_____ 21. I meet my obligations to friends and authorities on time.

_____ 22. I've taken m share of abuse and rejection in the past.

_____ 23. I make decisions of the spur of the moment.

_____ 24. I take each day as it is rather than try to plan it out.

_____ 25. The past has too many unpleasant memories that I prefer not to think about.

_____ 26. It is important to put excitement in my life.

_____ 27. I've made mistakes in the past that I wish I could undo.

_____ 28. I feel that it's more important to enjoy what you're doing than to get work done on time.

_____ 29. I get nostalgic about my childhood.

_____ 30. Before making a decision,, I weigh the costs against the benefits.

_____ 31. taking risks keeps my life from becoming boring.

_____ 32. It is more important for me to enjoy life's journey than to focus only on the destination.

_____ 33. Things rarely work out as I expected.

_____ 34. It's hard for me to forget unpleasant images of my youth.

_____ 35. It takes joy out of the process and flow of my activities, if I have to think about goals, outcomes, and products.

_____ 36. Even when I am enjoying the present, I am drawn back to comparisons with similar past experiences.

_____ 37. You can't really plan for the future because things change so much.

_____ 38. My life path is controlled by forces I cannot influence.

_____ 39. It doesn't make sense to worry about the future, since there is nothing that I can do about it anyway.

_____ 40. I complete projects on time by making steady progress.

_____ 41. I find myself tuning out when family members talk about the way things used to be.

_____ 42. I take risks to put excitement in my life.

_____ 43. I make lists of things to do.

_____ 44. I often follow my heart more than my head.

_____ 45. I am able to resist temptations when I know that there is work to be done.

_____ 46. I find myself getting swept up in the excitement of the moment.

_____ 47. Life today is too complicated; I would prefer the simpler life of the past.

_____ 48. I prefer friends who are spontaneous rather than predictable.

_____ 49. I like family rituals and traditions that are regularly repeated.

Interest and Preference Test

SSS Form V

Directions: Each of the items below contains two choices, A and B. Please indicate (circle) on your answer sheet which of the choices most describes your likes or the way you feel. In some cases you may find items in which both choices describe your likes or feelings. Please choose the one which better describes your likes or feelings. In some cases you may find items in which you do not like either choice. In these cases mark the choice the dislike least. Please try to answer each item.

It is important you respond to all items with only one choice, A or B. We are interested only in your likes or feeling, not in how others feel about these things or how one is supposed to feel. There are no right or wrong answers as in other kinds of tests. Be frank and give your honest appraisal of yourself.

1.   A.   I like "wild" uninhibited parties
        B.   I prefer quiet parties with good conversation

2.   A.   There are some movies I enjoy seeing a second or even a third time
        B.   I can't stand watching a movie that I've seen before

3.   A.   I often wish I could be a mountain climber
        B.   I can't understand people who risk their necks climbing mountains

4.   A.   I dislike all body odors
        B.   I like some for the earthly body smells

5.   A.   I get bored seeing the same old faces
        B.   I like to comfortable familiarity of everyday friends

6.   A.   I like to explore a strange city or section of town by myself, even if it means getting lost
        B.   I prefer a guide when I am in a place I don't know well

7.   A.   I dislike people who do or say things just to shock or upset others
        B.   When you can predict almost everything a person will do and say he or she must be a bore

8.   A.   I usually don't enjoy a movie or play where I can predict what will happen in advance
        B.   I don't mind watching a movie or a play where I can predict what will happen in advance

9.   A.   I have tried marijuana or would like to
        B.   I would never smoke marijuana

10.   A.   I would not like to try any drug which might produce strange and dangerous effects on me
        B.   I would like to try some of the new drugs that produce hallucinations

11.   A.   A sensible person avoids activities that are dangerous
        B.   I sometimes like to do things that are a little frightening

12.   A.   I dislike "swingers" (people who are uninhibited and free about sex)
        B.   I enjoy the company of real "swingers"

13.   A.   I find that stimulants make me uncomfortable
       B.   I often like to get high (drinking liquor or smoking marijuana)

14.   A.   I like to try new foods that I have never tasted before
       B.   I order the dishes with which I am familiar, so as to avoid disappointment and unpleasantness

15.   A.   I enjoy looking at home movies or travel slides
       B.   Looking at someone's home movies or travel slides bores me tremendously

16.   A.   I would like to take up the sport of water skiing
       B.   I would not like to take up water skiing

17.   A.   I would like to try surf boarding
       B.   I would not like to try surf boarding

18.   A.   I would like to take off on a trip with no preplanned or definite routes, or timetable
       B.   When I go on a trip I like to plan my route and timetable fairly carefully

19.   A.   I prefer the "down to earth" kinds of people as friends
       B.   I would like to make friends in some of the "far out" groups like artists or "punks"

20.   A.   I would not like to learn to fly an airplane
       B.   I would like to learn to fly an airplane

21.   A.   I prefer the surface of the water to the depths
       B.   I would like to go scuba diving

22.   A.   I would like to meet some persons who are homosexual (men or women)
       B.   I stay away from anyone I suspect of being "gay or lesbian"

23.   A.   I would like to try parachute jumping
       B.   I would never want to try jumping out of a plane with or without a parachute

24.   A.   I prefer friends who are excitingly unpredictable
       B.   I prefer friends who are reliable and predictable

25.   A.   I am not interested in experience for its own sake
       B.   I like to have new and exciting experiences and sensations even if they are a little frightening, unconventional, or illegal

26.   A.   The essence of good art is in its clarity, symmetry of form and harmony of colors
       B.   I often find beauty in the "clashing" colors and irregular forms of modern paintings

27.   A.   I enjoy spending time in the familiar surroundings of home
       B.   I get very restless if I have to stay around home for any length of time

28.   A.   I like to dive off the high board
       B.   I don't like the feeling I get standing on the high board (or I don't go near it at all)

29.   A.   I like to date members of the opposite sex who are physically exciting
       B.   I like to date members of the opposite sex who share my values

30. A. Heavy drinking usually ruins a party because some people get loud and boisterous
    B. Keeping the drinks full is the key to a good party

31. A. The worst social sin is to be rude
    B. The worst social sin is to be a bore

32. A. A person should have considerable sexual experience before marriage
    B. It's better if two married persons begin their sexual experience with each other

33. A. Even if I had the money I would not care to associate with flight rich persons like those in the "jet set"
    B. I could conceive of myself seeking pleasures around the world with the "jet set"

34. A. I like people who are sharp and witty even if they do sometimes insult others
    B. I dislike people who have their fun at the expense of hurting the feelings of others

35. A. There is altogether too much portrayal of sex in movies
    B. I enjoy watching many of the "sexy" scenes in movies

36. A. I feel best after taking a couple of drinks
    B. Something is wrong with people who need liquor to feel good

37. A. People should dress according to some standard of taste, neatness, and style
    B. People should dress in individual ways even if the effects are sometimes strange

38. A. Sailing long distances in small sailing crafts is foolhardy
    B. I would like to sail a long distance in a small but seaworthy sailing craft

39. A. I have no patience with dull or boring persons
    B. I find something interesting in almost every person I talk to

40. A. Skiing down a high mountain slope is a good way to end up on crutches
    B. I think I would enjoy the sensations of skiing very fast down a high mountain slope

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ZKPQ-III-R

Directions: Shown below you will find a number of statements. Please read each statement and decide whether or not it describes you. Please indicate your response to the left of each statement, using the following scale:

1 = True	2 = False

____ 1. I tend to begin a new job without much advance planning on how I will do it

____ 2. I usually think about what I am going to do before doing it.

____ 3. I often do things on impulse.

____ 4. I very seldom spend much time on the details of planning ahead.

____ 5. Before I begin a complicated job, I make careful plans.

____ 6. I enjoy getting into new situations where you can't predict how things will turn out.

____ 7. I often get so carried away by new and exciting things and ideas that I never think of possible complications.

____ 8. I am an impulsive person.

DRIVING QUESTIONNAIRE

Directions: Using the scale shown below, please indicate the extent to which you engage in each driving behavior. Please place your response in the space provided to the left of the item.

1	2	3	4	5
Never	Rarely	Sometimes	Often	Always

_____ 1. I speed up to turn on a yellow light.

_____ 2. I drive 5 to 10 mph over the speed limit.

_____ 3. I take risks when driving.

_____ 4. I do things against the law when it is safe.

_____ 5. I drive over the speed limit in clear weather.

_____ 6. I play the radio very loud.

_____ 7. I drive over the speed limit at night.

_____ 8. I eat or drink beverages while driving.

_____ 9. I drive on people's bumpers.

_____ 10. I get back at people with my car.

_____ 11. I let people know when I am unhappy with their driving.

_____ 12. I give other drivers a nonverbal gesture.

_____ 13. I smoke and drive at the same time.

_____ 14. I slow down when someone is trying to pass.

_____ 15. I use my horn a lot.

_____ 16. I speed up to get through a yellow light.

_____ 17. I run red lights.

_____ 18. I race in my car.

_____ 19. I drive over the speed limit.

_____ 20. I take risks while bicycling.

_____ 21. I drive under the influence of alcohol.

22. How many speeding tickets have you received? _____

23. Not counting speeding tickets, how many other moving violations (e.g., running a red light) have you received? _____

24. Have you ever been hospitalized for an automobile accident? _____

25. How many automobile accidents have you been in? _____

Appendix 2

Washington Driver's Experience Survey

WASHINGTON STATE UNIVERSITY

WASHINGTON DRIVER'S
EXPERIENCE SURVEY

2004

You are being asked to take part in a statewide survey which is being sponsored by Washington State University of 2,000 drivers to assess your experiences and preferences while driving. We fully expect that different people will have different experiences and preferences, and are interested in knowing what you have experienced and what you prefer. This survey was designed by researchers at Washington State University. Your participation is very important and entirely **VOLUNTARY** and your answers are completely **CONFIDENTIAL**. Only researchers from Washington State University will see your answers and comments. The survey should take 15 to 20 minutes to complete. Please seal and mail the completed survey in the enclosed pre-addressed and postage-paid envelope. Your participation in this survey is greatly appreciated and will help us better understand driver attitudes, preferences, and experiences in our state. Responses received by October 29, 2004, will automatically be entered to win one of five $100.00 awards.

If you agree to participate in this survey project please indicate that you have read this statement by signing below. *If you are under 18 years of age*, your parent or guardian must also sign this consent. Please read the directions carefully and complete the questions in the order that they appear *using the indicated scale*. This study has been reviewed and approved for human participation by the WSU Institutional Review Board (IRB). If you have any questions regarding your rights as a participant, you may contact them at 509-335-9661. Note that if you have any questions regarding this project, you may contact the project investigators whose names and contact information are listed below the signature lines.

_____   _____
(respondent signature)   (parent or guardian signature)

_____   _____
Nicholas P. Lovrich, Jr.   Steven J. Ellwanger, A.B.D., M.P.A.
Director   Principal Investigator
Division of Governmental Studies and Services   Washington State University
Claudius and Mary Johnson Distinguished Prof.   Vancouver, WA 98686
Pullman, WA 99164   (360) 546-9495
(509) 335-3329

Note: *The processing number on this questionnaire is used only to coordinate mailings. When you return your survey your number is checked off our mailing list and you will not be bothered by follow-up mailings.*

Mail Processing Number _____

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DIRECTIONS: For each of the statements below, please indicate whether or not the statement is characteristic of you. If the statement is extremely uncharacteristic of you (not at all like you) please write "1" in the space provided to the left of the statement; if the statement is extremely characteristic of you (very much like you) please write "7" in the space provided. And, of course, use the numbers in the middle if you fall between the two extremes.

1	2	3	4	5	6	7
Extremely Uncharacteristic	**Moderately Uncharacteristic**	**Slightly Uncharacteristic**	**Uncertain**	**Slightly Characteristic**	**Moderately Characteristic**	**Extremely Characteristic**

_____ 1. I get frustrated when I encounter road construction which halts my progress.

_____ 2. I <u>don't</u> get frustrated when a driver is driving well above the posted speed limit.

_____ 3. I <u>don't</u> get frustrated when another driver will not heed my attempt to merge into traffic.

_____ 4. I get frustrated when the driver in front of me makes a turn without signaling.

_____ 5. I <u>don't</u> get frustrated when a bicyclist is riding in the middle of the lane and slowing down traffic.

_____ 6. I <u>don't</u> get frustrated when a driver is holding up traffic by being slow to park.

_____ 7. I get frustrated when I see a law enforcement official watching traffic from a hidden position.

_____ 8. I <u>don't</u> get frustrated when I encounter road construction with detours.

_____ 9. I get frustrated when a driver passes me on the "right," or the non-passing lane.

_____ 10. I <u>don't</u> get frustrated when a slow vehicle on a winding road will not pull over to allow others to pass.

_____ 11. I <u>don't</u> get frustrated when the condition of the roadway is so poor that it is difficult to see its markings.

_____ 12. I <u>don't</u> get frustrated when my defroster is unable to keep my windshield clear at all times.

_____ 13. I <u>don't</u> get frustrated when I cannot pass another vehicle because a driver in the passing lane is driving too slowly.

_____ 14. I get frustrated when someone backs out in front of me without looking.

_____ 15. I <u>don't</u> get frustrated when a driver appears to be engaged in activities not related to driving (e.g., talking on cell phone, putting on makeup, eating).

1 Extremely Uncharacteristic	2 Moderately Uncharacteristic	3 Slightly Uncharacteristic	4 Uncertain	5 Slightly Characteristic	6 Moderately Characteristic	7 Extremely Characteristic

_____ 16. I don't get frustrated when at night, a driver who is approaching does not dim their bright lights.

_____ 17. I don't get frustrated when someone hastily pulls out into oncoming traffic, causing the flow of traffic to unnecessarily slow.

_____ 18. I don't get frustrated when a law enforcement official appears to be following me.

_____ 19. I don't get frustrated when a portion of a vehicle which is pulled off to the side of the highway remains in my driving lane.

_____ 20. I get frustrated when driving behind a truck which has material flapping around in the back.

_____ 21. I get frustrated when the driver in front of me appears to be uncertain about his/her actions.

_____ 22. I don't get frustrated when at night, the person immediately behind me is driving with their bright lights on.

_____ 23. I don't get frustrated when a vehicle remains in my "blind spot" for an extended period.

_____ 24. I get frustrated when someone runs a red light.

_____ 25. I get frustrated when the driver in front of me repeatedly drifts across the marked road lines.

_____ 26. I get frustrated when a responding Emergency Services Vehicle (e.g., police, fire, ambulance) disrupts traffic flow.

_____ 27. I get frustrated when a law enforcement official pulls me over.

_____ 28. I get frustrated when it is raining so heavily that it is difficult to see.

DIRECTIONS: For each of the statements below, please indicate your level of agreement. If you strongly agree with the statement (is very much like you) please write "5" in the space provided to the left of the statement; if you strongly disagree with the statement (is not at all like you) please write "1" in the space provided. And, of course, use the numbers in the middle if you fall between the two extremes.

1	2	3	4	5
Strongly Disagree	Somewhat Disagree	Uncertain	Somewhat Agree	Strongly Agree

_____ 29. I often act on the spur of the moment without stopping to think.

_____ 30. I frequently try to avoid projects that I know will be difficult.

_____ 31. I like to test myself every now and then by doing something a little risky.

_____ 32. If I had a choice, I would almost always rather do something physical than something mental.

_____ 33. I try to look out for myself first, even if it means making things difficult for other people.

_____ 34. I lose my temper pretty easily.

_____ 35. I don't devote much thought and effort to preparing for the future.

_____ 36. When things get complicated, I tend to quit or withdraw.

_____ 37. Sometimes I will take a risk just for the fun of it.

_____ 38. I almost always feel better when I am on the move than when I am sitting and thinking.

_____ 39. I'm not very sympathetic to other people when they are having problems.

_____ 40. Often, when I'm angry at people I feel more like hurting them than talking to them about why I am angry.

_____ 41. I often do whatever brings me pleasure here and now, even at the cost of some distant goal.

_____ 42. The things in life that are easiest to do bring me the most pleasure.

_____ 43. I sometimes find it exciting to do things for which I might get in trouble.

_____ 44. I like to get out and do things more than I like to read or contemplate ideas.

_____ 45. If things I do upset people, it's their problem not mine.

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1	2	3	4	5
Strongly Disagree	Somewhat Disagree	Uncertain	Somewhat Agree	Strongly Agree

_____ 46. When I'm really angry, other people better stay away from me.

_____ 47. I'm more concerned with what happens to me in the short run than in the long run.

_____ 48. I dislike really hard tasks that stretch my abilities to the limit.

_____ 49. Excitement and adventure are more important to me than security.

_____ 50. I seem to have more energy and a greater need for activity than most other people my age.

_____ 51. I will try to get things I want even when I know it's causing problems for other people.

_____ 52. When I have a serious disagreement with someone, it's usually hard for me to talk calmly about it without getting upset.

DIRECTIONS: Using the scale shown below, please indicate the extent to which you engage in each driving behavior. Please place your response in the space provided to the left of the item.

1	2	3	4	5
Never	Rarely	Sometimes	Often	Always

_____ 53. I speed up to turn on a yellow light.

_____ 54. I drive 5 to 10 mph over the speed limit.

_____ 55. I take risks when driving.

_____ 56. I do things against the law when it is safe.

_____ 57. I drive over the speed limit in clear weather.

_____ 58. I play the radio very loud.

_____ 59. I drive over the speed limit at night.

_____ 60. I eat or drink beverages while driving.

_____ 61.   I drive on people's bumpers.

1	2	3	4	5
Never	**Rarely**	**Sometimes**	**Often**	**Always**

_____ 62.   I get back at people with my car.

_____ 63.   I let people know when I am unhappy with their driving.

_____ 64.   I give other drivers a nonverbal gesture.

_____ 65.   I slow down when someone is trying to pass.

_____ 66.   I use my horn a lot.

_____ 67.   I speed up to get through a yellow light.

_____ 68.   I run red lights.

_____ 69.   I race in my car.

_____ 70.   I drive over the speed limit.

Please write the appropriate response in the space provided:

71.   How many speeding tickets have you received? _____

72.   Not counting speeding tickets, how many other moving violations (e.g., running a red light) have you received? _____

73.   In how many automobile accidents have you been involved as the driver? _____

74.   Approximately how many miles do you drive during a typical week? _____

75.   What percentage of your weekly miles is related to recreation or leisure activities?
         _____ (0% - 100%)

76.   Approximately how long have you been in possession of a driver's license?
         _____ Years and _____ Months

77. What is your age? _____ Years

Please check the appropriate response:

78. Do you own your own vehicle?   _____Yes   _____No

79. How would you characterize the area in which the majority of your driving occurs?

          _____ Urban   _____ Rural
                (City)   (Country)

80. Would you characterize the type of vehicle which you drive as an economy car (small fuel efficient car)?

          _____ Yes   _____ No

81. Are you/have you ever participated in a Graduated Licensing Program (a program which restricted your driving activities, e.g., a driving curfew, between 16 and 18 years of age)?

          _____ Yes   _____ No

82. Gender: _____ Male   _____ Female

83. Ethnicity: _____ African American

                   _____ Asian American

                   _____ Caucasian (White)

                   _____ Hispanic

                   _____ Native American

                   _____ Other

We are very much interested in any **COMMENTS** you might have on this survey. Please record any comments you'd like to share with us here. [Attach additional sheets of paper if necessary.]

THANK YOU FOR YOUR PARTICIPATION IN THIS VERY IMPORTANT SURVEY

Appendix 3

Results of Exploratory Factor Analysis

```
[DataSet1] D:\Aggressive Driver\Data
Play\cfc_agg_ss_driving_w01_recoded_linus and dr j_for SEM3.sav
```

Communalities

	Initial	Extraction
drive1	.665	.494
drive2	.731	.659
drive3	.606	.480
drive4	.520	.448
drive5	.811	.687
drive6	.318	.200
drive7	.634	.622
drive8	.354	.191
drive9	.604	.549
drive10	.633	.528
drive11	.512	.428
drive12	.369	.344
drive14	.262	.154
drive15	.288	.187
drive16	.640	.482
drive17	.454	.234
drive18	.500	.334
drive19	.765	.722

Extraction Method: Principal Axis Factoring.

Total Variance Explained

Factor	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings(a)
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total
1	6.678	37.100	37.100	6.180	34.331	34.331	5.828
2	2.084	11.580	48.680	1.563	8.684	43.015	3.817
3	1.349	7.496	56.176				
4	1.202	6.678	62.854				
5	.936	5.198	68.051				
6	.899	4.994	73.046				
7	.827	4.594	77.640				
8	.693	3.847	81.487				
9	.650	3.613	85.100				

10	.490	2.725	87.825
11	.472	2.621	90.446
12	.363	2.015	92.461
13	.318	1.765	94.225
14	.302	1.679	95.904
15	.240	1.336	97.240
16	.199	1.103	98.343
17	.172	.954	99.297
18	.127	.703	100.000

Extraction Method: Principal Axis Factoring.
a   When factors are correlated, sums of squared loadings cannot be added to obtain a total variance.

Scree Plot
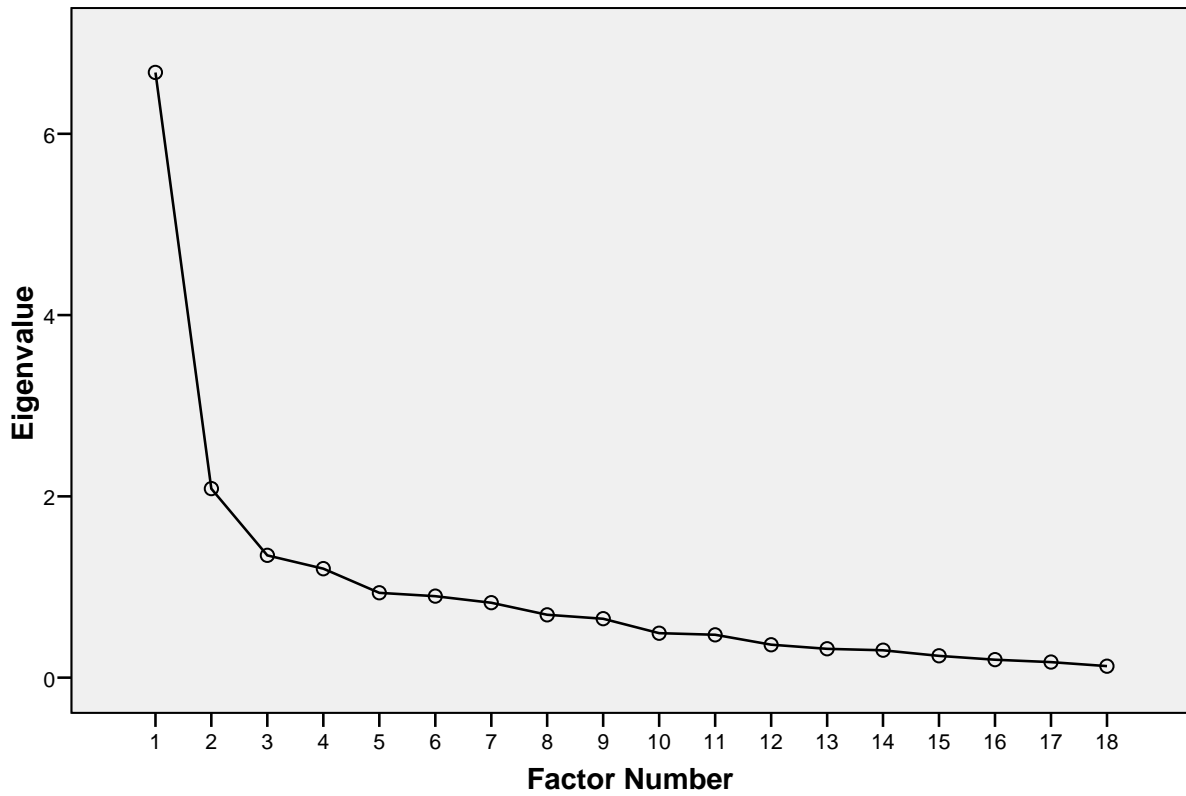
Factor Matrix(a)

	Factor	
	1	2
drive1	.698	-.085
drive2	.756	-.294
drive3	.693	.015
drive4	.668	-.048
drive5	.774	-.295
drive6	.446	-.019
drive7	.756	-.223
drive8	.434	.049
drive9	.621	.404
drive10	.506	.521
drive11	.430	.493
drive12	.363	.461
drive14	-.345	-.188
drive15	.254	.349
drive16	.667	-.192
drive17	.482	.047
drive18	.561	.140
drive19	.709	-.469

Extraction Method: Principal Axis Factoring.
a   2 factors extracted. 5 iterations required.

Pattern Matrix(a)

	Factor	
	1	2
drive1	.635	.125
drive2	.848	-.084
drive3	.551	.234
drive4	.581	.157
drive5	.863	-.079
drive6	.377	.120
drive7	.792	-.007
drive8	.314	.190
drive9	.184	.636
drive10	-.003	.728
drive11	-.042	.673
drive12	-.071	.617
drive14	-.131	-.313
drive15	-.071	.461
drive16	.695	-.001

	.354	.202
drive17		
drive18	.344	.328
drive19	.948	-.290

Extraction Method: Principal Axis Factoring.
 Rotation Method: Promax with Kaiser Normalization.
a   Rotation converged in 3 iterations.

Structure Matrix

	Factor	
	1	2
drive1	.694	.426
drive2	.808	.318
drive3	.662	.495
drive4	.655	.432
drive5	.826	.330
drive6	.434	.299
drive7	.788	.369
drive8	.404	.338
drive9	.485	.723
drive10	.342	.726
drive11	.277	.654
drive12	.222	.584
drive14	-.279	-.375
drive15	.148	.428
drive16	.694	.329
drive17	.450	.370
drive18	.500	.492
drive19	.811	.159

Extraction Method: Principal Axis Factoring.
 Rotation Method: Promax with Kaiser Normalization.

Factor Correlation Matrix

Factor	1	2
1	1.000	.474
2	.474	1.000

Extraction Method: Principal Axis Factoring.
 Rotation Method: Promax with Kaiser Normalization.

Appendix 4

Descriptive Statistics for Study 2

| Variables | Min | Max | Mean | SD | Skewness | | Kurtosis | |
					Value	C.R.	Value	C.R.
v29	1	7	2.489	1.231	0.393	**3.079**	-0.858	**-3.372**
v35	1	5	1.817	1.126	1.315	**10.312**	0.747	**2.936**
v41	1	5	2.205	1.168	0.654	**5.129**	-0.716	**-2.813**
v47	1	5	2.027	1.052	0.784	**6.145**	-0.361	-1.421
v31	1	5	3.227	1.272	-0.368	**-2.887**	-1.078	**-4.240**
v37	1	5	2.997	1.380	-0.127	-0.997	-1.358	**-5.340**
v43	1	5	2.514	1.309	0.254	1.990	-1.361	**-5.351**
v49	1	5	2.418	1.069	0.526	**4.126**	-0.383	-1.504
v34	1	5	2.279	1.305	0.662	**5.195**	-0.856	**-3.365**
v40	1	5	2.030	1.239	0.889	**6.972**	-0.513	-2.016
v46	1	5	2.426	1.271	0.521	**4.082**	-0.949	**-3.732**
v52	1	5	2.678	1.379	0.191	1.495	-1.360	**-5.345**
V16r	1	7	5.500	1.563	-1.152	**-9.033**	0.676	**2.658**
V17r	1	7	5.366	1.492	-0.992	**-7.779**	0.417	1.640
V22r	1	7	5.754	1.660	-1.570	**-12.309**	1.647	**6.474**
V5r	1	7	5.008	1.882	-0.718	**-5.634**	-0.672	**-2.641**
V6r	1	7	4.145	1.798	-0.119	-0.932	-1.176	**-4.622**
V8r	1	7	4.145	1.767	-0.182	-1.430	-1.103	**-4.337**
V10r	1	7	5.145	1.793	-0.916	**-7.181**	-0.245	**-0.962**
V13r	1	7	5.137	1.648	-0.811	**-6.359**	-0.179	-0.704
V11r	1	7	4.770	1.812	-0.513	**-4.023**	-0.843	**-3.315**
V12r	1	7	4.735	1.837	-0.568	**-4.453**	-0.718	**-2.822**
v19r	1	7	4.615	1.680	-0.451	**-3.537**	-0.629	-2.475
v20	1	7	4.391	1.935	-0.426	**-3.342**	-1.072	**-4.216**
v28	1	7	4.402	1.988	-0.394	**-3.087**	-1.101	**-4.330**
v7	1	7	3.839	2.162	0.029	0.230	-1.398	**-5.498**
V18r	1	7	4.514	1.952	-0.320	**-2.513**	-1.110	**-4.364**
v27	1	7	4.787	1.875	-0.503	**-3.945**	-0.666	**-2.618**
v53	1	5	2.973	0.959	0.036	0.282	-0.458	-1.800
v54	1	5	3.631	0.941	-0.532	**-4.174**	-0.223	-0.876
v55	1	5	2.134	0.889	0.864	**6.774**	0.944	**3.711**
v56	1	5	2.295	1.036	0.617	**4.840**	-0.231	-0.907
v57	1	5	3.464	1.048	-0.415	**-3.254**	-0.417	**-1.641**
v59	1	5	2.664	1.025	0.388	**3.041**	-0.261	**-1.028**
v67	1	5	3.071	0.957	0.084	0.657	-0.372	**-1.463**
v70	1	5	3.303	0.953	-0.104	**-0.816**	-0.501	**-1.970**

| Variables	Min	Max	Mean	SD	Skewness		Kurtosis	
					Value	C.R.	Value	C.R.
v61	1	5	1.530	0.778	1.809	**14.189**	4.056	**15.945**
v62	1	4	1.284	0.598	2.274	**17.836**	5.128	**20.163**
v63	1	5	2.049	1.008	0.820	**6.431**	0.290	1.142
v64	1	5	1.705	0.928	1.282	**10.052**	1.193	**4.689**
v66	1	5	1.642	0.791	1.398	**10.963**	2.256	**8.871**
CFC-I	1	5	2.016	0.870	0.818	**6.412**	0.018	0.072
RskSek	1	5	2.789	0.990	0.089	0.702	-0.892	**-3.508**
Temper	1	5	2.353	0.951	0.585	**4.586**	-0.237	-0.931
Law	1	7	4.380	1.519	-0.146	-1.144	-0.821	**-3.229**
Slow	1.667	7	4.616	1.054	-0.406	**-3.182**	-0.184	-0.722
RskDrv	1	5	2.915	0.803	0.085	0.663	-0.234	-0.920
AggDrv	1	4.75	1.670	0.634	1.300	**10.196**	2.264	**8.903**

N = 366

CFC: consideration of future consequences; RskSek:

C.R.: critical ratio (skewness/kurtosis over its standard error)

Appendix 5

Replicated Regression Model without Cross-loading observed variables
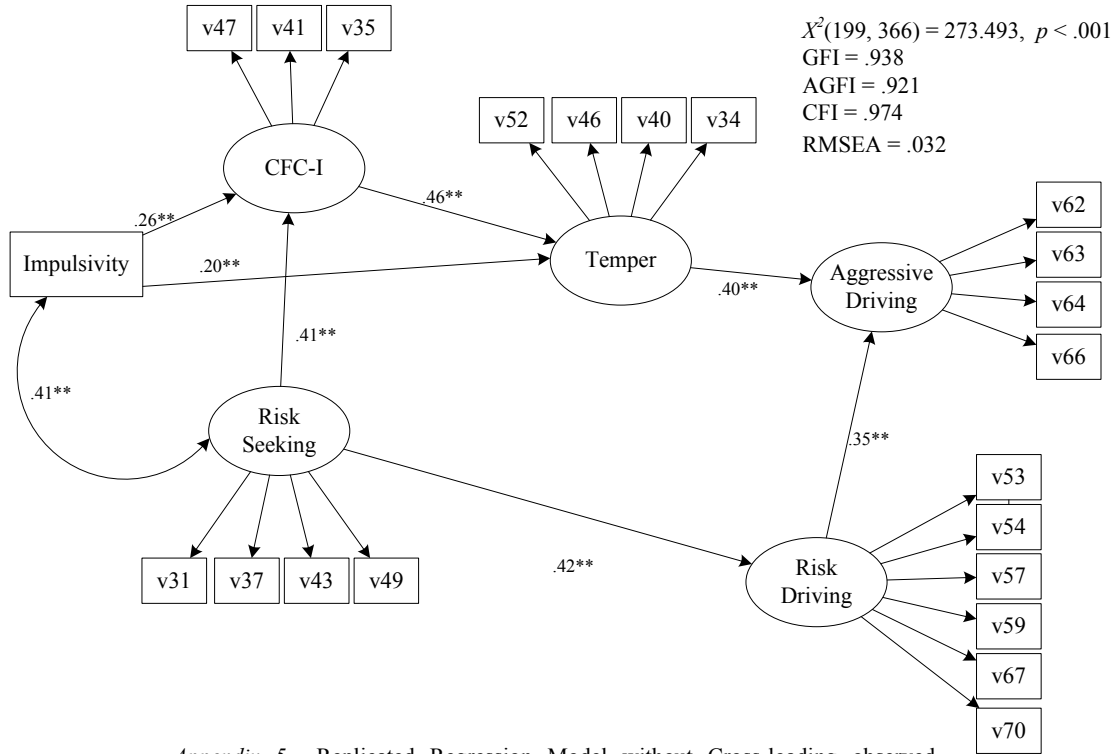
Appendix 5 Replicated Regression Model without Cross-loading observed variables. CFC-I: consideration of future consequences-immediate.
* $p < .05$; ** $p < .01$; *** $p < .001$