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Investigating the Roles of Time Perspective and Emerging Adulthood in Predicting Driving Behavior

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**INVESTIGATING THE ROLES OF TIME PERSPECTIVE AND
EMERGING ADULTHOOD IN PREDICTING DRIVING BEHAVIOR**

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ABSTRACT

INVESTIGATING THE ROLES OF TIME PERSPECTIVE AND EMERGING ADULthood IN PREDICTING DRIVING BEHAVIOR

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Old Dominion University, 2012
Director: Dr. Bryan E. Porter

In the U.S., motor vehicle crashes are the leading cause of death for individuals 2 to 34 years of age (National Highway Traffic Safety Administration, 2009c). Of particular interest are 18 to 25 year olds or *emerging adults* because of their increased crash risk. The prevalence of crashes attributable to the combination of driving inexperience and risky behaviors creates the necessity to identify predictors of crash likelihoods. While there are known personality variables that predict risky driving, time perspective as an additional one was suggested. Time perspective pertains to how the past, present, and future influence an individual's actions. Zimbardo, Keough, and Boyd (1997) investigated the relationship between time perspective and risky driving behavior as part of a larger health behavior study. The current research focused on replicating and extending their initial endeavor. Proposed improvements included expanding the risky driving outcome questionnaire from Zimbardo's five items to include scales more commonly used in the traffic research field (e.g., the Driver Behavior Questionnaire: Lajunen, Parker, & Summala, 2004; the Driving Anger Expression Inventory: Deffenbacher, Lynch, Oetting, & Swaim, 2002). Second, the two separate present time perspective subscales of the Zimbardo Time Perspective Inventory (ZTPI), which have not been used in driving risk research, were employed to better reflect differing driving behaviors and characteristics associated with fatalism and hedonism (Zimbardo & Boyd,

1999). Third, the role of positive driving behaviors seemed important given its recent focus in the literature. Thus, both risky and positive driving behaviors were investigated (Özkan & Lajunen, 2005). Based on previous research, hypotheses were tested among the various time perspective orientations and risky and positive driving behaviors. The utility of time perspective as a predictor of driving behavior is discussed. In addition to studying the relationship between time perspective and driving behaviors, the influence of emerging adulthood were explored. Today many individuals are extending the time between adolescence and adulthood (Arnett, 2000). This intermediate stage where individuals are taking more time to explore their options before making long-term commitments was tested for its unique contribution toward predicting driving behavior. Specifically, it was hypothesized that those who score lower on the emerging adult factor would display more risky driving behaviors and fewer positive driving behaviors. Emerging adulthood was also tested in an overall model of risky driving which includes the time perspectives of interest and the control variables of sensation seeking and anger.

I would like to dedicate this dissertation to my wonderful family - particularly my fantastic and understanding husband, Ricky, and daughter, Gabby. Your endless support and encouragement helped me make it through. The weekends now belong to you again.

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CHAPTER I

INTRODUCTION

Each year approximately 1.3 million people are killed and between 20 and 50 million are injured in traffic crashes globally (World Health Organization [WHO], 2009). Of all injury-related deaths, more than 5 million yearly, one in four of those deaths were the result of road traffic incidents. Based on the World Bank's Traffic Fatalities and Economic Growth project estimates, motor-vehicle-related fatalities and injuries will increase to 2.4 million yearly by 2030 (WHO, 2009).

In the U.S., motor vehicle crashes are the leading cause of death for individuals 2 to 34 years of age (National Highway Traffic Safety Administration [NHTSA], 2009c). Of particular interest are emerging adult drivers - aged 18 to 25 (Arnett, 2000). These individuals are no longer considered adolescents but are also not yet considered adults by either themselves or their parents (Nelson et al., 2007). Although this age group comprises only 11.2% of the U.S. population (U.S. Census Bureau, 2009), they accounted for 22.8% of all motor vehicle occupant fatalities in 2008 (NHTSA, 2009a). These alarming statistics stress the necessity of developing more reliable measures to predict the likelihood of crashes especially within this high-risk group. Knowing characteristics of those at highest risk helps with developing and implementing targeted strategies and interventions. Although a number of personality variables have been

The model for this dissertation is the *Publication Manual of the American Psychological Association*, 6th edition.

studied and their association with risky driving behaviors explored, there is still more work to do to complete the picture of what personality variables are critical to explain driving behavior.

Purpose

Although a number of personality variables such as sensation seeking, anger, and alienation (Gulliver & Begg, 2007; Iverson & Rundmo, 2002; Jonah, 1997) are related to driving behaviors, particularly risky driving behaviors, time perspective is one variable that has not received as much attention in the traffic psychology literature. This research specifically addresses the potential usefulness of the time perspective variable as an additional predictor of future driving behaviors. To help understand the concept of time perspective, an overview of its definitions and relationship to risky health behaviors in general, as well as driving safety is discussed. The case for using time perspective to predict driving behaviors is a particularly specific focus after the general discussion.

This research also focuses on improvements to how time perspective has been studied in driving safety and how it should be continued. For example, although Zimbardo, Keough, and Boyd (1997) previously explored the time perspective and risky driving behavior relationship, that investigation used only five items of driving behavior to represent the driving environment. Certainly, expanding the scope and scale of their risky driving questionnaire by including current driving behavior questionnaires more commonly used (i.e., the Driver Behavior Questionnaire [Lajunen, Parker, & Summala, 2004] and the Driving Anger Expression Inventory [Deffenbacher, Lynch, Oetting, & Swaim, 2002]) was warranted. In addition, understanding the relationship between time

perspective and positive driving behaviors was important, particularly given a recent focus on courteous driving behaviors (Özkan & Lajunen, 2005).

In addition to using time perspective to predict risky and positive driving behaviors, characteristics associated with emerging adulthood such as being married, living with parents, and being financially independent were explored. The focus on young drivers was not unique; however, the specific focus on emerging adult drivers and the characteristics of emerging adults was unique. Emerging adults (typically individuals aged 18-25) are essential to study because as a whole this is one of the most at-risk crash groups (NHTSA, 2009b). The majority of research on time perspective and risky driving behaviors has been conducted with this age group; however, participants have been classified as emerging adults solely based on age and the specific life events differentiating emerging adults from adults have been largely ignored. These characteristics are discussed and, as with time perspective, relevant risky health behaviors are reviewed.

What is Time Perspective?

Although the construct of time has been used for thousands of years with calendar systems (e.g., solar and Roman calendars [Encyclopedia Britannica, 2012]) and studied objectively for nearly a century and a half (e.g., reaction times and work hours [Benschop & Draaisma, 2000]), it has only been more recently that psychologists have focused on the subjective aspect of time. McGrath and Kelly (1986) found over 200 ways to define the concept of time perspective, but the current paper focuses on time perspective as defined by Hornik and Zakay (1996, p. 385) as a “relative dominance of past, present, and future in a person’s thought.” The subjective influence of time perspective on daily

activities has led to an emerging field chronicling the impact of how our own perception of time affects present and future decisions and planning.

Time perspective describes a personality characteristic (Gorman & Wessman, 1977) by which an individual partitions experiences into past, present, and future time blocks. Zimbardo and Boyd (1999) believed that although time perspective is a stable disposition, situational factors can and do influence responses. Overall, when an individual bases decisions and actions using one predominant time orientation, these individuals tend to be more likely to display certain associated behaviors. (Specific health associated behaviors are discussed later.) The influence of time perspective on behavior compels the question of whether this construct can be used to identify future driving behaviors. This specific relationship was the impetus of this study.

Time Perspective Orientation

When one of the time perspectives - past, present, or future, dominates over the other two, an individual is classified as having that specific dominant perspective. For example, if someone is past-oriented, they tend to rely on prior experiences, memories, and cultural standards to direct their behaviors (Boniwell & Zimbardo, 2004). If an individual with a past time perspective is presented with a new way to do something, they will cling to their original methods and reject new techniques. Present-oriented people tend to rely on immediate environmental and situational factors to make decisions. A person with a present time orientation lives for the day and does whatever makes them happy now in the short-term. Research indicates that males tend to be more present-oriented than females (Zimbardo et al., 1997). Future-oriented people tend to rely on imagined future situations and the later consequences of their present actions when

making decisions (Boniwell & Zimbardo, 2004). These individuals are planners who determine what they want and devise ways to make their dreams attainable in the future. Females tend to be more future-oriented than males (Zimbardo et al., 1997).

Measuring Time Perspective

For over 30 years, efforts have been made to develop a reliable scale to measure time perspective. Some of the most notable efforts have included the Circles Test (Cottle, 1976), Time Lines (Rappaport, Enrich, & Wilson, 1985), the Time Structure Questionnaire (Bond & Feather, 1988), and the Stanford Time Perspective Inventory (Zimbardo & Boyd, 1999). The Circles Test involves asking participants to draw circles representing the past, present, and future (Cottle, 1976). The relative sizes and any overlaps of the circles are indicative of the individual's unique time perspective. The Time Lines conceived by Rappaport et al. (1985) presents participants with a long strip of paper on which they must indicate significant events that have happened, are happening, and will happen as well as their respective age for each event. Unlike these two projective tests, Bond and Feather's Time Structure Questionnaire (1988) contains 26 time-related items answered on a Likert scale. Sample items include "Do you ever have trouble organizing the things you have to do?" and "Do you spend time thinking about opportunities you have missed?"

The majority of time perspective questionnaires developed had poor reliability, scoring problems, and typically ignored past time perspective (Boniwell & Zimbardo, 2004). Zimbardo revised his Stanford Time Perspective Inventory to improve on the faults of previous time perspective scales (Zimbardo & Boyd, 1999).

The Zimbardo Time Perspective Inventory (ZTPI). The original ZTPI was composed of past, present, and future factors. The newest revision of the ZTPI also divides the past and present perspectives into two subscales for each perspective. Overall, the past time perspective measures history, traditions, and family events (Boniwell & Zimbardo, 2004). The past-positive factor represents a sentimental, pleasant view of the past and family and is associated with a higher self-esteem and happiness than the other time perspective factors. The past-negative is related to a focus on past events that were unpleasant or traumatic. These individuals tend to be extremely conservative, maintain the status quo even when it is not prudent, and avoid new experiences.

The present time perspective emphasizes making decisions based on salient features of the environment and situation (Boniwell & Zimbardo, 2004). The present-hedonistic factor addresses pleasure in the here and now and has been associated with a lack of consideration for future consequences, low ego and impulse control, low concern for consistency, and high interest in novelty and sensation seeking (Zimbardo & Boyd, 1999). In contrast, the present-fatalistic factor is associated with thinking of life as predestined by fate and has been linked to higher levels of depression, anxiety, and aggression.

The last factor - future time perspective, is associated with working toward future goals and rewards. Having a future perspective is associated with consideration of future consequences, conscientiousness, and preference for consistency (Zimbardo & Boyd, 1999). This personality variable is negatively related to sensation seeking and novelty seeking; aggression was not related to having a future time perspective.

The outcome of the ZTPI is a profile of the person on each time perspective component, with individuals scoring higher on one factor relative to others being labeled as temporally influenced at that time (Zimbardo et al, 1997). For example, an individual scoring higher on the present factor would be labeled present perspective; however, in analyses an individual's score on each scale is used to make predictions about each of the individual time perspective factors. The ZTPI scale has been refined over the last two decades and in addition to its original American populations, its factor structure has been tested with French, German, Italian, and Turkish populations (D'Alessio, Guarino, De Pascalis, & Zimbardo, 2003). A convenience sample of college students has typically been used to study the ZTPI; however, there are several studies which have used the ZTPI with elementary-aged children (Wills, Sandy, & Yaeger, 2001) and older adults (Zimbardo et al., 1997). Regardless of participant age, each of these studies demonstrated a cross-section of temporal orientations. Although a present orientation seems to be predominant in the very young and old, there does not seem to be a specific age at which a person develops a future or past orientation. Education, environmental surroundings and situations, cultural standards, and other learned experiences may facilitate temporal development.

Overview of Time Perspective and Risky Health-Related Behaviors

Time perspective is predominately discussed in terms of present and future orientations. A search of the literature identified only one research study that explored the relationship between past time perspective and risky health-related behaviors (Apostolidis, Fieulaine, Simonin, & Rolland, 2006). Keough, Zimbardo, and Boyd (1999) and Zimbardo et al. (1997) used only the present and future scales because they

were the most psychometrically sound and refined scales of the ZTPI (Keough et al., 1999). In addition, Henson, Carey, Carey, and Maisto (2006) noted that past perspective was excluded in studies because it lacked “explanatory capability in young adults” (p. 127). As such, past time perspective was not included in the current study. See Appendix A for the present and future subscale items of the Zimbardo Time Perspective Inventory.

Present time perspective and risky health-related behaviors. For young adults, having a present time perspective has been correlated with increased drinking, smoking, drug use, and increased HIV+ risk (e.g., Keough et al., 1999; Rothspan & Read, 1996). In Keough et al.’s 1999 study, 15 mostly college-aged samples of participants ($N = 2,627$) were surveyed regarding their substance abuse. Individuals who scored higher on present time perspective continuum tended to report more substance use (specifically tobacco, alcohol, and drugs) and more frequent and heavier drinking. Because of the link between substance abuse and personality variables, these researchers also tested whether or not present time perspective was a unique personality characteristic. Among the personality variables studied were aggression, depression, conscientiousness, ego control and resiliency, impulse control, and sensation seeking. After testing discriminate validity, present time perspective was a unique predictor of substance use. With elementary school students, Wills et al. (2001) found a similar relationship between present time perspective and experimentation with substance use (specifically tobacco, alcohol, and marijuana) with higher levels of present time perspective predicting more experimentation with drugs.

Several studies have investigated risky health behaviors using the newer ZTPI with the separate present-fatalism and present-hedonism scales. Rothspan and Read (1996) reported a correlation between present time perspective and having more sexual partners. In addition, individuals who scored higher in hedonism (a subscale of present time perspective) were more likely to report having had sexual intercourse. With regard to heroin use, Petry, Bickel, and Arnett (1998) reported that when heroin addicts were compared to a non-addicted control group, heroin addicts demonstrated both higher levels of present-fatalism and present-hedonistic time perspectives. Henson et al. (2006) reported that a present-hedonistic perspective was associated with more frequent drinking, drug use, smoking, and having more sexual partners. Present-fatalism only discriminated non-smokers from smokers with smokers scoring higher on fatalism. Recently Laghi, Baiocco, D'Alessio, and Gurrieri (2009) found that high school students with severe suicidal ideation had higher levels of present-fatalism compared to non-ideators. (Refer to Table 1 for a list of the health-related behaviors based on time perspective category.)

Future time perspective and risky health-related behaviors. Individuals with a future time perspective were less likely to demonstrate risky health behaviors. For instance, Keough et al. (1999) and Wills et al. (2001) found a negative correlation between frequency of substance use and future time perspective. Levy and Earleywine (2004) found a similar negative relationship when comparing drinking problems (negative consequences resulting from drinking) and future time perspective. With respect to HIV+ risk factors, future time perspective was related to having fewer sexual partners and being less likely to have had intercourse (Rothspan & Read, 1996). Having

Table 1

General Time Perspective Categories and Their Health-Related Behavior Relationships for Young Adults

Orientation	Health-related behavior correlates
Present	<p>Increased alcohol drinking, smoking, drug use (hedonistic)^a, (present)^b</p> <p>More smokers (fatalistic)^a</p> <p>More frequent and heavier alcohol drinking^b</p> <p>More experimentation with substance use^g</p> <p>Increased HIV+ risk^f</p> <p>Have more sexual partners (hedonistic)^a, (present)^f</p> <p>More likely to have had intercourse (hedonistic)^f</p> <p>More heroin addicts (hedonistic and fatalistic)^c</p> <p>Severe suicidal ideation (fatalistic)^c</p>
Future	<p>Decreased frequency of substance abuse^{a, b, g}</p> <p>Fewer negative drinking-related consequences^d</p> <p>Fewer sexual partners^g</p> <p>Less likely to have had intercourse^f</p> <p>Try to find out sexual partner's history^f</p> <p>More likely to stay with one sexual partner^f</p>

Note. ^a Henson et al. (2006), ^b Keough et al. (1999), ^c Laghi et al. (2009), ^d Levy & Earleywine (2004), ^e Petry et al. (1998), ^f Rothspan & Read (1996), ^g Wills et al. (2001)

a future orientation was also correlated with trying to find out a partner's sexual history, trying to stay with one partner, and abstaining from sex with new partners. Henson et al. (2006) demonstrated the same negative relationship among all of the aforementioned risky behaviors - drinking, drug use, and smoking and future time perspective.

An intervention employing time perspective. Previous data on the personality construct of time perspective, which has historically been limited to present and future orientations, and its relation to health behaviors poses the question of how this construct

can be used to help tailor health-improvement programs. One such study employed the use of time perspective to increase physical activity in young adults. Hall and Fong (2003) studied two small samples of college students' exercise habits. The researchers implemented an intervention wherein participants received a short (three 30-minute sessions before exercising) future based time perspective information program on the long-term benefits of exercise. Two control groups were used - one that received a goal-setting perspective (again three 30-minute sessions) and the other a true control group that did nothing other than exercise. Six months after the intervention, intervention participants still reported spending more time exercising than both control groups suggesting that participating in the future-based time orientation intervention may help increase adherence to physical exercise. Although those individuals undergoing the treatment condition increased their exercise habits, it is unknown if the outcome was the result of a personality or attitude change and if this change transferred to other behaviors. Even so this type of intervention has promise and may be used and tailored to driving behavior research. Overall, Hall and Fong (2003) indicate that the use of the personality construct of time perspective may be an important tool to help change specifically targeted risky health behaviors.

Using Time Perspective to Predict Driving Behaviors

Zimbardo et al. (1997) studied the correlation between time perspective and risky driving. They demonstrated that present time perspective correlated with reporting more risky driving behaviors. The positive correlation between present time perspective and risky driving was stronger than the negative correlation between future time perspective and risky driving. Furthermore, males tended to report more risky driving behaviors and

to be more present oriented than females who were more future oriented. Using backward multiple regression analyses, the relationship between risky driving and present time perspective versus other risky driving related personality variables (e.g., sensation seeking, aggression, and impulsivity) and controlling for gender, present time perspective still remained a unique predictor. The strongest predictors of risky driving were present time perspective, sensation seeking, and gender. Aggression and impulsivity were not significant predictors of risky driving.

Performing a replication of Zimbardo et al.'s (1997) Studies 1 and 2, results of the current study were expected to be the same as those reported by Zimbardo et al.

Hypotheses 1-8 represent the replications. Specific replication hypotheses were as follows:

Hypothesis 1. Males would score higher on the present time perspective factor as measured by the original Zimbardo Time Perspective Inventory than females.

Hypothesis 2. Females would score higher on the future time perspective factor as measured by the original Zimbardo Time Perspective Inventory than males.

Hypothesis 3. Males would report more risky driving as measured by the Health and Risk Questionnaire - Risky Driving Scale than females.

Hypothesis 4. Individuals who score higher on present time perspective as measured by the original Zimbardo Time Perspective Inventory would report more risky driving as measured by the Health and Risk Questionnaire - Risky Driving Scale.

Hypothesis 5. There would be a stronger relationship between present time perspective as measured by the original Zimbardo Time Perspective Inventory and risky

driving as measured by the Health and Risk Questionnaire - Risky Driving Scale than future time perspective and risky driving.

Hypothesis 6. Individuals who score higher on future time perspective as measured by the Zimbardo Time Perspective Inventory would report less risky driving as measured by the Health and Risk Questionnaire - Risky Driving Scale.

Hypothesis 7. Present and future time perspective as measured by the original Zimbardo Time Perspective Inventory would be unique predictors.

Hypothesis 8. Present time perspective as measured by the original Zimbardo Time Perspective Inventory would be a significant predictor of risky driving independent of sensation seeking as measured by the Sensation Seeking Scale - Form V (Zuckerman, 1994).

Although Zimbardo et al.'s work found a relationship between present and future time perspective and risky driving behaviors, there were several limitations that need to be addressed. First, the risky driving scale they used was composed of only five items that dealt with "taking risks driving, car racing, speeding, taking risks biking, and driving under the influence" (Zimbardo et al., 1997, p. 1010). These specific items were part of a larger 37-item Health and Risk Questionnaire and did not capture the breadth of risky driving behaviors. See Appendix B for the specific risky driving questions. Another potential limitation was that the present time perspective scale was not separated into the fatalistic and hedonistic subscales. Perhaps one of these subscales is more related to engaging in risky driving behaviors. For instance, someone with a hedonistic perspective may be more apt to engage in risky driving behaviors, because they are thinking only about their specific needs. A further issue of concern was that the relationship between

future time orientation and their five-item measure of risky driving was weak (i.e., $r(1662) = -.08, p < .01$). It is unknown whether this is an artifact of the risky driving scale or a true measure of the relationship strength. It is hypothesized that by using more rigorously tested and researched driving-specific scales that the relationship between risky driving and time perspective would be more accurately assessed.

These limitations prompt a revisiting of the present/future time perspective and risky driving issue. Other than Zimbardo et al's. (1997) studies, a search of the current literature retrieved no studies that specifically investigated the time perspective and risky driving relationship. Proposed improvements included: (1) expanding the scope and scale of the risky driving questionnaire by using current state of the art driving behavior questionnaires, (2) separating the subscales of the ZTPI present time perspective factor to better reflect differing driving behaviors and characteristics, and (3) in addition to assessing risky driving behaviors, investigating the relationship of positive (courteous) driving behaviors and time perspective orientation. It is important to study the impact and relationship of positive driving behaviors in addition to risky driving behaviors, because these considerate behaviors are ones that need to be emphasized and reinforced. If a relationship is observed between time perspective and positive driving behaviors, this information may be used to create programs that utilize time perspective interventions to increase considerate behaviors and as a result potentially decrease violations and crashes.

Why Use the Driving Realm?

Driving is a commonplace activity that most people take for granted, and as a result, disregard and underestimate the potential risks and consequences involved. In the United States in 2008, 5,811,000 police-reported motor vehicle crashes occurred in which

37,261 people died and 2,346,000 were injured (NHTSA, 2009c). Drinking and driving and speeding strongly contributed to these crashes and fatalities. Alcohol was involved in 32% of all fatal crashes. In the U.S. in 2007, a rate of one of every 144 licensed drivers was arrested for driving under the influence of alcohol or drugs (NHTSA, 2009c). Speeding was involved in 31% of fatalities. When the effects of alcohol and speeding were combined, the results become even more compelling. Forty-one percent of drivers who were legally intoxicated (BAC level of .08 g/dL or higher) were speeding when involved in a fatal crash compared to 15% of drivers with BAC levels of .00.

Other leading risky driving behaviors include tailgating, red light running, and aggressive driving (discussed below). These behaviors contribute to a significant proportion of crashes, and their actual prevalence is even higher (Virginia Department of Motor Vehicles, 2009). In fact, researchers have found that most people do run red lights (Porter & Berry, 2001; Porter & England, 2000) and tailgate (Porter, Johnson, & Berry, 2010) and that aggressive driving is becoming more prevalent (Chliaoutakis et al., 2002). Unlike Zimbardo et al.'s 1997 study investigating risky driving and time perspective, newer measures of risky driving behaviors investigate each of these issues and these specific measures are discussed in the next section.

Also discussed in the next section is a measure of aggressive driving. Aggressive driving was combined with risky driving, because they are frequently indistinguishable. Aggressive driving is defined by NHTSA (2010) as “when individuals commit a combination of moving traffic offenses so as to endanger other persons or property.” The Code of Virginia for aggressive driving - §46.2-868.1 (Virginia General Assembly, 2002) is as follows:

A person is guilty of aggressive driving if (i) the person violates one or more of the following: §46.2-802 (Drive on right side of highways), §46.2-804 (Failure to observe lanes marked for traffic), §46.2-816 (Following too closely), §46.2-821 (Vehicles before entering certain highways shall stop or yield right-of-way), §46.2-833.1 (Evasion of traffic control devices), §46.2-838 (Passing when overtaking a vehicle), §46.2-841 (When overtaking vehicle may pass on right), §46.2-842 (Driver to give way to overtaking vehicle), §46.2-842.1 (Driver to give way to certain overtaking vehicles on divided highway), §46.2-843 (Limitations on overtaking and passing), any provision of Article 8 (§46.2-870 et seq.) of Chapter 8 of Title 46.2 (Speed), or §46.2-888 (Stopping on highways); and (ii) that person is a hazard to another person or commits an offense in clause (i) with the intent to harass, intimidate, injure or obstruct another person.

In Virginia, drivers must meet both parts of the statute to be found guilty. The second component of the law is that the driver is a hazard to another person or that they performed the driving behavior “with the intent to harass, intimidate, injure or obstruct another person.” Even without the additional component to be classified as an aggressive act, the law’s mentioned behaviors are classified as risky behaviors. As such for this study, the concept of risky driving was composed of both a risky driving scale and an aggressive driving scale.

Whereas all of the above driving behaviors involve risky actions, easy ways to help reduce motor vehicle related injuries and even death are by performing courteous behaviors such as not tailgating, using turn signals, and driving the speed limit. These specific driving related behaviors as well as other similar courteous driving behaviors

(e.g., being considerate of other drivers and pedestrians) have not been studied in relation to time perspective. Recent scales, such as the Positive Driver Behaviors Scale (Özkan & Lajunen, 2005) and the Adaptive/Constructive Expression subscale of the Driving Anger Expression Inventory (Deffenbacher et al., 2002), have explored positive behaviors drivers display on roadways. Although the past standard has been to focus only on risky or bad behaviors, an effort must be made to investigate courteous driver behaviors as well. This research used newer driving measures to examine not only risky behaviors, but also positive driving behaviors. Actual sample items and scale psychometrics are discussed in the Methods section.

Current Measures of Risky, Positive, and Angry Driving Behaviors

The measures discussed below are newer, more robust measures of driving behaviors. Although Zimbardo et al. (1997) explored the relationship between risky driving and time perspective, the driving measure included only five general questions that focused on risky driving related behaviors. To better explore the relationship between driving behavior and time perspective, it was thought that these more widely used, detailed, rigorously tested, and more specific driving measures might provide a clearer picture of the exact nature of this relationship. These measures are discussed to provide a quick overview of the scales currently being used to address risky driving and the newer concept of positive driving behaviors.

Driver Behavior Questionnaire (DBQ). Although many measures of driving behavior exist, one of the most employed to measure driving problems and behaviors is the Driver Behavior Questionnaire (DBQ). Unlike Zimbardo et al.'s (1997) 5-item risky driving measure, this measure encompasses a breadth of driving behaviors that may make

this scale a better choice for measuring risky driving. The original scale was comprised of three factors - violations (which are deliberate behaviors), dangerous errors (“the failure of planned actions to achieve their intended consequences”), and relatively harmless lapses (memory and attention failures) (Reason, Manstead, Stradling, Baxter, & Campbell, 1990). Although there are several versions of the DBQ, the most widely used version also includes an additional factor - aggressive violations (Lajunen et al., 2004). Since its development, the DBQ has been extensively used among a variety of diverse populations with respect to age, driving experience, and nationality (e.g., the DBQ has been used and translated for participants in Australia, China, Finland, Greece, The Netherlands, New Zealand, Spain, Sweden, Turkey, and the United States; Blockey & Hartley, 1995; Gras et al., 2006; Kontogiannis, Kossiavelou, & Marmaras, 2002; Lajunen, Parker, & Summala, 1999, 2004; Lajunen & Summala, 2003; Özkan & Lajunen, 2005; Reimer et al., 2005; Rimmö & Åberg, 1999; Sullman, Meadows, & Pajo, 2002; Xie & Parker, 2002). The current research used only the ordinary and aggressive violations scales that include behaviors indicative of risky driving. Although only the ordinary and aggressive scales were used for the current study, the entire scale was administered for possible future analyses. See Appendix C for both violation scales of the DBQ.

Positive Driver Behaviors Scale. Given that knowing about poor driving behaviors is only part of the picture of overall driving characteristics, an offshoot of the DBQ includes the development of a positive driving behaviors scale. This scale includes items on decreasing close following (tailgating), waving to thank other drivers, giving the right-of-way to other drivers, and being considerate of pedestrians (Özkan & Lajunen, 2005). Demonstrating positive or courteous driving behaviors was negatively correlated

with errors and violations (Özkan & Lajunen, 2005). Furthermore, having more driving experience (using age and mileage as proxies) was associated with more positive behaviors. Measuring positive behaviors in addition to risky behaviors added another facet to the relationship between driving behaviors and time perspective. See Appendix D for the scale.

Driving Anger Expression Inventory (DAX). Because aggressive driving is a major component of risky driving, it is also important to assess how drivers express their anger while driving. Deffenbacher et al. (2002) developed the Driving Anger Expression Inventory (DAX) to measure the degree to which drivers express their anger. This inventory is different from other measures of driving anger, because it assesses what makes a driver angry and the ensuing response; the DAX uncovers the retaliatory behaviors that drivers perform when another driver makes them angry. The DAX is composed of four subscales, which include Verbal Aggressive Expression (e.g., yelling at other drivers), Personal Physical Aggressive Expression (e.g., trying to get out of the vehicle to start a fight), Use of the Vehicle to Express Anger (e.g., flashing lights at another driver), and Adaptive/Constructive Expression (using positive coping strategies to deal with anger, e.g., trying to relax). (See Appendix E for the entire questionnaire.) The first three subscales positively correlate with one another and represent various aggressive aspects of risky driving (Deffenbacher et al., 2002). Together they comprise an Aggressive Expression Index. The last subscale of the DAX, Adaptive/Constructive Expression, is negatively correlated with the other subscales and represents performing positive behaviors while driving. Like the violation scales of the DBQ, the first three scales of the DAX will provide a measure of risky driving with the DAX specifically

targeting aggressive driving. The DAX's Adaptive/Constructive Expression subscale will be combined with the Positive Driver Behaviors Scale to assess positive driving.

Time Perspective and Risky Driving Behaviors

Although a correlation between present time perspective and risky driving behaviors has been documented (Zimbardo et al., 1997), more research is necessary to elicit the relationship between the present time perspective subscales of hedonism and fatalism. Based on previous health-related risky behavior research, it was hypothesized that both of these subscales would be positively correlated with risky driving behaviors. To begin testing these relationships, an exploratory study was conducted with 241 college students (Martinez, 2007) using the full-length ZTPI and more commonly used scales of driving behavior described above. The exploratory study helped to determine the feasibility of using the full ZTPI (without the past) with factor divisions, i.e., hedonistic and fatalistic time perspective.

Specifically, it was hypothesized that present-fatalism and present-hedonism would be positively related to risky driving. Fatalists with their “whatever happens, happens” attitude may believe that risks are appropriate, because if something is meant to happen it will no matter what behaviors they engage in. Hedonists, on the other hand, may not think that their risky driving behaviors will cause any problems and do not see their driving as risky, because they are doing what they need to do for themselves. I hypothesized that higher levels of hedonism would be associated with more risky driving, because perhaps these drivers do not care about other drivers on the roadway and only care about getting where they want to go as quickly as possible. Although these

hypotheses predicted the same relationships, it was thought that the strength of the relationships may differ with hedonists being more risky drivers.

Hypothesis 9. Individuals who score higher on the present-hedonistic time perspective factor as measured by the Zimbardo Time Perspective Inventory would score higher on the latent variable of risky driving as measured by the Ordinary and Aggressive Violations Scales of the Driver Behavior Questionnaire and the Aggressive Expression Index of the Driving Anger Expression Inventory.

Hypothesis 10. Individuals who score higher on the present-fatalistic time perspective factor as measured by the Zimbardo Time Perspective Inventory would score higher on the latent variable of risky driving as measured by the Ordinary and Aggressive Violations Scales of the Driver Behavior Questionnaire and the Aggressive Expression Index of the Driving Anger Expression Inventory.

These hypotheses along with others described herein were integrated into an overall driving model. Please see Figure 1 for the entire model.

With regard to risky driving and future time perspective, it was hypothesized that a future time perspective would be negatively correlated with risky driving behaviors.

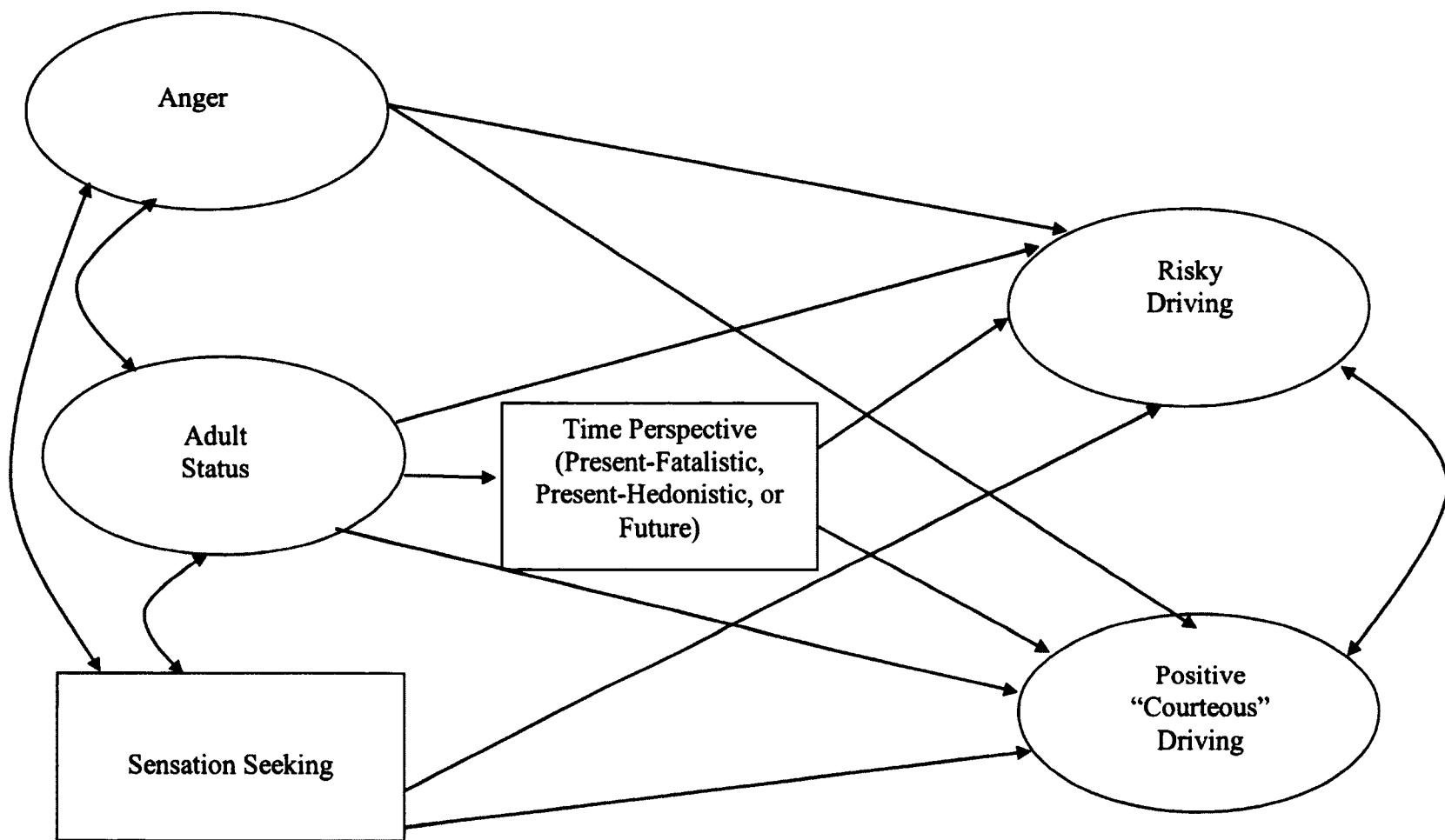


Figure 1. Driving Model

Individuals who are future oriented tend to think about the consequences of their current actions and evaluate how the behavior will help or hinder them in the future. Thus, they should be less likely to demonstrate risky driving behaviors.

Hypothesis 11. Individuals who score higher on the future time perspective factor as measured by the Zimbardo Time Perspective Inventory would score lower on the latent variable of risky driving as measured by the Ordinary and Aggressive Violations Scales of the Driver Behavior Questionnaire and the Aggressive Expression Index of the Driving Anger Expression Inventory.

Time Perspective and Positive Driving Behaviors

Research has not been conducted on time perspective and positive driving behaviors. It is believed that the present-hedonistic and present-fatalistic time perspectives will be negatively correlated with positive driving behaviors. These drivers were hypothesized to display more risky driving behaviors, and thus, display less positive driving behaviors.

Hypothesis 12. Individuals who score higher on the present-hedonistic time perspective factor as measured by the Zimbardo Time Perspective Inventory would score lower on the latent variable of positive “courteous” driving behavior as measured by the Positive Driver Behaviors Scale and the Adaptive/Constructive Expression scale of the Driving Anger Expression Inventory.

Hypothesis 13. Individuals who score higher on the present-fatalistic time perspective factor as measured by the Zimbardo Time Perspective Inventory would score lower on the latent variable of positive “courteous” driving behavior as measured by the Positive Driver Behaviors Scale and the Adaptive/Constructive Expression scale of the Driving Anger Expression Inventory.

On the other hand, future time perspective has been related to reporting fewer incidences of risky driving (Zimbardo et al., 1997). It is expected that drivers with future time perspectives would be more likely than drivers with either present orientation to display more positive driving behaviors, such as avoiding tailgating and yielding for pedestrians even when it is your right-of-way. These drivers would contemplate the future value of their current actions and perform more positive driving behaviors

Hypothesis 14. Individuals who score higher on the future time perspective factor as measured by the Zimbardo Time Perspective Inventory would score higher on the latent variable of positive driving behavior as measured by the Positive Driver Behaviors Scale and the Adaptive/Constructive Expression scale of the Driving Anger Expression Inventory.

In addition to further investigating the importance of using time perspective to predict risky driving behavior, emerging adulthood characteristics were explored. Criteria used to differentiate emerging adults from adults were analyzed with respect to their influence on time perspective and risky driving behaviors.

Who are Emerging Adults?

Recently *The New York Times Magazine* (Marantz Henig, August 22, 2010) ran a cover story entitled “What is it about 20-somethings?” This popular press article recounted how individuals in their 20’s are moving back in with their parents, taking longer to start careers, and delaying marriage and children. While this period between adolescence and adulthood (traditionally 18-25 years old) is typically marked by a period of increased independence, many 20-somethings are taking an increased amount of time

to learn about themselves and their surroundings without taking on the traditional adult responsibilities. Arnett (2000) coined this time of change *emerging adulthood*.

Among the traditional markers of achieving adulthood are role transitions, such as finishing education, getting married, having a child, purchasing a home, being employed full-time, and settling into a long-term career (Rankin & Kenyon, 2008). Although the specific criteria that differentiate an emerging adult from an adult can at times be unclear, recent studies have investigated which characteristics are believed to be necessary to become adults (Hartmann & Toguchi Swartz, 2007; Nelson et al., 2007; Rankin & Kenyon, 2008). Of the multiple factors, including role transitions, which influence feeling like an adult, relational maturity (e.g., having good control of your emotions and accepting responsibility for your actions) is thought to be most important to both emerging adults and their parents (Badger, Nelson, & Barry, 2006; Nelson et al., 2007).

What Differentiates Emerging Adults from Adolescents and Adults?

A variety of demographic factors are associated with distinguishing emerging adults from adults. In this age group, individuals more likely to be classified as adults were African-American, came from lower income backgrounds, and were less likely to engage in risky behaviors such as drinking, binge drinking, smoking, and gambling (Blinn-Pike, Lokken Worthy, Jonkman, & Rush Smith, 2008). Badger et al. (2006) surveyed college students and their parents about the criteria necessary to be considered an adult. These items factored into the five categories of relational maturity, family capacities (e.g., being able to care for children, support family), norm compliance (e.g., avoid drinking and driving, driving safely), role transitions, and biological and age transitions (e.g., being biologically capable to have children, having a license). College

students who were more likely to endorse traditional role markers were members of fraternities or sororities, traditional college age, ethnic minorities, had traditional marital statuses (e.g., single, dating, married), or belonged to religious organizations (Rankin & Kenyon, 2008).

Overview of Emerging Adults and Risky Health-Related Behaviors

Since the term emerging adulthood was introduced by Arnett in 2000, numerous papers have focused on this age group; however, the majority of these efforts have focused on the specific age of individuals and not the criteria used to differentiate emerging adults from adults. Unless otherwise noted, the following studies concentrated on the age group and did not differentiate emerging adults from adults. The following studies detail some of the risky health behaviors associated with persons in this age group.

The period from age 18 to 25 is typically marked by higher levels of alcohol and drug use, number of sexual partners, and overall risk taking (Bradley & Wildman, 2002; Duangpatra, Bradley, & Glendon, 2009). Bradley and Wildman (2002) noted that although over half of their respondents in this age group participated in socially approved risky behaviors (e.g., risky adventure sports and riding motorcycles), comparatively fewer engaged in reckless substance use practices (e.g., using amphetamines, MDMA, or cocaine) or reckless sexual behaviors (e.g., having sex without contraception, casual sex, or many sexual partners). Specifically, about one-fifth of a sample reported using marijuana at least five times in the past year, whereas only a small minority used cocaine or MDMA (Bradley & Wildman, 2002). Henson et al. (2006) reported that on average during a typical week participants consumed 12.9 alcoholic drinks. Only 56% of

participants reported always using some form of birth control. With respect to drug use, 29% of students had never used drugs (excluding alcohol), and over half had not used drugs in the last month.

Interestingly, some of the frequent risky health related behaviors displayed by members of this age group are among the criteria used by some researchers to demarcate the transition from emerging adult to adult. These criteria deal with complying with societal norms. The norm compliance criteria include avoiding becoming drunk, drinking and driving, and using illegal drugs, having no more than one sexual partner at a time, not committing petty crimes (e.g., vandalism and shoplifting), driving safely and close to the speed limit, avoiding use of profanity, and using contraception when having sex if not trying to conceive (Nelson et al., 2007). The emerging adult variable can be used to explain many of these frequency differences. For instance, Blinn-Pike et al. (2008) found that emerging adults were more likely to consume alcohol, binge drink, and smoked more cigarettes than same age individuals who were classified as adults.

Emerging Adults and Risky Driving

Although emerging adults were less likely to participate in risky sexual and drug related behaviors, they were prone to engage in risky driving behaviors. In fact over 25% of respondents reported driving more than 20 miles per hour over the speed limit in just the past week and over 70% of the sample reported not stopping at a traffic light (Bradley & Wildman, 2002). A longitudinal stratified random study of 18-25 years old drivers found that risky behaviors decreased across this age period for both men and women (Jessor, Turbin, & Costa, 1997). This decrease is consistent with U.S. crash data where crashes peak for 16 year olds and decrease steadily for the next nine years (NHTSA,

2009c). Jessor et al. (1997) also explored the influence of changing social roles and psychosocial and behavioral conventionality. These variables were predictive of level of risky driving demonstrated across the age range.

The emerging adult variable was tested for its unique contribution toward predicting driving behavior. Specifically it was hypothesized that those who score lower on the emerging adult factor would perform more risky driving behaviors and fewer positive driving behaviors. Emerging adulthood would also be tested in an overall model of risky driving that included the time perspectives of interest and the control variables of sensation seeking and anger. To reiterate, the majority of previous research has differentiated adulthood by using age to determine whether or not an individual was an adult. Solely using age as the cutoff criteria can be misleading by incorrectly categorizing individuals who are not quite adults as adults, because they are, for instance, 25 years old. They are certainly still not adolescents, but neither they nor their parents may see them completely as adults. Thus, for the purposes of this research, adulthood was operationalized using two measures of adult status. The first adult status criteria measure is based on Arnett's original conceptual model (2000) and used the adapted version of Kins and Beyers (2010) that includes instruction point of view modifications and the factor analyzed criteria of Badger et al. (2006). The second adult status markers measure was Blinn-Pike et al.'s (2008) four statement survey, which is based on an extensive literature review of the markers emerging adults believe differentiate adults from emerging adults.

Hypothesis 15. Individuals who score higher on the variable adult status as measured by adult status criteria would score lower on the latent variable of risky driving

as measured by the Ordinary and Aggressive Violations Scales of the Driver Behavior Questionnaire and the Aggressive Expression Index of the Driving Anger Expression Inventory.

Hypothesis 16. Individuals who score higher on the variable adult status as measured by adult status criteria would score higher on the latent variable of positive driving behavior as measured by the Positive Driver Behaviors Scale and the Adaptive/Constructive Expression scale of the Driving Anger Expression Inventory.

Emerging Adults and Time Perspective

Although most research with emerging adults and time perspective has been conducted with college students, the relationship between these variables has not been extensively studied. The majority of research investigating individuals from this age group (18-25) and their time perspectives have used the term emerging adults to refer to this age group; however, the specific criteria used to differentiate emerging adults from adults were not used. Thus, the resulting relationships were limited to the age group of 18-25 and not emerging adults versus adults. Using age as a proxy for emerging adulthood status, Duangpatra et al. (2009) found that higher ages were associated with higher levels of future time perspective and lower levels of present time perspective. Based on this research, it was thought that adult status (and milestones of adulthood) would help predict an individual's time perspective. Thus having a specific adult status would influence the impact of each time perspective. For instance, someone who was classified as an adult may be more likely to be future oriented because of the adult situations and circumstances that they must deal with such as buying a house, getting married, having children, and being financially independent of their parents. Their adult

status makes them more likely to adjust their time perspective to deal with life's demands. Prior research using criteria for emergence and time perspective was not found. In the current research, the upper age limit was 30 to ensure that a range of adulthood from emerging adult to adult was captured.

Hypothesis 17. Individuals who score higher on the variable adult status as measured by adult status criteria would score higher on the future time perspective factor as measured by the Zimbardo Time Perspective Inventory.

Hypothesis 18. Individuals who score higher on the variable adult status as measured by adult status criteria would score lower on the present-hedonistic time perspective factor as measured by the Zimbardo Time Perspective Inventory.

Hypothesis 19. Individuals who score higher on the variable adult status as measured by adult status criteria would score lower on the present-fatalistic time perspective factor as measured by the Zimbardo Time Perspective Inventory.

Incorporating Time Perspective, Risky and Positive Driving, and Emerging Adulthood - The Driving Model

The emerging adulthood variable was tested in the model with time perspective and risky and positive driving behaviors. The hypothesized model is presented in Figure 1, where rectangles represent measured variables and circles represent latent variables. The proposed model is comprised of three factors and 10 observed variables. For each of the three factors, at least two scale scores were used to represent the latent variable. Multiple indicators were used for the latent variables, including risky and positive driving behaviors. In the model, Anger is represented by scores on the Driving Anger Scale (Deffenbacher, Oetting, & Lynch, 1994) and the Buss and Perry Anger Scale (1992);

Risky Driving is represented by scores on the Ordinary and Aggressive Violations scales of the Driver Behavior Questionnaire (Lajunen et al., 2004; Reimer et al., 2005) and the Aggressive Expression Index of the Driving Anger Expression Inventory; Deffenbacher et al., 2002); and Positive Driving is represented by scores on the Positive Driver Behaviors Scale (Özkan & Lajunen, 2005) and the Adaptive/Constructive Expression subscale of the Driver Angry Expression Inventory. For the observed variables, Adult Status is measured by adult status criteria (Arnett, 2000; Badger et al., 2006; Kins & Beyers, 2010); Sensation Seeking is measured by the Sensation Seeking Scale - Form V (Zuckermann, 1994); and Time Perspective is measured by the Zimbardo Time Perspective Inventory (Zimbardo & Boyd, 1999; Zimbardo et al., 1997). In the model, each time perspective factor (present-hedonistic, present-fatalistic, or future) was inserted separately so the model was run three times. This allowed each of the time perspectives to be investigated independently.

Hypothesis 20. Each of the time perspective factors (present-hedonistic, present-fatalistic, and future as measured by the Zimbardo Time Perspective Inventory) would be a mediator for adult status as measured by adult status criteria and risky driving as measured by the Ordinary and Aggressive Violations Scales of the Driver Behavior Questionnaire and the Aggressive Expression Index of the Driving Anger Expression Inventory (See Figure 2).

Hypothesis 21. Each of the time perspective factors (present-hedonistic, present-fatalistic, and future as measured by the Zimbardo Time Perspective Inventory) would be a mediator for adult status as measured by adult status criteria and positive “courteous” driving behavior as measured by the Positive Driver Behaviors Scale and the Adaptive/

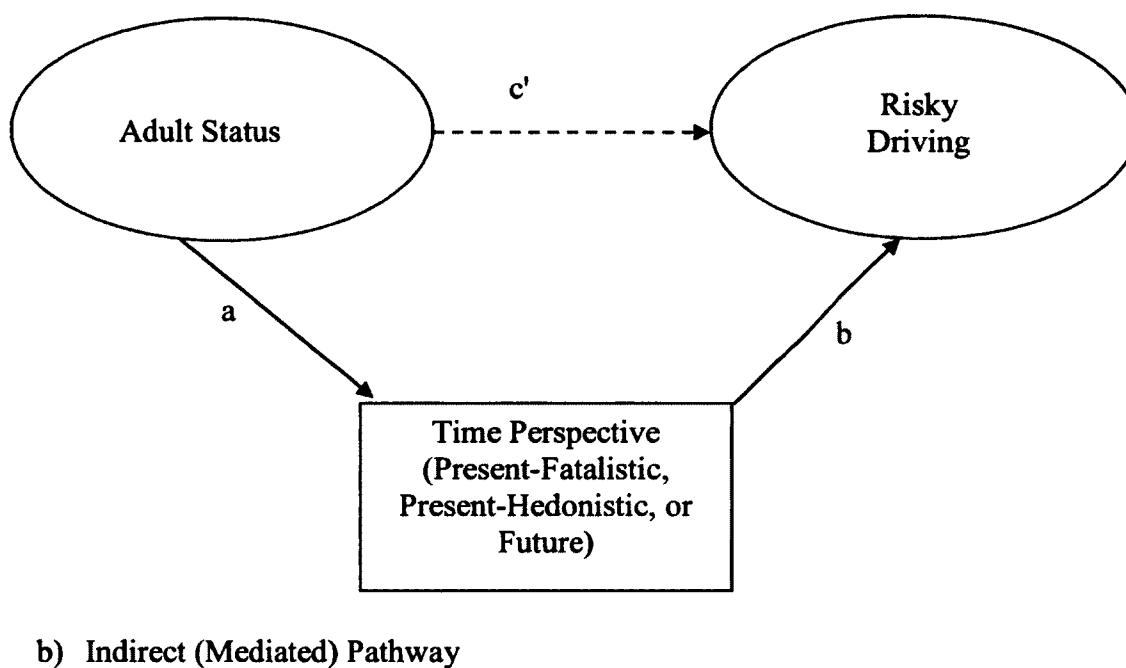
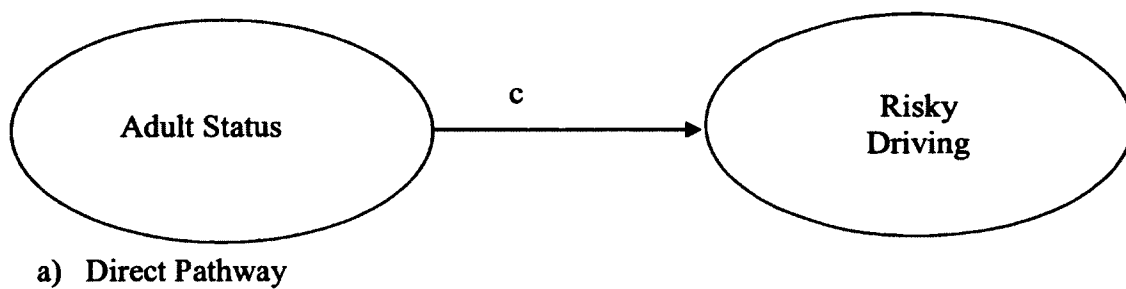
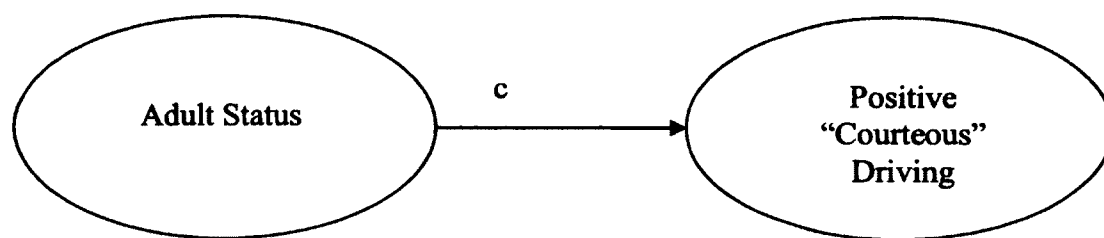
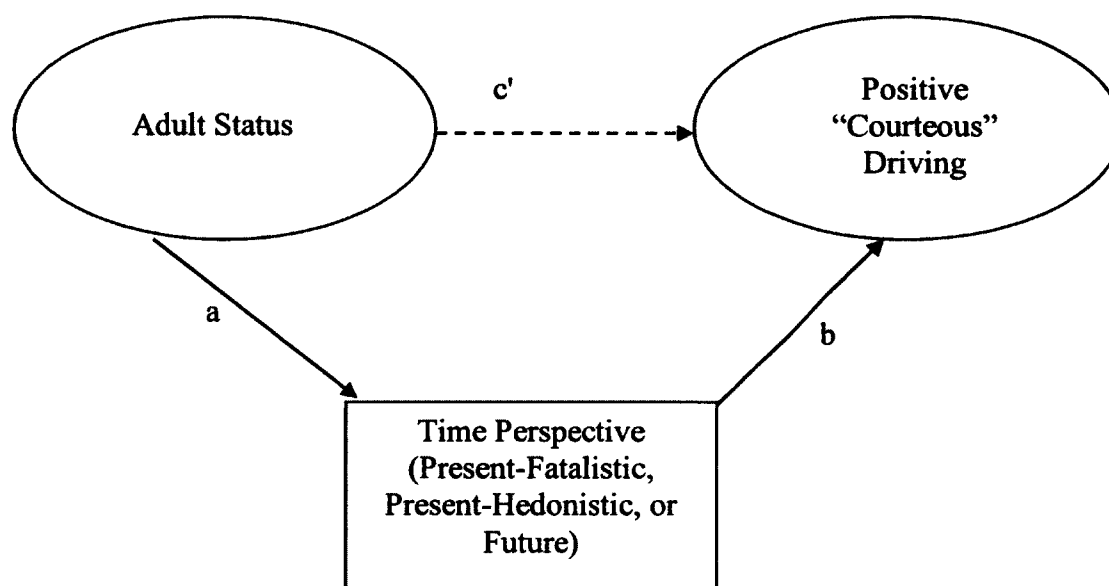


Figure 2. Mediation model relationship taken from the larger driving model which tested each Time Perspective factor as a mediator of the relationship between Adult Status and Risky Driving.



a) Direct Pathway



b) Indirect (Mediated) Pathway

Figure 3. Mediation model relationship taken from the larger driving model which tested each Time Perspective factor as a mediator of the relationship between Adult Status and Positive “Courteous” Driving.

Constructive Expression scale of the Driving Anger Expression Inventory (See Figure 3).

As noted previously, gender differences have been reported among the variables of time perspective and risky driving. Zimbardo et al. (1997) stated that females were

more likely than males to be future oriented and males were more likely than females to be present oriented. Furthermore, when asked about their risky driving behaviors, males recounted more risky driving than females (Zimbardo et al., 1997). Using a combination of the ordinary and aggressive violations scales of the DBQ, males were more likely than females to affirm having committed more violations (Özkan & Lajunen, 2005). Because time perspective and risky driving differ slightly by gender, gender was tested in a multiple group model.

Research Question. Gender was tested with the overall driving model to determine if the model worked well for both males and females.

Other Personality Variable Covariates

Although the current personality characteristic of interest was time perspective, the relationship between risky driving and other personality characteristics must be noted. Two of the most relevant are sensation seeking and anger. Sensation seeking as defined by Zuckerman (1994) is “the seeking of varied, novel, complex, and intense sensations and experiences, and the willingness to take physical, social, legal and financial risks for sake of such experience” (p. 27). Sensation seeking has been linked to drinking and driving (Vingilis, Stoduto, Macartney-Filgate, Liban, & McLellan, 1994), speeding (Arnett, 1996), safety belt non-use, and lane changing (Jonah, 1997). With regard to the four subscales of the Swedish DBQ (violations, mistakes, inattention, and inexperience errors), sensation seeking accounted for 27% of the explained variance in the violations subscale and only 2-3% of the variance for the other subscales (Rimmö & Åberg, 1999). Being higher on impulsiveness, a component of sensation seeking, has been associated with more driving errors and driving violations (Owsley, McGwin, & McNeal, 2003).

The other main personality covariate to consider is anger. Chliaoutakis et al. (2002) reported a positive correlation between irritability (feelings of aggression) and involvement in motor vehicle crashes. Connecting anger with future time perspective, perhaps individuals who show more consideration of future consequences will only demonstrate less aggression when they believe the aggression may have future consequences. Joireman, Anderson, and Strathman (2003) reported a link between sensation seeking and ego control, where higher levels of sensation seeking predicted a desire to engage in verbal and physical aggression. Although no specific hypotheses are posed regarding these two variables, sensation seeking and anger, they were integrated into the proposed model as covariates because of their reported impact on driving behaviors.

Operationalization of Concepts/Variables

Each concept or variable was measured using either a single questionnaire or a set of questionnaires. Table 2 indicates the concept of interest and the measure(s) used to evaluate that concept. This table can be used to help understand how each hypothesis was structured with the specific measure and scale of interest used in the analysis.

Table 2

Concepts/Variables and the Measures Used to Operationalize Them

Concept/Variable	Measure(s)	Scale scores used in analyses
Time perspective	Zimbardo Time Perspective Inventory (Zimbardo & Boyd, 1999; Zimbardo et al., 1997)	Present-hedonistic, present-fatalistic, future used in overall model; Original overall present and future used in replication analyses
Risky driving behaviors	Driver Behavior Questionnaire (Lajunen & Summala, 2003; Özkan & Lajunen, 2005; Reimer et al., 2005) Driving Anger Expression Inventory (Deffenbacher et al., 2002)	Ordinary and aggressive violations Aggressive expression index (subscales verbal aggressive expression, personal physical aggressive expression, use of the vehicle to express anger)
Positive (courteous) driving behaviors	Positive Driver Behaviors Scale (Özkan & Lajunen, 2005) Driving Anger Expression Inventory (Deffenbacher et al., 2002)	Entire scale score Adaptive/constructive expression subscale
Emerging adulthood (adult status)	Adult status markers (Blinn-Pike et al., 2008) Adult status criteria - modified and adapted version of Arnett's adulthood questionnaire (2001) (Badger et al., 2006; Kins & Beyers, 2010)	Entire scale score Entire scale composite score (factors role transitions, norm compliance, biological/age-related transitions, family capacities, relational maturity)

Table 2 (continued)

Concept/Variable	Measure(s)	Scale scores used in analyses
Anger	Driver Anger Scale (Deffenbacher et al., 1994)	Entire scale score (subscales hostile gestures, illegal driving, police presence, slow driving, discourtesy, traffic obstructions)
	Aggression Questionnaire (Buss & Perry, 1992)	Entire scale score (subscales physical aggression, verbal aggression, anger, hostility)
Sensation seeking	Sensation Seeking Scale - Form V (Zuckerman, 1994)	Entire scale score (subscales thrill and adventure seeking, experience seeking, boredom susceptibility, disinhibition)

Overview of Hypotheses

Replication Hypotheses. The first eight hypotheses represented replications of Zimbardo et al.'s (1997) research on the relationship among time perspective (present and future) and risky driving. The analyses performed for these hypotheses are based on the original methods used by Zimbardo et al. (1997).

- 1) Males would score higher on the present time perspective factor as measured by the original Zimbardo Time Perspective Inventory than females.
- 2) Females would score higher on the future time perspective factor as measured by the original Zimbardo Time Perspective Inventory than males.
- 3) Males would report more risky driving as measured by the Health and Risk Questionnaire - Risky Driving Scale than females.
- 4) Individuals who score higher on present time perspective as measured by the original Zimbardo Time Perspective Inventory would report more risky driving as measured by the Health and Risk Questionnaire - Risky Driving Scale.
- 5) There would be a stronger relationship between present time perspective as measured by the original Zimbardo Time Perspective Inventory and risky driving as measured by the Health and Risk Questionnaire - Risky Driving Scale versus future time perspective and risky driving.
- 6) Individuals who score higher on future time perspective as measured by the Zimbardo Time Perspective Inventory would report less risky driving as measured by the Health and Risk Questionnaire - Risky Driving Scale.

- 7) Present and future time perspective as measured by the original Zimbardo Time Perspective Inventory would be unique predictors of risky driving as measured by the Health and Risk Questionnaire - Risky Driving Scale.
- 8) Present time perspective as measured by the original Zimbardo Time Perspective Inventory would be a significant predictor of risky driving independent of sensation seeking as measured by the Sensation Seeking Scale - Form V.

SEM Hypotheses and Research Question. Hypotheses 9-21 represented individual pathways and mediation effects. After the hypotheses was a research question testing the model by gender. The specific relationships were analyzed within an SEM model because of its parsimonious nature and the ability to test multiple regression equations simultaneously which allows the analysis of complex relationships.

- 9) Individuals who score higher on the present-hedonistic time perspective factor as measured by the Zimbardo Time Perspective Inventory would score higher on the latent variable of risky driving as measured by the Ordinary and Aggressive Violations Scales of the Driver Behavior Questionnaire and the Aggressive Expression Index of the Driving Anger Expression Inventory.
- 10) Individuals who score higher on the present-fatalistic time perspective factor as measured by the Zimbardo Time Perspective Inventory would score higher on the latent variable of risky driving as measured by the Ordinary and Aggressive Violations Scales of the Driver Behavior Questionnaire and the Aggressive Expression Index of the Driving Anger Expression Inventory.

- 11) Individuals who score higher on the future time perspective factor as measured by the Zimbardo Time Perspective Inventory would score lower on the latent variable of risky driving as measured by the Ordinary and Aggressive Violations Scales of the Driver Behavior Questionnaire and the Aggressive Expression Index of the Driving Anger Expression Inventory.
- 12) Individuals who score higher on the present-hedonistic time perspective factor as measured by the Zimbardo Time Perspective Inventory would score lower on the latent variable of positive “courteous” driving behavior as measured by the Positive Driver Behaviors Scale and the Adaptive/Constructive Expression scale of the Driving Anger Expression Inventory.
- 13) Individuals who score higher on the present-fatalistic time perspective factor as measured by the Zimbardo Time Perspective Inventory would score lower on the latent variable of positive driving behavior as measured by the Positive Driver Behaviors Scale and the Adaptive/Constructive Expression scale of the Driving Anger Expression Inventory.
- 14) Individuals who score higher on the future time perspective factor as measured by the Zimbardo Time Perspective Inventory would score higher on the latent variable of positive driving behavior as measured by the Positive Driver Behaviors Scale and the Adaptive/Constructive Expression scale of the Driving Anger Expression Inventory.
- 15) Individuals who score higher on the variable adult status as measured by adult status criteria would score lower on the latent variable of risky driving as measured by the Ordinary and Aggressive Violations Scales of the Driver Behavior Questionnaire and the Aggressive Expression Index of the Driving Anger Expression Inventory.

- 16) Individuals who score higher on the variable adult status as measured by adult status criteria would score higher on the latent variable of positive driving behavior as measured by the Positive Driver Behaviors Scale and the Adaptive/Constructive Expression scale of the Driving Anger Expression Inventory.
- 17) Individuals who score higher on the variable adult status as measured by adult status criteria would score higher on the future time perspective factor as measured by the Zimbardo Time Perspective Inventory.
- 18) Individuals who score higher on the variable adult status as measured by adult status criteria would score lower on the present-hedonistic time perspective factor as measured by the Zimbardo Time Perspective Inventory.
- 19) Individuals who score higher on the variable adult status as measured by adult status criteria would score lower on the present-fatalistic time perspective factor as measured by the Zimbardo Time Perspective Inventory.
- 20) Each of the time perspective factors (present-hedonistic, present-fatalistic, and future as measured by the Zimbardo Time Perspective Inventory) would be a mediator for adult status as measured by adult status criteria and risky driving as measured by the Ordinary and Aggressive Violations Scales of the Driver Behavior Questionnaire and the Aggressive Expression Index of the Driving Anger Expression Inventory.
- 21) Each of the time perspective factors (present-hedonistic, present-fatalistic, and future as measured by the Zimbardo Time Perspective Inventory) would be a mediator for adult status as measured by adult status criteria and positive “courteous” driving behavior as measured by the Positive Driver Behaviors Scale and the Adaptive/Constructive Expression scale of the Driving Anger Expression Inventory.

Research Question. Gender was tested with the overall driving model to determine if the model worked well for both males and females.

Please see the following figures (Figure 4-6) for the structural models relevant to Hypotheses 9-19.

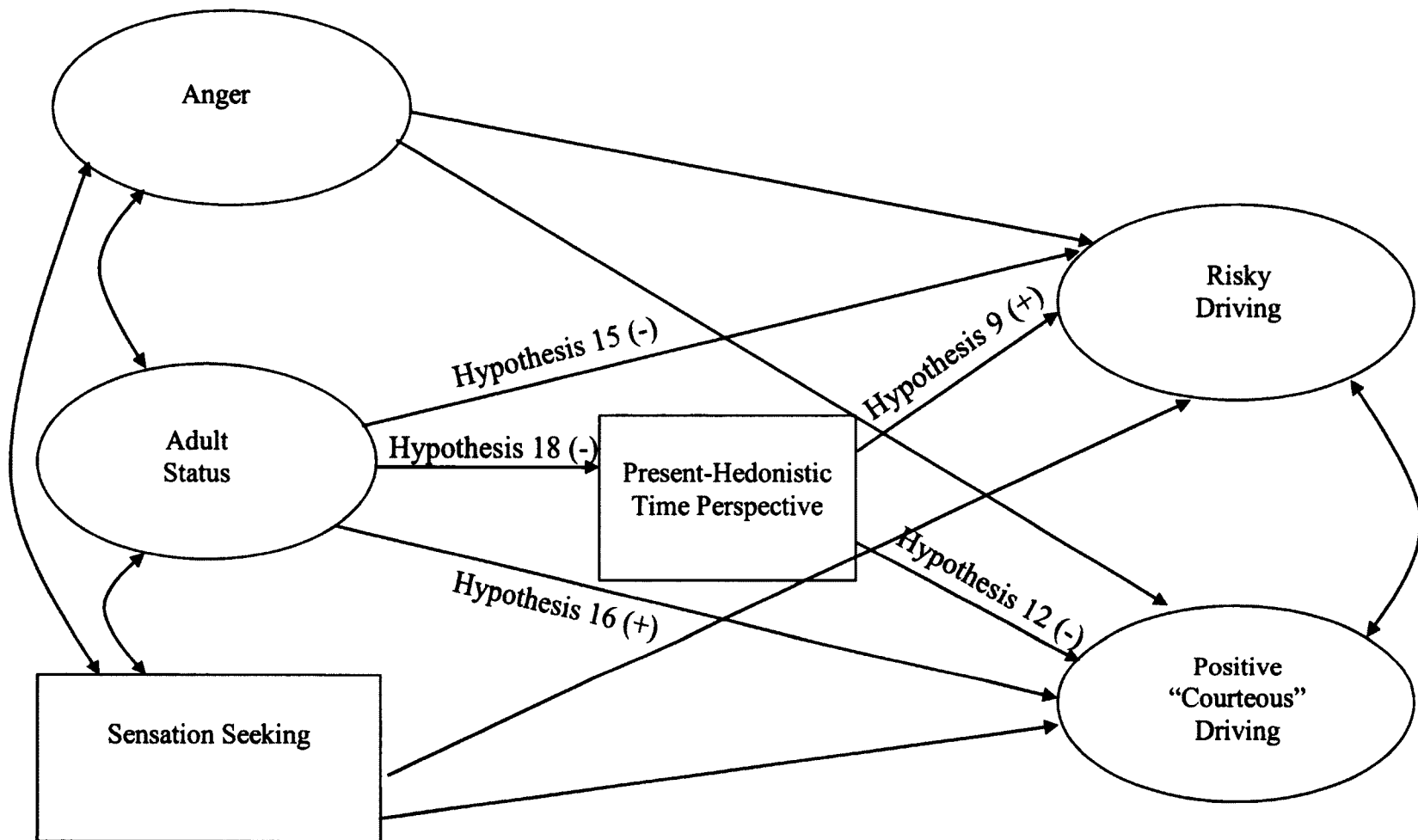


Figure 4. Driving Model with direct effect hypotheses for **present-hedonistic** time perspective and hypothesized relationship direction in parentheses.

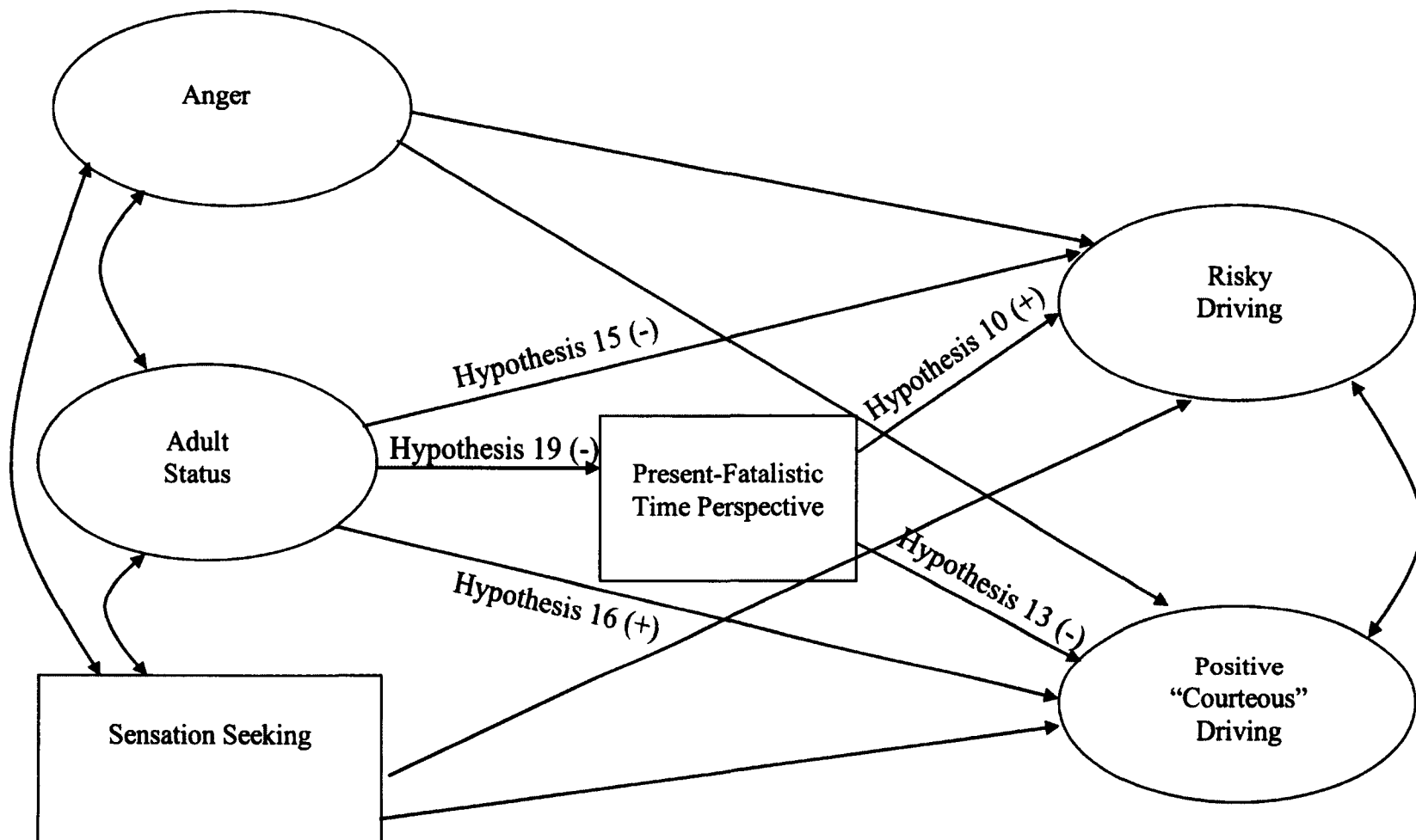
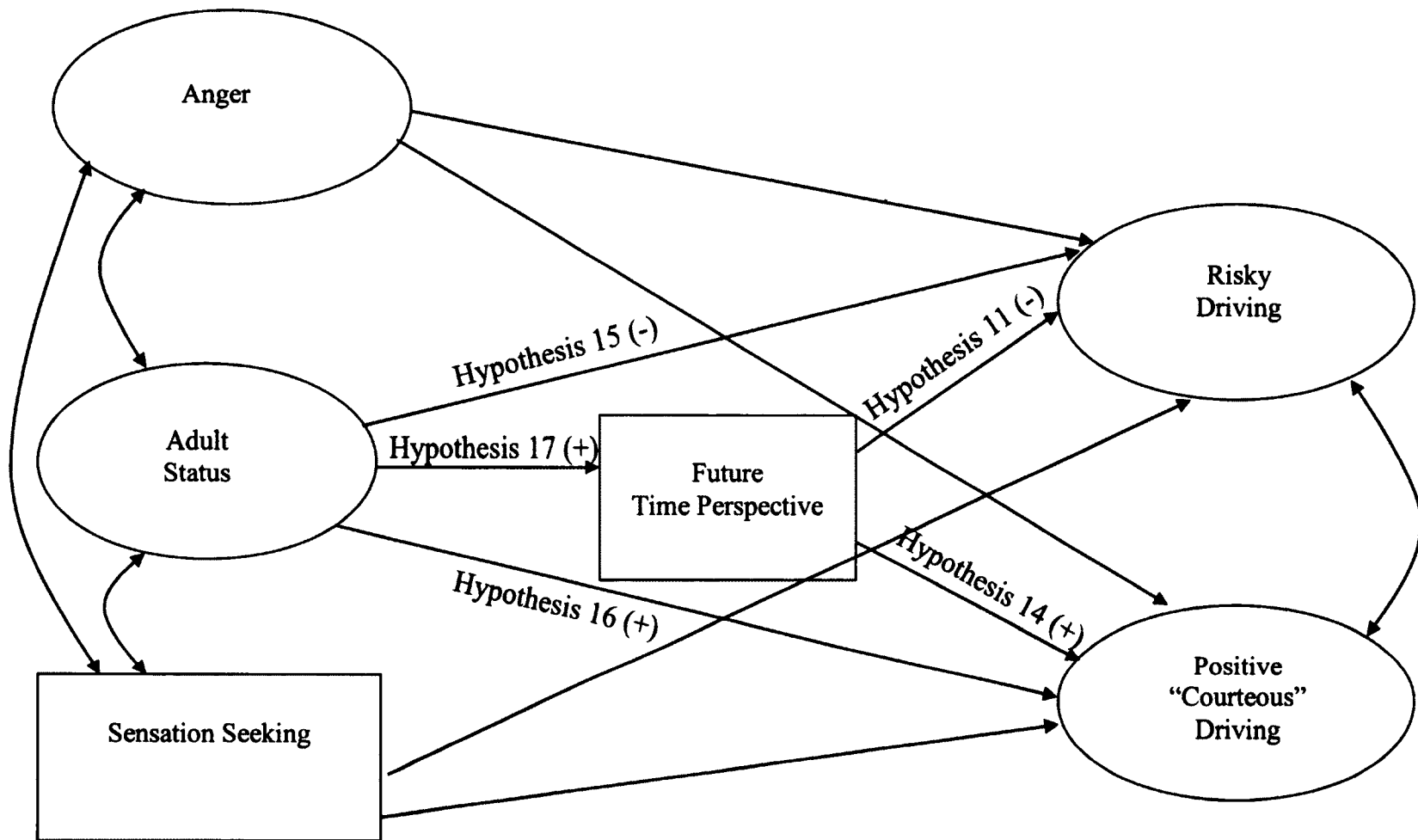


Figure 5. Driving Model with direct effect hypotheses for **present-fatalistic** time perspective and hypothesized relationship direction in parentheses.



*Figure 6. Driving Model with direct effect hypotheses for **future** time perspective and hypothesized relationship direction in parentheses.*

CHAPTER II

METHODS

Participants

The initial sample of participants contained 630 students recruited from a Psychology Department's participant pool at a southeastern university. Requirements for completing the study included limiting participation to those 18 and older with a driver's license. Demographic questions assessed these requirements and participants who completed the study without meeting these requirements were excluded from analyses. For this study, only participants aged 18-30 were included. The upper age limit was set at 30, because this is the upper endpoint of individuals who based on the literature could be classified as emerging adults. The age and driver's license restrictions resulted in 544 final-sample participants with a mean age of 20.78 ($SD = 2.60$). Although there are a variety of formulas for determining sample size, rule of thumb estimates by Tabachnick and Fidell (2001) indicate a sample size of 300 participants is sufficient to test an SEM model.

The final hypothesis tested in this study involved gender. Thus, the study aimed to recruit relatively equal numbers of men and women by limiting the number of females who could sign up at one time and stopping the collection of female responses before those of males. Although this was attempted, ultimately, respondents were 68.8% female and 30% male. This was expected because nearly 70% of the Psychology Department's undergraduate population is female. The majority of respondents were White (56.4%), Black (25.9%), or Multi-racial (7.2%). (See Table 3 for a specific racial breakdown.)

Current year academic standing was nearly equally divided among the classes (see Table 3).

Table 3

Basic Respondent Demographics (N's range from 537-544)

Demographic	Percentage
Gender	
Male	30.0
Female	68.8
Race	
White	56.4
Black	25.9
Alaskan Native/Native American	0.4
Hispanic	4.0
Asian	4.4
Multi-Racial	7.2
Other	0.9
Current Academic Standing	
Freshman	26.6
Sophomore	23.7
Junior	26.2
Senior	22.9

Because a major component of this study was driving behavior, various driving related demographics were also measured. These included frequency of driving, average number of miles driven each week, type of vehicle usually driven, history of prior citations and crashes, and years of driving experience. Over half of the participants

indicated that they drive everyday (56.6%), 67.8% drive less than 100 miles a week, 78.3% usually drive a passenger car, 55.9% had received a driving citation, and 48.0% had been involved in a crash. Table 4 categorizes these driving demographics. Respondents on average had nearly 5 years of driving experience ($M = 4.93$, $SD = 2.71$, range 1-16).

Several driving related risks were also assessed - seat belt use as a driver or a passenger, and cell phone use and texting while driving. As drivers, most respondents reported always wearing a seat belt, 79.0%. As passengers, the percent reporting always wearing a seat belt was lower, 73.2%. Although these numbers were lower than the ones reported by the state in which this study was conducted (Virginia), they do follow the same pattern with driver use being higher than passenger use (Porter, Johnson, Dozier, & Murphy, 2010; Porter & Murphy, 2011). While the majority of respondents indicated a good driving behavior - seat belt use, 60% of respondents also revealed that they at least sometimes use a cell phone while driving. In addition, nearly half (49.7%) of those surveyed at least sometimes text while driving. It is important to note that both not wearing a seat belt and texting while driving are illegal in Virginia.

Another set of demographics dealt with respondent independence and adult status. These questions assessed relationship status, being employed, being a parent, being financially independent of parents, and being the primary owner of the vehicle usually driven. Most surveyed were single (47.6%), followed by in a relationship (40.2%), engaged (4.8%), married (6.1%), and divorced (0.7%). Over half (58.3%) of the participants had a job, with 24% of the jobs being full-time. Based on employment status, it was not surprising that only 28.5% of respondents considered themselves

Table 4

Driving Demographics (N's range from 540-544)

Demographic	Percentage
Driving Frequency	
Every day	56.6
3-5 times per week	19.7
Once or twice a week	10.5
Rarely drive	11.4
Don't drive	1.5
Miles Driven Per Week	
0	4.2
1-24	24.8
25-49	18.0
50-99	20.8
100-199	16.7
200-299	8.5
300 or more	7.0
Vehicle Driven Most Often	
Passenger car	78.3
Mini-van	1.3
SUV	15.8
Pickup truck	3.9
Motorcycle	0.2
Received Driving Citation	
Yes	55.9
No	43.8
Involved in Traffic Crash	
Yes	48.0
No	51.3

financially independent of their parents, and 38.8% were the primary owners of a vehicle being responsible for its payment, title, and insurance.

Participants were administered a series of questionnaires online through the department's pool management system and with Inquisite software. They received 1 hour of credit for their participation. All responses were anonymous.

Measures

Zimbardo Time Perspective Inventory. Partitioning time and experiences into past, present, and future and how these temporal frames influence behavior were measured by the ZTPI (Zimbardo & Boyd, 1999). The ZTPI is a 56-item scale with good reliability and psychometric properties. Each item is rated from 1 (*very uncharacteristic*) to 5 (*very characteristic*) by the respondent. The measure includes subscales for all three temporal perspectives - past, present, & future. Furthermore, the scale separates past time perspective into past-positive and past-negative and present time perspective into present-hedonistic and present-fatalistic. As discussed previously, only the present (both hedonistic and fatalistic) and future scales were used in this study. Table 5 details this scale's psychometric properties including Cronbach's α , mean, and standard deviation. Please see Table 6 for sample items and characteristics of each time perspective orientation. The present and future items are displayed in Appendix A.

Driver Behavior Questionnaire (DBQ). This survey measures the risks associated with driving. The original questionnaire devised by Reason et al. (1990) was composed of 3 subscale factors - errors, violations, and lapses. Errors occur when planned actions fail in their desired outcomes. Examples of errors are failing to check the rearview mirror before changing lanes and underestimating the speed of an oncoming

Table 5

Zimbardo Time Perspective Inventory Psychometric Properties

Measure	Construct	Subscale/Factor Used	Subcategory	Number of Items	α	M	SD
Zimbardo Time Perspective Inventory (Zimbardo & Boyd, 1999; *Zimbardo et al., 1997)	Time Perspective	Original Present	--	9	.67	25.56	5.22
		Present	Hedonistic	15	.81	51.30	7.80
			Fatalistic	9	.71	23.40	5.40
		Original Future	--	13	.64	45.63	5.72
		Future	--	13	.78	47.06	6.89

Table 6

Time Perspective Categories and Exemplars

Orientation	Subcategory	Characteristics	Sample items from the Zimbardo Time Perspective Inventory (Zimbardo & Boyd, 1999)
Present	Hedonistic	Pleasure in the here and now Lack of consideration for future consequences Low ego/impulse control Low concern for consistency High interest in novelty and sensation seeking	Taking risks keeps life from becoming boring. I often follow my heart more than my head. I do things impulsively.
	Fatalistic	Think of life as predestined by fate Higher levels of depression, anxiety, and aggression	Often luck pays off better than hard work. My life path is controlled by forces I cannot influence. You can't really plan for the future because things change so much.
Future	--	Imagine future situations and the later consequences of their present actions when making decisions	It upsets me to be late for appointments. I am able to resist temptations when I know that there is work to be done. I complete projects on time by making steady progress.

vehicle when passing. Violations involve disregarding driving laws. Violations assessed in the questionnaire included following too closely to indicate that the driver should move out of the way and red light running. Lapses, the third subscale, concerns memory and attention failures that are unlikely to cause crashes. Lapses include misreading signs and missing your exit and switching on one thing when you meant to turn on something else (i.e., turning on headlights instead of windshield wipers) (Lajunen et al., 2004; Özkan & Lajunen, 2005; Reimer et al., 2005).

This study used a hybrid of the current version of the DBQ (Lajunen et al., 2004) and the U.S. revision of the questionnaire (Reimer et al., 2005). There are 28-items with 8-items on each of the ordinary violations, errors, and lapses subscales and 3-items on the aggressive violations subscale. Respondents determine how often each occurrence has happened to them and rate responses on a six-point Likert scale from 0 (*never*) to 5 (*nearly all the time*). The three subscales (errors, lapses, and ordinary violations) were all highly reliable - Cronbach's $\alpha = .81$, $.71$, and $.80$, respectively. The aggressive violations reliability was lower - Cronbach's $\alpha = .67$ (see Table 7). The factors are positively correlated. Although the entire DBQ was administered, only the ordinary and aggressive violations scales were used in analyses (see Appendix C).

Driving Anger Expression Inventory (DAX). Whereas the DBQ assesses risky driving, the DAX investigates the degree to which drivers express their anger while driving (Deffenbacher et al., 2002). Unlike measures of anger, this measure uncovers the specific behaviors that drivers perform in retaliation when another driver makes them angry. Participants rate the behaviors on a 4-point scale from 1 (*almost never*) to 4 (*almost always*). The DAX is composed of four subscales, which include Verbal

Aggressive Expression (e.g., yelling at other drivers), Personal Physical Aggressive Expression (e.g., trying to get out of the vehicle to start a fight), Use of the Vehicle to Express Anger (e.g., flashing lights at another driver), and Adaptive/Constructive Expression (using positive coping strategies to deal with anger - e.g., trying to relax). The first three scales positively correlate with one another (r range .38 to .63) and represent various aggressive aspects of risky driving. These scales can be combined into the Total Aggressive Expression Index, Cronbach's $\alpha = .94$ (see Table 7). Individually the scales also had good reliability - Cronbach's $\alpha = .91$, .91, and .89, respectively. The Adaptive/Constructive Expression scale reliability was high - Cronbach's $\alpha = .91$, and this scale was negatively correlated with the aggressive scales (r range: -.26 to -.34). (See Table 8). The entire scale can be found in Appendix E.

Positive Driver Behaviors Scale. This 14-item questionnaire focuses on courteous driving behaviors. This scale includes items on decreasing close following (tailgating), waving to thank drivers, giving the right-of-way to other drivers, and being considerate of pedestrians (Özkan & Lajunen, 2005). An example of one of the items is "Did your best not to be an obstacle for other drivers." Again the items are scored on a six-point Likert scale from 1 (*never*) to 6 (*nearly all the time*) as to how often the driver commits each behavior. The positive behavior scale had good reliability - Cronbach's $\alpha = .84$. Several items on the scale were Americanized from their original form to facilitate American drivers' responses. An example of this was changing the original item stating "Tried to use less frequently your *long lights* not to disturb oncoming drivers" to "Tried to use less frequently your *high beams* not to disturb oncoming drivers." (See Appendix D for the complete scale and Table 8 for psychometric properties.)

Table 7

Risky Driving Measures

Measure	Subscale/Factor Used	Number of Items	α	M	SD
Driver Behavior Questionnaire (Lajunen & Summala, 2003; Lajunen et al., 2004; Özkan & Lajunen, 2005; Reimer et al., 2005)	Ordinary Violations	8	.80	22.00	6.00
	Aggressive Violations	3	.67	5.70	2.49
Driving Anger Expression Inventory (Deffenbacher et al., 2002)	Verbal Aggressive Expression	12	.91	27.00	8.64
	Personal Physical Aggressive Expression	11	.91	13.20	4.40
	Use of the Vehicle to Express Anger	11	.89	17.27	5.83
	Total aggressive expression index (total of these three subscales scales only)	34	.94	57.46	15.64
Health and Risk Questionnaire (Zimbardo et al., 1997)	Risky driving scale	5	.71	9.90	3.10

Table 8

Positive Driving Measures

Measure	Subscale/Factor	Number of Items	α	M	SD
Positive Driver Behaviors Scale (Özkan & Lajunen, 2005)	Entire scale	13	.84	55.90	10.40
Driving Anger Expression Inventory (Deffenbacher et al., 2002)	Adaptive/ Constructive Expression	15	.91	43.05	9.60

Health and Risk Questionnaire - Risky Driving scale. The five items used by Zimbardo et al. (1997), which represented their risky driving scale, were also administered ($\alpha = .71$). This scale asks respondents to indicate how frequently they engage in each of the following behaviors: "taking risks driving, car racing, speeding, taking risks biking, and driving under the influence of alcohol." Each item is rated from 0 (*never*) to 4 (*always*). (See Appendix B for the scale and Table 7 for psychometric properties.)

Adult Status Markers. Blinn-Pike et al. (2008) devised four statements to assess adult status based on the four markers cited by researchers as being the markers of adulthood. These statements are: (1) I am ready for a serious relationship or marriage; (2) I have things I want to do before settling down (reverse scored); (3) I consider myself a self-supporting adult; and (4) My parents and I have the same religious beliefs. Each statement is assessed on a 5-point Likert scale from 1 (*strongly disagree*) to 5 (*strongly agree*). Respondents are then placed into the adult or emerging adult category by the number of agree or strongly agree responses. Adults agreed or strongly agreed with three or all four of the statements. Emerging adults agreed or strongly agreed with none or only one of the statements. Blinn-Pike et al. (2008) also had an "undecided" category to help maximize the differences between adults and emerging adults. The current research used a continuum for the adulthood score and not categorize participants into either adult or emerging adult; however, because of low reliability ($\alpha = .34$) this scale was not used in the SEM model. See Appendix F for the list of statements.

Adult Status Criteria. These criteria are based on the original adulthood criteria hypothesized by Arnett (2001), which were factor analyzed by Badger et al. (2006). The

adapted instructions of Kins and Beyers (2010) were used. The five scales of the criteria include role transitions, norm compliance, biological/age-related transitions, family capacities, and relational maturity. Role transitions include being financially independent of parents, no longer living with parents, and settling into a long-term career. Norm compliance encompasses limiting risky actions such as getting drunk, using illegal drugs, and having more than one sexual partner. “Biological and age-related transitions” refers to events such as obtaining a driver’s license and being able to drive, being allowed to drink, and having had sexual intercourse. “Family capacities” varies slightly for men and women, but the three basic criteria are caring for children, supporting a family, and keeping your family safe. The last factor is “relational maturity,” which deals with accepting responsibility for your actions, controlling your emotions, and considering others. The factor reliabilities are .73, .71, .54, .81, and .66, respectively. Please note that the computed reliabilities are slightly lower than the original reliabilities reported by Badger et al. (2006). The difference is thought to be the result of changing the response format from the original where respondents indicated whether each criterion was necessary for adulthood on a four point Likert scale of 1 (*not all important*) to 4 (*very important*).

Traditionally respondents are asked to what extent they believe each of these criteria is necessary to become an adult. This research used the instructional format of Kins and Beyers (2010) where participants were asked whether or not they have achieved the specific criteria. Each criterion was rated on the degree to which the participant believes they have negotiated the criteria. Choices included *no, in some respects yes and in some respects no*, and *yes*. These response choices were put onto a Likert scale and

the criteria scores were combined into a total adulthood score. This combined score was tested to ensure that adequate psychometric properties were met. (See Table 9 for the psychometric properties and Appendix G for the modified instructions and the specific statements.)

Table 9

Adult Status Criteria Psychometrics

Measure	Category	Number of Items	α	M	SD
Criteria for adulthood (Badger et al., 2006)	Role transitions	7	.73	9.52	2.38
	Norm compliance	8	.71	19.68	3.12
	Biological/age-related transitions	6	.54	15.96	2.16
	Family capacities	4	.81	7.84	2.52
	Relational maturity	4	.66	10.52	1.52
	Total	29	.77	63.55	6.95

Sensation Seeking Scale - Form V (SSS-V). The SSS-V is comprised of four 10-item subscales: Thrill and Adventure Seeking (TAS), Experience Seeking (ES), Boredom Susceptibility (BS), and Disinhibition (DIS) (Zuckerman, 1994). Each item is composed of two varying statements of which the respondent must indicate which one best describes how they feel; this is a forced choice agreement with one statement. For example, "I like 'wild' uninhibited parties" versus "I prefer quiet parties with good conversation." Several items were revised in 1996 with more up to date terminology (Zuckerman, 1996). Although the subscales may be administered individually, the entire test battery was used. The TAS subscale measures involvement in risky sports and

adventurous physical activities like rock climbing or parachuting; the ES subscale measures engagement in music, art, travel, and drugs; the DIS subscale measures social extraversion and impulsive behaviors through sexual experiences, drinking, and parties; and the BS subscale measures intolerance of repetitive experiences (Zuckerman, 1994). The Total Score provides an overall assessment of sensation seeking. (See Table 10 for the SSS-V's psychometric properties and Appendix H for the questionnaire.)

Table 10

Sensation Seeking Scale Psychometrics

Measure	Subscale	Number of Items	α	M	SD
Sensation Seeking Scale - Form V (Zuckermann, 1994)	Thrill and Adventure Seeking	10	.77	6.02	2.76
	Experience Seeking	10	.51	4.80	2.00
	Boredom Susceptibility	10	.51	2.74	1.84
	Disinhibition	10	.73	4.54	2.60
	Entire scale	40	.80	18.10	6.32

Driving Anger Scale (DAS). The DAS is a 33-item measure designed to explore the amount of anger typical driving occurrences invoke (Deffenbacher et al., 1994). (See Appendix I for the entire scale.) Each of the scale's items describes different driving situations and asks participants to imagine that the event is actually happening to them. Participants rate the amount of anger that the situation would provoke in them on a 5-point, Likert scale of 1 (*not at all*) to 5 (*very much*). Higher tallied responses indicate that the driver is an angrier driver. The Driver Anger Scale reliability is .94.

The scale is divided into six separate clusters - Hostile Gestures (“Someone makes an obscene gesture toward you about your driving”), Illegal Driving (“Someone is weaving in and out of traffic”), Police Presence (“A police officer pulls you over”), Slow Driving (“Someone is driving slower than reasonable for the traffic flow”), Discourtesy (“Someone is driving right up on your back bumper”), and Traffic Obstruction (“You are stuck in a traffic jam”). The subscale reliabilities are .86, .77, .78, .83, .87, and .85, respectively. (See Table 11 for psychometric information.) The overall DAS score was used in analyses to elicit the anger component involved with driving.

Table 11

Anger Measure Psychometrics

Measure	Subscale/Factor	Number of Items	α	M	SD
Driving Anger Scale (Deffenbacher, Oetting, & Lynch, 1994)	Hostile Gestures	3	.86	8.6	3.2
	Illegal Driving	4	.77	9.5	3.5
	Police Presence	4	.78	9.4	3.9
	Slow Driving	6	.83	15.8	4.5
	Discourtesy	9	.87	28.9	7.1
	Traffic Obstructions	7	.85	18.4	5.8
	Entire scale	33	.94	90.2	21.7
Aggression Questionnaire (Buss & Perry, 1992)	Physical Aggression	9	.74	21.3	6.3
	Verbal Aggression	5	.69	15.5	4.0
	Anger	7	.78	17.2	5.5
	Hostility	8	.77	22.7	6.1
	Entire scale	29	.89	76.7	17.6

Aggression Questionnaire. This 29-item questionnaire is composed of four aggression subtraits: Physical Aggression, Verbal Aggression, Anger, and Hostility (Buss

& Perry, 1992). These scales can be administered individually or as an entire battery. The internal consistency for the complete scale is .89. The individual scale alphas were .74, .69, .78, and .77, respectively. (See Table 11 for psychometrics and Appendix J for the questionnaire.) Sample items include "Some of my friends think I'm a hothead" and "I have become so mad that I have broken things." Responses are rated on a Likert scale from 1 (*extremely uncharacteristic of me*) to 5 (*extremely characteristic of me*).

Demographic questions. A number of questions were administered to collect demographic information. These questions included, but were not limited to, asking the respondent's age, gender, race, driving experience, crash involvement, driving violations, miles traveled per week, and vehicle information. (See Appendix K).

Procedure

After receiving IRB approval, the survey was made available online through the Psychology Department's Internet management system at Old Dominion University. The survey was created with Inquisite software, and measures were counterbalanced into two versions. One version contained measures A-J followed by the demographic section. The other version reversed the measure order and contained measures J-A followed by the demographic section. Psychology students were given the opportunity to sign-up and complete the survey and received one research credit toward their psychology course as compensation. Potential respondents were required to read a notification sheet (Appendix L) and indicated their consent to participate by clicking on the appropriate response box to continue the survey online. The entire set of questionnaires took approximately one hour to complete. Data collection occurred during the Fall 2010 and Spring 2011 academic semesters.

CHAPTER III

RESULTS

First, the response set was examined for missing data and outliers. As stated in the Participants portion of the Methods section, the response set was limited to those with a driver's license and between the ages of 18 and 30. Missing data were inspected first to determine if the values were missing at random. There were very few missing values for each variable (at most 1.3%) so the expectation-maximization (EM) algorithm was used to replace missing data. Once the missing values were replaced, scale scores along with scale means and standard deviations were tabulated. A correlation table with all relevant scales administered (see Table 12), and a table of scale means and standard deviations is presented (see Table 13). Data were scrutinized for multicollinearity by inspecting variance inflation factors. The variables demonstrating multicollinearity were the ZTPI original present scale and the present-hedonistic scale, and the ZTPI original future scale and the future scale. It is not surprising that these scales had significant overlap given the newer versions were derived from the original scales. The multicollinearity between the scales did not present a problem, because the scales were not used concurrently in analyses.

Replications of Zimbaro et al.'s 1997 Risky Driving and Time Perspective Study

First, data were analyzed to replicate portions of Zimbardo et al.'s (1997) original study on risky driving and time perspective. These replications represent Hypotheses 1-8.

Table 12

Correlations Between Measures (N = 544, not corrected for multiple comparisons)

Measure	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Present-fatalistic TP (1)		.375**	-.379**	.505**	-.174**	.096*	.236**	.207*	.161**	-.230**	-.066	.149**	.241**	.095*	-.053	-.150**
Present-hedonistic TP (2)			-.236**	.687**	.016	.206**	.201**	.237**	.217**	-.097*	-.011	.431**	.237**	.179**	-.059	-.131**
Future TP (3)				-.444**	.826**	-.178**	-.146**	-.098*	-.260**	.243**	.183**	-.229**	-.158**	.030	.121**	.201**
Original present TP (4)					-.170**	.286**	.313**	.313**	.351**	-.284**	-.161**	.493**	.331**	.115**	-.130**	-.197**
Original future TP (5)						-.053	.005	.068	-.167**	.138**	.103*	-.125**	.068	.174**	.124**	.141**
DBQ Ordinary Violations (6)							.539**	.504**	.583**	-.427**	-.376**	.376**	.377**	.366**	-.055	-.168**
DBQ Aggressive Violations (7)								.573**	.369**	-.492**	-.331**	.284**	.403**	.405**	-.036	-.104*
DAX Aggressive Expressive Index (8)									.441**	-.381**	-.360**	.301**	.450**	.482**	-.098*	-.135**
Health and risk (9)										-.377**	-.287**	.401**	.339**	.205**	-.132**	-.175**
Positive behaviors questionnaire (10)										.385**	-.287**	-.241**	-.288**	-.188**	.049	.236**
DAX adaptive/constructive (11)											.385**	-.159**	-.253**	-.257**	.047	.183**
Sensation seeking - Form V (12)													.230**	.105*	-.244**	-.177**
Aggression Questionnaire (13)														.399**	-.103*	-.217**
DAS Total (14)															-.003	-.083
Adult status markers - total (15)																.309**
Adult status criteria - total (16)																

* $p < .05$, ** $p < .01$

Table 13

Measure Means and Standard Deviations

Measure		
	Present-fatalistic TP (1)	
	Present-hedonistic TP (2)	
	Future TP (3)	
	Original present TP (4)	
	Original future TP (5)	
	DBQ Ordinary Violations (6)	
	DBQ Aggressive Violations (7)	
	DAX Aggressive Expressive Index (8)	
	Health and risk (9)	
	Positive behaviors questionnaire (10)	
	DAX adaptive/constructive (11)	
	Sensation seeking - Form V (12)	
	Aggression Questionnaire (13)	
	DAS Total (14)	
	Adult status markers - total (15)	
	Adult status criteria - total (16)	
<i>M</i>	2.60	3.42
<i>SD</i>	.56	.52
	3.63	.53
	2.84	.58
	3.63	.53
	2.50	.75
	1.90	.83
	57.37	15.56
	9.91	3.10
	4.30	.80
	43.04	9.66
	15.71	4.60
	76.58	18.25
	90.19	21.72
	13.37	1.72
	63.55	6.94

The specific analyses chosen for these replications were based on the tests used by Zimbardo et al. (1997). For Hypotheses 1 and 2, males' scores on both the present and future factor of the Zimbardo Time Perspective Inventory were compared to females' using a *t*-test to determine if males were more present oriented than females and if females were more future oriented than males. For Hypothesis 1, males were significantly more present oriented ($M = 2.93$, $SD = .56$) than females ($M = 2.80$, $SD = .59$), $t(535) = 2.26$, $p = .024$, $r = .10$. For hypothesis 2, there was also a significant effect for gender, $t(535) = -6.16$, $p < .001$, $r = .26$, with females ($M = 3.59$, $SD = .43$) being more future oriented than males ($M = 3.34$, $SD = .43$). Results from hypotheses 1 and 2 replicated Zimbardo's original findings.

Hypotheses 3-6 explored replications dealing with time perspective, gender, and risky driving. For hypothesis 3, males and females were compared on the risky driving portion of the Health and Risk Questionnaire. Again, score differences were assessed using a *t*-test with males ($M = 2.15$, $SD = .68$) reporting more risky driving than females ($M = 1.91$, $SD = .58$), $t(267.56) = 3.90$, $p < .001$, $r = .23$. Homogeneity of variance was evaluated using Levene's Test for Equality of Variances. Because the test was significant, the degrees of freedom were adjusted for unequal group variances.

For Hypotheses 4, 5, and 6, a Pearson correlation table of the variables present and future time perspective and Zimbardo et al.'s (1997) measure of risky driving (five driving relevant items taken from their longer Health and Risk Questionnaire) was constructed and is presented below as Table 14. It should be noted that in their original study, present time perspective was not divided into hedonistic and fatalistic subscales and to maintain consistency, the entire present scale was used in this analysis. For

Hypothesis 4, being present-oriented was related to performing more risky driving behaviors, $r(542) = .35, p < .001, R^2 = .12$. Also consistent with the previous study, for Hypothesis 6, being future-oriented was related to displaying fewer risky driving behaviors, $r(542) = -.17, p < .001$. For hypothesis 5, the strength of these correlations was assessed to determine whether present or future time perspective was a stronger predictor of risky driving. A Fisher's r -to- z transformation was performed in which the two correlations were transformed into z scores, and a z -score was computed based on the difference between these two values and the variance of the difference between the two scores. The correlation between present time perspective and risky driving was found to be significantly higher than the correlation between future time perspective and risky driving, $z = 5.80, p < .001, R^2 = .03$. Thus, present time perspective is a stronger predictor of risky driving than future time perspective.

Table 14

Correlations Between Present and Future Time Perspective and Zimbardo et al.'s (1997) Risky Driving Scale

Measure	Present TP	Future TP
Future TP	-.17*	
Risky driving scale (Zimbardo et al.)	.35*	-.17*

* $p < .001$.

Because one of the goals of the current research was to extend the use of the ZTPI to include the present-hedonistic and fatalistic scales, this breakdown was included to explore the relationship between the subscales and Zimbardo et al.'s (1997) measure of

risky driving. Although no specific hypotheses were posited, the correlations between the measures are shown in Table 15. Like the original present scale, both the present-hedonistic and fatalistic scales were positively related to risky driving. The new future scale demonstrates a similar relationship with risky driving as the original future scale, with respondents who scored higher on the future scale displaying fewer risky driving behaviors.

Table 15

Correlations Between Present and Future Time Perspective and Risky Driving

Measure	Original present TP	Present- hedonistic TP	Present- fatalistic TP	Original future TP	Future TP
Present-hedonistic TP	.69*				
Present-fatalistic TP	.51*	.38*			
Original future TP	-.17*	.02	-.17*		
Future TP	-.44*	-.24*	-.38*	.83*	
Risky driving scale (Zimbardo et al.)	.35*	.22*	.16*	-.17*	-.26*

* $p < .001$.

Zimbardo et al. (1997) reported a significant correlation between present and future time perspectives, so a correlation between present time perspective and risky driving with future time perspective partialled out was performed. The same analyses used by Zimbardo et al. (1997) were performed in this study. Both the present and future time perspective correlation [$r(544) = -.17, p < .001, R^2 = .03$] and the present and risky driving correlation with future time perspective partialled out were significant [$r(541) =$

.33, $p < .001$, $R^2 = .11$]. In addition, as was conducted by Zimbardo et al. (1997), a backward multiple regression was performed with the risky driving scale as the criterion variable and the predictor variables of present time perspective, future time perspective, gender, and the interactions of future and present time perspective, future time perspective and gender, and present time perspective and gender. The previous study also used location of participant sample as an independent variable. This predictor was excluded from the current study, because in the original Zimbardo et al. (1997) study, location did not achieve significance; in the current study, the entire sample of participants was comprised of students from the psychology participant pool. This backward multiple regression represents Hypothesis 7 of the current study, and it was performed to determine if present and future time perspective were unique predictors.

The variables present time perspective, gender, and the present time perspective and gender interaction remained in the model as predictors of risky driving. In this model, 15% of the variance of risky driving was explained. The summary results are presented in Table 16. Males and individuals scoring higher on the present time perspective were more likely to report performing risky driving behaviors. The interaction of present time perspective and gender was significant; as risky driving increases, scores on present time perspective increase slightly for males and stay constant for females. This interaction is presented as part of the results for Hypothesis 8. Although future time perspective remained in the final model, it was not significant. It is not known from the results presented in the Zimbardo et al.'s (1997) study, if future time perspective was significant; however, it is indicated that the interaction of future time perspective and gender was significant. What was confirmed with this backward multiple

regression replication and the correlation between present time perspective and risky driving with future time perspective partialled out was that the perspectives are unique indicators with present time perspective being a stronger predictor of risky driving than future time perspective.

For hypothesis 8, the risky driving scale, present and future time perspective scales, and the Sensation Seeking Scale - Form V (SSS-V) were assessed to determine similarities between present time perspective and sensation seeking. For this set of analyses, five items addressing drinking and drug use were omitted from the SSS-V because of their commonality with the risky driving question about “driving under the influence of alcohol.”

Table 16

Predictors of Risky Driving (Zimbardo et al.) Using a Backward Multiple Regression Analysis for Present and Future Time Perspective and Gender

Variable	B	SE(B)	β	<i>t</i>	<i>p</i> -value
Future TP	-.009	.004	-.081	-1.95	.052
Present TP	.039	.005	.331	8.20	.001
Gender (Male = 0, Female = 1)	-.145	.057	-.107	-2.56	.011
Present TP x Gender	-.023	.011	-.089	-2.19	.029

Note: Adjusted $R^2 = .15$, $N = 536$; $F(4, 532) = 25.24$, $p < .001$. The backward multiple regression was used to replicate Zimbardo et al.’s procedure. This analysis was also run as a standard multiple regression and produced the same results.

The expected overlap of present time perspective and sensation seeking necessitates testing the unique contribution of present time and sensation seeking on risky driving behaviors. First, the correlation between present time perspective and sensation seeking was calculated, $r(544) = .49, p < .001, R^2 = .24$. This relationship was then examined with sensation seeking partialled out to determine if there was still a significant correlation between present time perspective and risky driving, $r(541) = .19, p < .001, R^2 = .04$. Next, another backward multiple regression was run with risky driving as the criterion variable and the predictors of future time perspective, present time perspective, gender, sensation seeking, and the interactions of future and present time perspective, future time perspective and gender, and present time perspective and gender. This replication component represents hypothesis 8 of the current study.

Table 17

Predictors of Risky Driving (Zimbardo et al.) Using a Backward Multiple Regression Analysis for Present and Future Time Perspective, Sensation Seeking, and Gender

Variable	B	SE(B)	β	<i>t</i>	<i>p</i> -value
Future TP	-.007	.004	-.070	-1.75	.080
Present TP	.022	.005	.184	4.14	.001
Sensation seeking	.040	.006	.299	6.76	.001
Gender (Male = 0, Female = 1)	-.134	.054	-.100	-2.47	.014
Present TP x Gender	-.022	.010	-.084	-2.17	.031

Note: Adjusted $R^2 = .22, N = 536; F(5, 531) = 31.04, p < .001$. The backward multiple regression was used to replicate Zimbardo et al.'s procedure. This analysis was also run as a standard multiple regression and produced the same results.

Present time perspective, sensation seeking, gender, and the present time perspective and gender interaction were significant predictors of risky driving. As with Hypothesis 7, future time perspective was not significant. Future time perspective also dropped out of Zimbardo et al.'s (1997) test of this model. Both present time perspective and sensation seeking were unique predictors of risky driving. (See Table 17 above for the specific results). The interaction of present time perspective and gender is presented in Figure 7. As risky driving increases, scores on present time perspective increase slightly for males and stay constant for females.

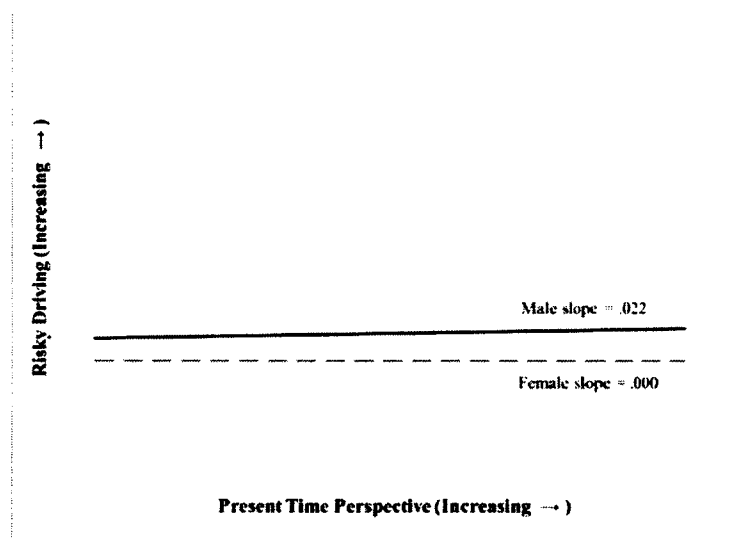


Figure 7. The interaction of risky driving and present time perspective for males and females.

Hypotheses 1-8, predominantly confirmed the results of the previous risky driving and time perspective study by Zimbardo et al. (1997). The one exception was that future time perspective did not remain in the backward multiple regression models when tested with present time perspective and gender and combinations of their interactions.

Although Hypotheses 1-8 mainly comprised replications of previous research, the remainder of the results tests current measures of risky driving and time perspective within a structural equation model framework.

Testing the Proposed Structural Equation Model

Structural equation modeling allows multiple observed variables to be combined into a smaller number of latent or unobserved variables by investigating the covariance among the observed variables (Schrieber, Stage, King, Nora, & Barlow, 2006).

Structural equation modeling based on 544 respondents between the ages of 18 and 30 was performed using AMOS 19.0 (Arbuckle, 2009) with the various questionnaires.

Results were verified with EQS 6.1 (Multivariate Software, Inc., 2006). The model is presented in Figure 1 where rectangles represent measured variables and circles represent latent variables. The model was comprised of three factors and 10 observed variables.

For each of the three factors, at least two scale scores were utilized to represent the latent variable. Multiple indicators were used for the latent variables including the Y-side latent variables representing risky and positive driving behaviors. In the model, Anger is represented by scores on the Driving Anger Scale (Deffenbacher, Oetting, & Lynch, 1994) and the Aggression Questionnaire (Buss & Perry, 1992); Risky Driving is represented by scores on the Ordinary Violations and Aggressive Violations scales of the Driver Behavior Questionnaire (Lajunen et al., 2004; Reimer et al., 2005) and the Aggressive Expressions subscale of the Driver Angry Expression Inventory (Deffenbacher et al., 2002); and Positive Driving is represented by scores on the Positive Driver Behaviors Scale (Özkan & Lajunen, 2005) and the Adaptive/Constructive Expression subscale of the Driver Angry Expression Inventory (Deffenbacher et al.,

2002). Manifest (observed, measured) variables included adult status (Adulthood Criteria; Arnett, 2000; Badger et al., 2006; Kins & Beyers, 2010); sensation seeking (Sensation Seeking Scale Form V; Zuckerman, 1994, 1996); and time perspective (Zimbardo Time Perspective Inventory; Zimbardo & Boyd, 1999; Zimbardo et al., 1997). Anger and sensation seeking were used as covariates in the model because as discussed in the Introduction these variables have an impact of driving behaviors such as speeding, involvement in motor vehicle crashes, and seat belt non-use. Each of the three time perspectives studied - present-fatalistic, present-hedonistic, and future, were run in separate SEM models as illustrated previously in Figures 4-6. Table 12 contains the uncorrected correlations and Table 13 contains the means and standard deviations for the measures.

Again although there are a variety of formulae for determining sample size, estimates by Tabachnick and Fidell (2001) suggest a sample size of 300 participants is sufficient to test an SEM model. An examination of tolerance and VIFs (variance inflation factors) did not indicate a problem with multicollinearity (O'Brien, 2007).

The assumptions of multivariate normality and linearity were evaluated. Multivariate normality was assessed using Mardia's coefficient of multivariate kurtosis. Although the coefficients (range from 13.3-14.3) were slightly above the cutoff of 10 (Bentler, 1998), which indicates no problems with normality, they did not approach the cutoff of 30, which signifies major problems with normality. Even with slightly higher coefficients, significance is not enough to determine whether or not the non-normal distribution disrupts the analyses (Division of Statistics and Scientific Computation, 2012). Thus, the next step was to examine the Mahalanobis distances. For each of the

cases, AMOS computes the squared Mahalanobis distance as well as the probability that any case would exceed the squared Mahalanobis distance of that case ($p1$) and the probability that the largest squared distance of any case would exceed the computed Mahalanobis distance ($p2$) for the 100 most likely outlier cases. The heuristic described by Arbuckle (1997) indicates that small $p1$ values are acceptable, but that small $p2$ values need to be inspected, because they may indicate violations of the assumption of normality. Depending on the specific time perspective model (present-fatalistic, present-hedonistic, or future), between 36 and 63 cases with small $p2$ values (less than .1) were assessed. An inspection of squared Mahalanobis distances (Bynre, 2009) and small $p2$ value cases showed minimal indication of serious multivariate outliers. This inspection, along with the closer to normal Mardia's coefficients and research indicating that removing enough cases to achieve multivariate normality, often leads to a reduced sample size model that produces different results led to no cases being dropped from the analyses (Gao, Mokhtarian, & Johnston, 2008). Furthermore, to be cautious, the overall model was tested using maximum likelihood estimation, because it is robust to the violation of normality assumption (Olsson, Foss, Troye, & Howell, 2000).

The proposed model initially encountered errors; therefore, modifications were made. The Adult Status latent variable was changed into the single scale indicator of Adult Status Criteria, because the Adult Status Markers scale was dropped from the analysis due to poor scale reliability. The proposed model had a small number of relationships defined; however, several additional relationships needed to be identified for the model to run. Two correlations for exogenous variables were added to the model. The correlations added were between (1) Anger and Adult Status Criteria; and (2)

Sensation Seeking and Adult Status Criteria. In addition, based on modification indices, support of previous literature indicating a strong relationship between sensation seeking and present time perspective (Zimbardo et al., 1997), and the current study's finding of a strong correlation between sensation seeking and present-hedonistic time perspective, a pathway was added between Sensation Seeking and Time Perspective for the present-hedonistic model only.

The refined models appeared to be a good fit to the data. Although χ^2 was significant, this statistic is not the best choice to evaluate larger sample sizes as with this study (Schumacher & Lomax, 2004). For this reason, several other goodness-of-fit indicators were used, including the absolute fit index standard root mean square residual (SRMR), root mean square error of approximation (RMSEA), and Bentler's Comparative Fit Index (CFI). A review of current goodness of fit research by Hooper, Coughlan, and Mullen (2008) indicated that a $SRMR < .05$, $RMSEA \leq .08$, and $CFI \geq .95$ indicate well-fitting models. For the present-fatalistic time perspective model, the SRMR was .05, the RMSEA was .08, and the CFI was .94. Using the same configurations of the present-fatalistic and future time perspective models, the present-hedonistic model fit was poor - the χ^2 was 179.1 (102 more than the refined model), the SRMR was .08, the RMSEA was .11, and the CFI was .89. The model was refined by adding a path between sensation seeking and hedonistic time perspective. For the refined present-hedonistic time perspective model the model fit was good - the SRMR was .042, the RMSEA was .06, and the CFI was .96. For the future time perspective model, the SRMR was .05, the RMSEA was .07, and the CFI was .95. All of the fit indices with the exception of the CFI for the present-fatalistic model met the currently accepted cutoff values to indicate a good

model fit. Although the present-fatalistic CFI was slightly below the conservative cutoff value, some researchers use a CFI of $\geq .90$ which the present-fatalistic CFI meets (Hooper et al., 2008).

The direct (Hypotheses 9-19) and indirect effects (Hypothesis 20 and 21) are discussed below. Direct effects represent the effect of a predictor variable on a criterion variable (Schreiber et al., 2006). An example of a direct effect in this study was the effect of adult status on time perspective. An indirect effect represents the effect a predictor variable has on a criterion variable through a mediating variable (Schreiber et al., 2006). In the current study, an indirect effect was the effect of adult status on risky driving mediated through time perspective. The statistical significance of path coefficients was analyzed by examining standardized regression coefficients. Using AMOS, the partially mediated paths were assessed using bootstrapping to determine mediation significance (Preacher & Hayes, 2008). Following are the direct relationship results for Hypotheses 9-19. [Each of the relationship paths are presented as β 's, standardized correlation coefficients. These can be thought of as simple correlations that can be converted in R^2 for the effect sizes (Durlak, 2009)].

For Hypotheses 9, 10, and 11, the relationship between each of the time perspectives and risky driving was investigated. Hypothesis 9 considered that individuals who score higher on present-hedonism would also score higher on risky driving. (See Figure 8 and Tables 18 and 19 for the model, path coefficients and significance, and factor correlations.) There was not a significant relationship between being more hedonistic and risky driving, $\beta = .01, p > .05$. Hypothesis 10 was significant, ($\beta = .09, p < .05$), with individuals who were more fatalistic displaying more instances of risky

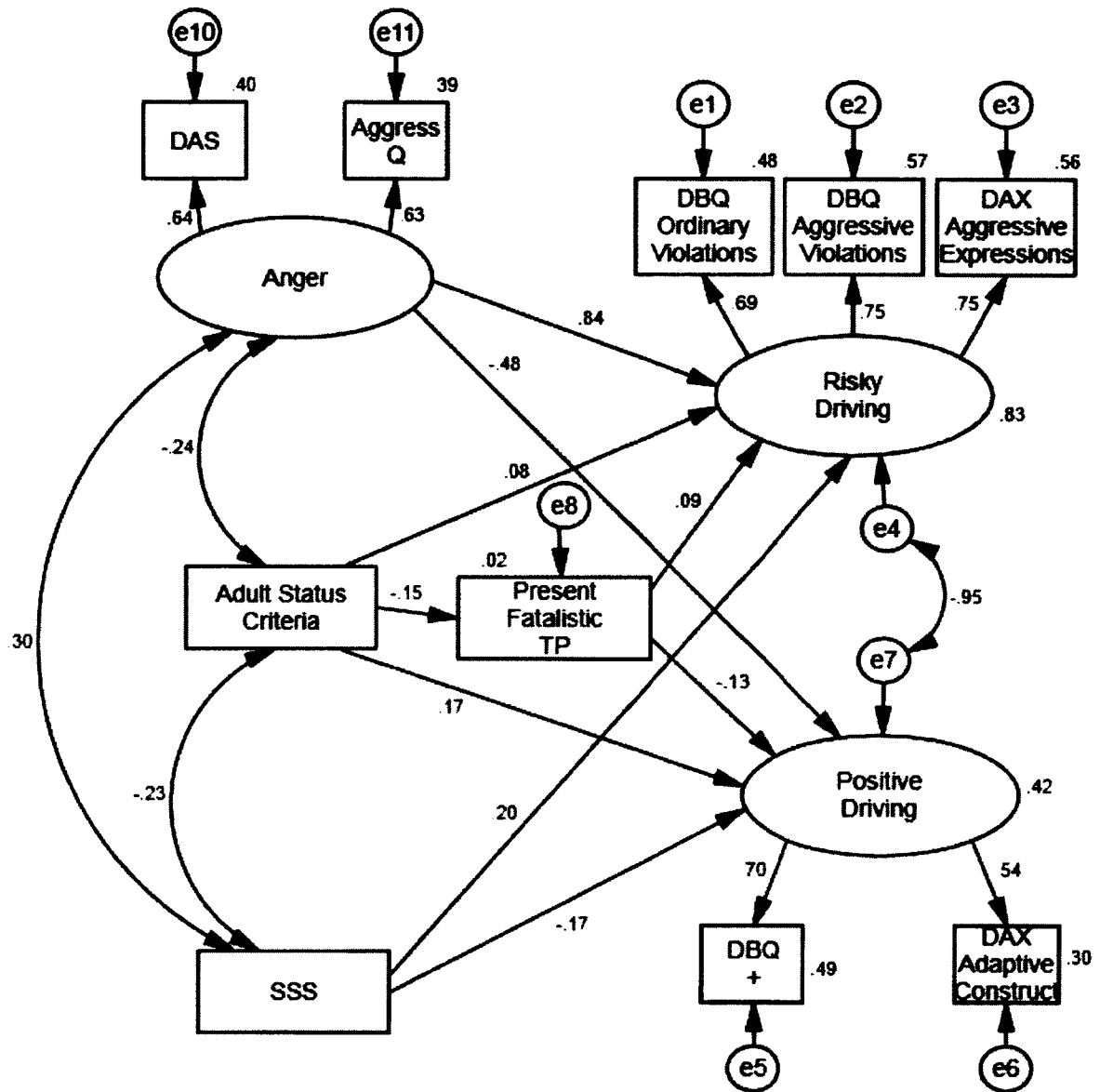


Figure 8. The overall **present-fatalistic** time perspective model with standardized coefficient estimates. Numbers adjacent to time perspective, risky driving, and positive driving are the effect sizes, R^2 .

Table 18

Standardized Path Coefficients for the Present-Fatalistic Time Perspective Model

Variable	Present-fatalistic TP	Risky driving	Positive driving
Anger	n/a	.84 (8.60*)	-.48 (-5.57*)
Adult status criteria	-.15 (-3.53*)	.08 (1.62)	.17 (2.96**)
Sensation seeking	n/a	.20 (3.98*)	-.17 (-2.89**)
Present-fatalistic TP	-	.09 (2.30***)	-.13 (-2.51**)

Note: $N = 544$. Numbers in parentheses are the t statistics.

* $p < .001$, ** $p < .01$, *** $p < .05$

Table 19

Correlations Between SEM Factors for Present-Fatalistic Time Perspective Model

Measure	Present- fatalistic TP	Adult status	Anger	Risky driving	Positive driving
Adult status	-0.15*				
Anger	0.27*	-0.24*			
Risky driving	0.25*	-0.18*	0.89*		
Positive driving	-0.26*	0.34*	-0.60*	-0.85*	
Sensation seeking	0.17*	-0.23*	0.30*	0.44*	-0.37*

Note: Correlations are uncorrected.

* $p < .001$

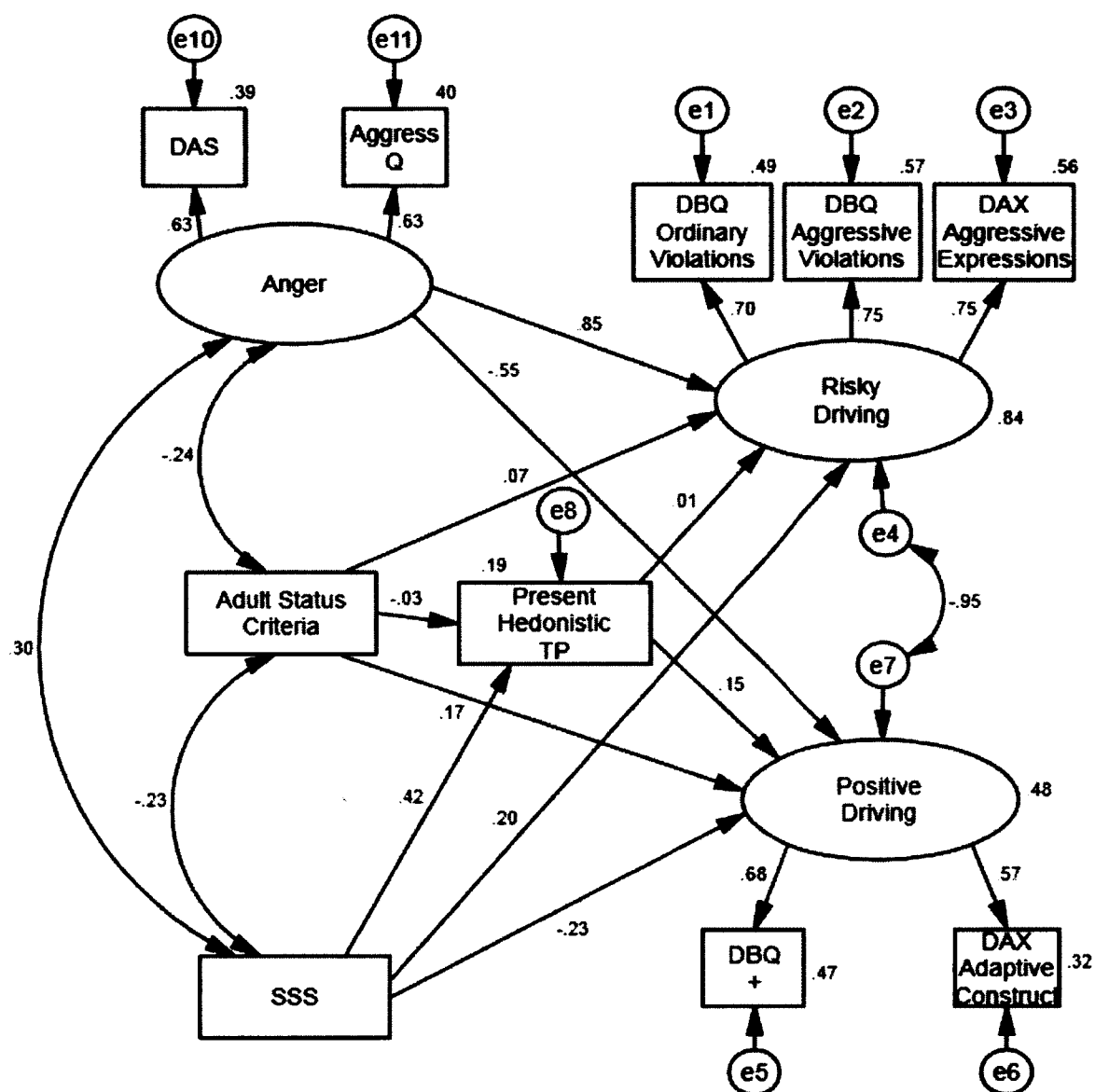


Figure 9. The overall **present-hedonistic** time perspective model with standardized coefficient estimates. Numbers adjacent to time perspective, risky driving, and positive driving are the effect sizes, R^2 .

Table 20

Standardized Path Coefficients for the Present-Hedonistic Time Perspective Model

Variable	Present-hedonistic TP	Risky driving	Positive driving
Anger	n/a	.85 (8.65*)	-.55 (-6.14*)
Adult status criteria	-.03 (-0.80)	.07 (1.51)	.17 (3.05*)
Sensation seeking	.42 (10.61*)	.20 (3.73*)	-.23 (-3.64*)
Present-hedonistic TP	-	.01 (0.33)	.15 (2.75**)

Note: $N = 544$. Numbers in parentheses are the t statistics.

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

Table 21

Correlations Between SEM Factors for Present-Hedonistic Time Perspective Model

Measure	Present-hedonistic TP	Adult status	Anger	Risky driving	Positive driving
Adult status	-0.13**				
Anger	0.33*	-0.24*			
Risky driving	0.29*	-0.18*	0.90*		
Positive driving	-0.10***	0.34*	-0.61*	-0.86*	
Sensation seeking	0.43*	-0.23*	0.30*	0.44*	-0.37*

Note: Correlations are uncorrected.

* $p < .001$, ** $p < .01$, *** $p < .05$

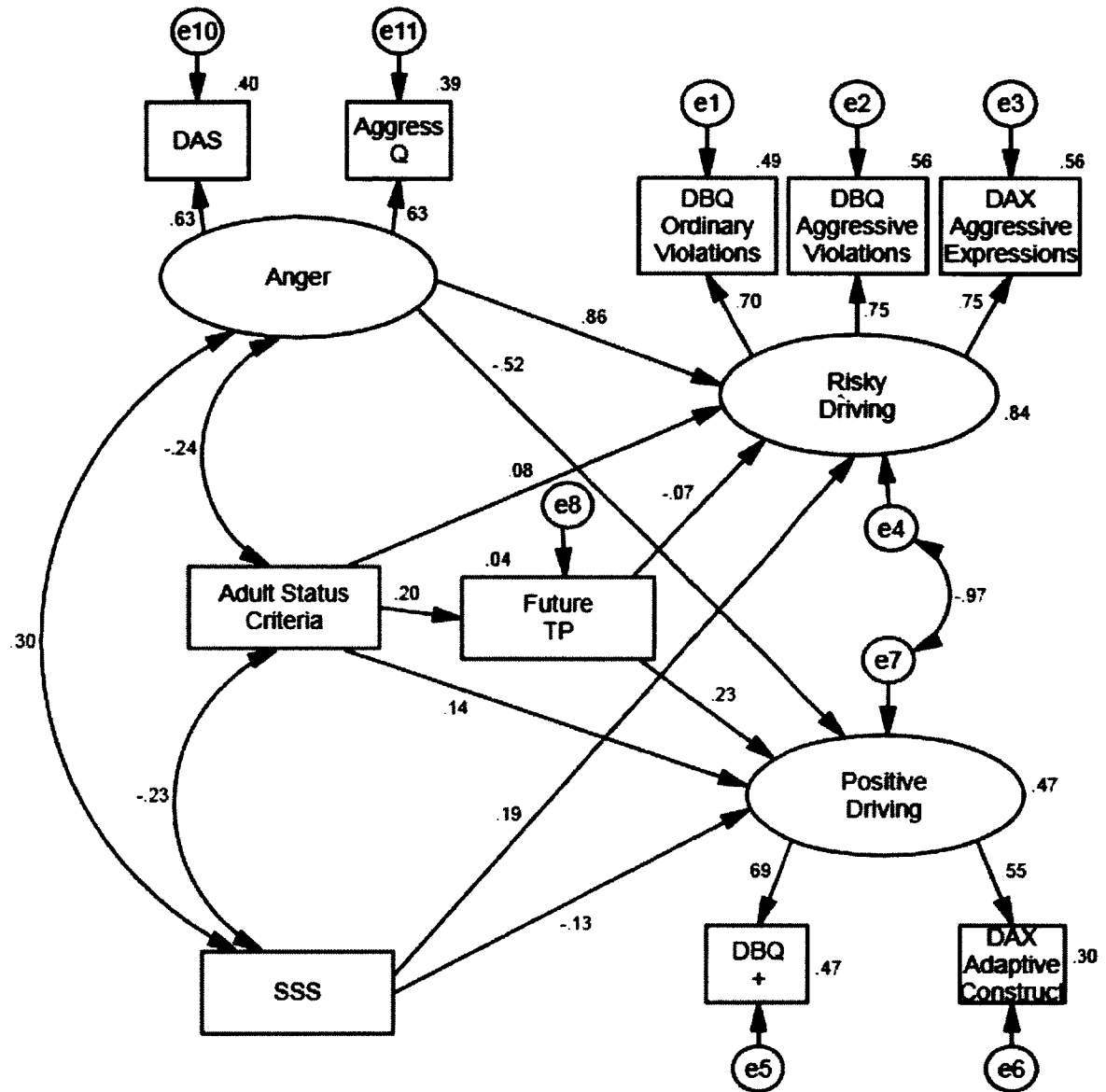


Figure 10. The overall **future** time perspective model with standardized coefficient estimates. Numbers adjacent to time perspective, risky driving, and positive driving are the effect sizes, R^2 .

Table 22

Standardized Path Coefficients for the Future Time Perspective Model

Variable	Future TP	Risky driving	Positive driving
Anger	n/a	.86 (8.69*)	-.52 (-5.88*)
Adult status criteria	.20 (4.78*)	.08 (1.67)	.14 (2.51***)
Sensation seeking	n/a	.19 (3.80*)	-.13 (-2.18***)
Future TP	-	-.07 (-1.83)	.24 (4.45*)

Note: $N = 544$. Numbers in parentheses are the t statistics.

* $p < .001$, ** $p < .01$, *** $p < .05$

Table 23

Correlations Between SEM Factors for Future Time Perspective Model

Measure	Future TP	Adult status	Anger	Risky driving	Positive driving
Adult status	0.20*				
Anger	-0.10***	-0.24*			
Risky driving	-0.19*	-0.18*	0.90*		
Positive driving	0.34*	0.34*	-0.60*	-0.86*	
Sensation seeking	-0.26*	-0.23*	0.30*	0.44*	-0.37*

Note: Correlations are uncorrected.

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

driving. (See Figure 9 and Tables 20 and 21 for the model, path coefficients and significance, and factor correlations.) Hypothesis 11 was not significant, ($\beta = -.07, p > .05$), and did not demonstrate a relationship between being future oriented and risky driving. (See Figure 10 and Tables 22 and 23 for the model, path coefficients and significance, and factor correlations.) Of the three time perspectives investigated, present-fatalism was the only perspective that was related to risky driving.

Hypotheses 12, 13, and 14 examined the relationship between each time perspective and positive or “courteous” driving behaviors. For Hypothesis 12, hedonism was thought to be negatively related to positive driving, where those who are more hedonistic tending to display less courteous driving behaviors; however, the opposite relationship was found. Drivers who were more hedonistic tended to display more positive driving behaviors, ($\beta = .15, p < .01$). Hypotheses 13 and 14 emerged as anticipated with individuals who were more fatalistic displaying less courteous behaviors when driving ($\beta = -.13, p < .01$) and individuals who were more future oriented performing more courteous behaviors when driving ($\beta = .24, p < .001$), respectively.

Although Hypotheses 9-14 examined specific pathways between the time perspectives and risky and positive driving, these analyses did not test whether time perspective added to the SEM models. To test if time perspective contributed to the models, the paths from each time perspective to risky driving and each time perspective to positive driving were removed. The models were then rerun to see if the χ^2 changed significantly. For each model, removing the paths resulted in significant χ^2 difference tests meaning that time perspective added to the models and should be retained. The specific χ^2 results can be seen in Table 24. In addition to examining the χ^2 differences,

the change in R^2 was examined. The R^2 difference is an effect size that signifies the amount of variance in the latent variable that is accounted for by the model. Although the risky driving R^2 changed little if at all (0-1%) when time perspective was added to the model, the positive driving R^2 increased by 4% and 5% in the present-hedonistic and future models, respectively.

Table 24

Comparison of the Time Perspective Models with and without Time Perspective Included in the Model

Model	Present-fatalistic TP				Present-hedonistic TP				Future TP			
	df	χ^2	R^2	R^2	df	χ^2	R^2	R^2	df	χ^2	R^2	R^2
			Risky	Positive			Risky	Positive			Risky	Positive
TP included	25	109.0	.83	.42	24	76.9	.84	.48	25	96.3	.84	.47
TP excluded	27	116.4	.84	.43	26	87.2	.84	.43	27	115.6	.84	.43
Difference	2	7.4	-.01	-.01	2	10.3	0	+.05	2	19.3	0	+.04

Note: $N = 544$. χ^2 cutoff value for $df(2)$ is 5.99.

Hypothesis 15 looked at the relationship between adult status and risky driving. Again remember that instead of using a latent variable composed of adult status criteria and adult status markers to represent adult status, the scale adult status criteria was used because of the low reliability of the adult status markers. Adult status was not related to risky driving. This relationship held in each of the time perspective models with β coefficients ranging from .07-.08, $p > .05$. Thus, it did not matter if the individual was classified as more of an emerging adult than an adult, because adult status did not affect reported risky driving behaviors. On the other hand, Hypothesis 16 explored the

relationship between adult status and positive driving behaviors. Unlike risky driving behaviors, adult status was related to positive driving behaviors. Each of the time perspective models displayed positive relationships between adult status and positive driving behaviors with β coefficients ranging from .14-.17, all p 's < .01. While adult status was not related to displaying risky driving behaviors, individuals who possessed more adult characteristics were more likely to perform good driving behaviors.

Hypotheses 17, 18, and 19 examined the relationship between each of the time perspectives and adult status. Hedonism was not related to adult status (Hypothesis 18), $\beta = -.03, p > .05$. Having a fatalistic or future time perspective were both related to adult status. Respondents who were more fatalistic tended to be less likely classified as adults (Hypothesis 19), $\beta = -.15, p < .001$. Respondents who were more future oriented tended to be more likely classified as adults (Hypothesis 17), $\beta = .20, p < .001$. Thus, adult status was not related to hedonism, but having more adult-like characteristics was related to having a less fatalistic time perspective and being more future oriented.

Hypotheses 20 and 21 pertain to the indirect effects in the models. Hypothesis 20 examines how the relationship between adult status and risky driving was mediated by time perspective. This mediation was investigated for each of the time perspective models using bootstrapping. Bootstrapping is a resampling technique that is particularly useful for small sample sizes or non-normally distributed data (Efron & Tibshirani, 1993). The indirect effects were tested with 2,000 bootstrapping samples drawn. To evaluate the significance of the indirect effect, 95% bias-corrected confidence intervals were used. Significant effects are indicated when the confidence interval does not include zero. The analysis demonstrated that the indirect path between adult status and risky

driving via time perspective was significant when tested in the present-fatalism time perspective model ($\beta = -.008, p = .029, 95\% \text{ CI } [-.019, .000]$), but not significant in the future ($\beta = -.008, p = .075, 95\% \text{ CI } [-.021, .001]$) and present-hedonism time perspective models ($\beta = .000, p = .093, 95\% \text{ CI } [-.008, .092]$). (See Tables 25-27 for more detailed results). Thus, Hypothesis 20 only correctly predicted that time perspective would be a mediator for adult status and risky driving for a present-fatalistic time perspective; the relationship was not significant for the other two time perspectives. Overall, the direct effect of adult status on risky driving (Hypothesis 15) was not significant for any of the time perspective models tested; however, the indirect effect mediated by time perspective was significant for the present-fatalism time perspective model, but it was not significant for the present-hedonism or future models. The total effect (which is the combination of the direct and indirect effects) of adult status on risky driving was not significant for any of the three time perspective models.

Hypothesis 21 explored whether there would be an indirect path from adult status to positive driving behaviors through time perspective. Again using 95% CI bias-corrected estimates, the indirect effect was significant for present-fatalism ($\beta = .020, p = .020, 95\% \text{ CI } [.004, .049]$) and future time perspectives ($\beta = .048, p = .001, 95\% \text{ CI } [.023, .083]$); however, the indirect effect was not significant for the present-hedonism time perspective model ($\beta = -.005, p = .334, 95\% \text{ CI } [-.023, .006]$). (See Tables 25-27 for more detailed results). Although Hypothesis 21 predicted that time perspective would be a mediator for adult status and risky driving for all three time perspective models, this prediction was valid for only two of the three time perspectives. This indirect effect indicates that the effect of adult status on positive driving is affected by the level of both

present-fatalistic and future time perspective. Summarizing the direct, indirect, and total effects: (1) the direct effect of adult status on positive driving behaviors (Hypothesis 16) was significant for all the time perspective models tested, (2) the indirect effect mediated by time perspective was significant for both the present-fatalism and future time perspective models, but it was not significant for the present-hedonism model, and (3) the total effect was significant for all three time perspective models.

Table 25

Effects of Adult Status on Risky and Positive Driving Through Hedonistic Time Perspective

Effect	Risky Driving				Positive Driving			
	Bootstrapping 95% CI ^a				Bootstrapping 95% CI ^a			
	β	Lower	Upper	<i>p</i>	β	Lower	Upper	<i>p</i>
Direct	.042	-.014	.087	.167	.175	.061	.326	.004
Indirect	.000	-.008	.092	.093	-.005	-.023	.006	.334
Total	.042	-.009	.093	.090	.170	.040	.309	.009

^a Bias-corrected bootstrapping confidence intervals.

Table 26

Effects of Adult Status on Risky and Positive Driving Through Fatalistic Time Perspective

Effect	Risky Driving				Positive Driving			
	Bootstrapping 95% CI ^a				Bootstrapping 95% CI ^a			
	β	Lower	Upper	<i>p</i>	β	Lower	Upper	<i>p</i>
Direct	.045	-.005	.095	.073	.173	.046	.315	.007
Indirect	-.008	-.019	.000	.029	.020	.004	.049	.020
Total	.037	-.012	.088	.127	.193	.063	.337	.005

^a Bias-corrected bootstrapping confidence intervals.

Table 27

Effects of Adult Status on Risky and Positive Driving Through Future Time Perspective

Effect	Risky Driving				Positive Driving			
	Bootstrapping 95% CI ^a				Bootstrapping 95% CI ^a			
	β	Lower	Upper	p	β	Lower	Upper	p
Direct	.047	-.003	.098	.063	.145	.011	.289	.029
Indirect	-.008	-.021	.001	.075	.048	.023	.083	.001
Total	.039	-.010	.090	.117	.194	.067	.334	.005

^a Bias-corrected bootstrapping confidence intervals.

The aforementioned mediations were tested based on Hypotheses 20 and 21; however, the present-hedonistic model contains an additional mediation. The additional mediation in the hedonistic model is the effect of sensation seeking on risky (and positive) driving through hedonistic time perspective. The additional path between sensation seeking and hedonistic time perspective was added based on the findings of Zimbardo et al. (1997), the current study's high correlation between hedonistic time perspective and sensation seeking both as individual scales and as variables within the SEM model, and modification indices and poor model fit. Again as with the previous mediation effect analyses, bootstrapping was used to determine 95% bias-corrected confidence intervals. From the results, present-hedonistic time perspective serves as a mediator for sensation seeking and positive driving ($\beta = .096$, $p = .012$, 95% CI [.021, .168]; however, present-hedonistic time perspective does not serve as a mediator for sensation seeking and risky driving ($\beta = .007$, $p = .635$, 95% CI [-.024, .040]. (See Table 28 for the results of the mediation including the indirect, direct, and total effects.) Thus,

the effect of sensation seeking on positive driving is affected by an individual's level of hedonism.

Table 28

Effects of Sensation Seeking on Risky and Positive Driving Through Hedonistic Time Perspective

Effect	Risky Driving				Positive Driving			
	Bootstrapping 95% CI ^a				Bootstrapping 95% CI ^a			
	β	Lower	Upper	<i>p</i>	β	Lower	Upper	<i>p</i>
Direct	.168	.067	.263	.002	-.323	-.515	-.124	.002
Indirect	.007	-.024	.040	.635	.096	.021	.168	.012
Total	.175	.077	.265	.002	-.227	-.417	-.026	.028

^a Bias-corrected bootstrapping confidence intervals.

Now that the individual hypotheses and the overall model results have been identified, it is time to consolidate the hypotheses into the overall model. In Figures 11-13, the initial model figures are revisited and the results of the SEM hypotheses 9-19 are visually depicted. Each figure includes the specific overall time perspective model, hypothesis number and hypothesized direction, calculated pathway coefficient and significance, and whether the hypothesis was supported. Also, included in the figures are the additional pathways for the covariates. These paths were included based on previous research support indicating relationships between driving behavior and anger and sensation seeking. In all three SEM models, adult status did not predict risky driving. For the present-fatalistic perspective model (Figure 11), all hypotheses tested were

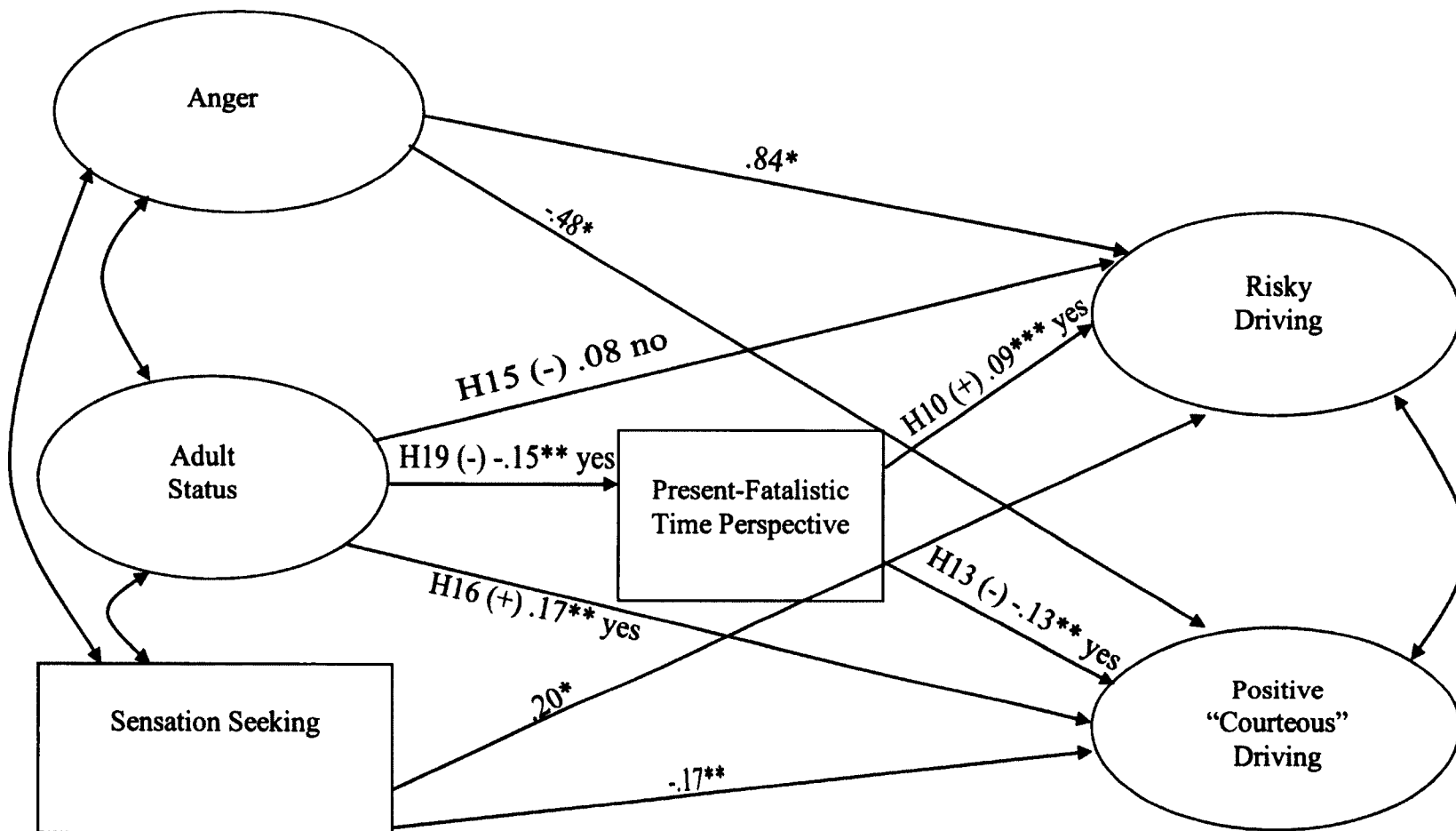


Figure 11. Driving Model with direct effect hypotheses for **present-fatalistic** time perspective with hypothesized relationship direction in parentheses followed by the computed path coefficient and significance, and whether the hypothesis was confirmed.

* $p < .001$, ** $p < .01$, *** $p < .05$

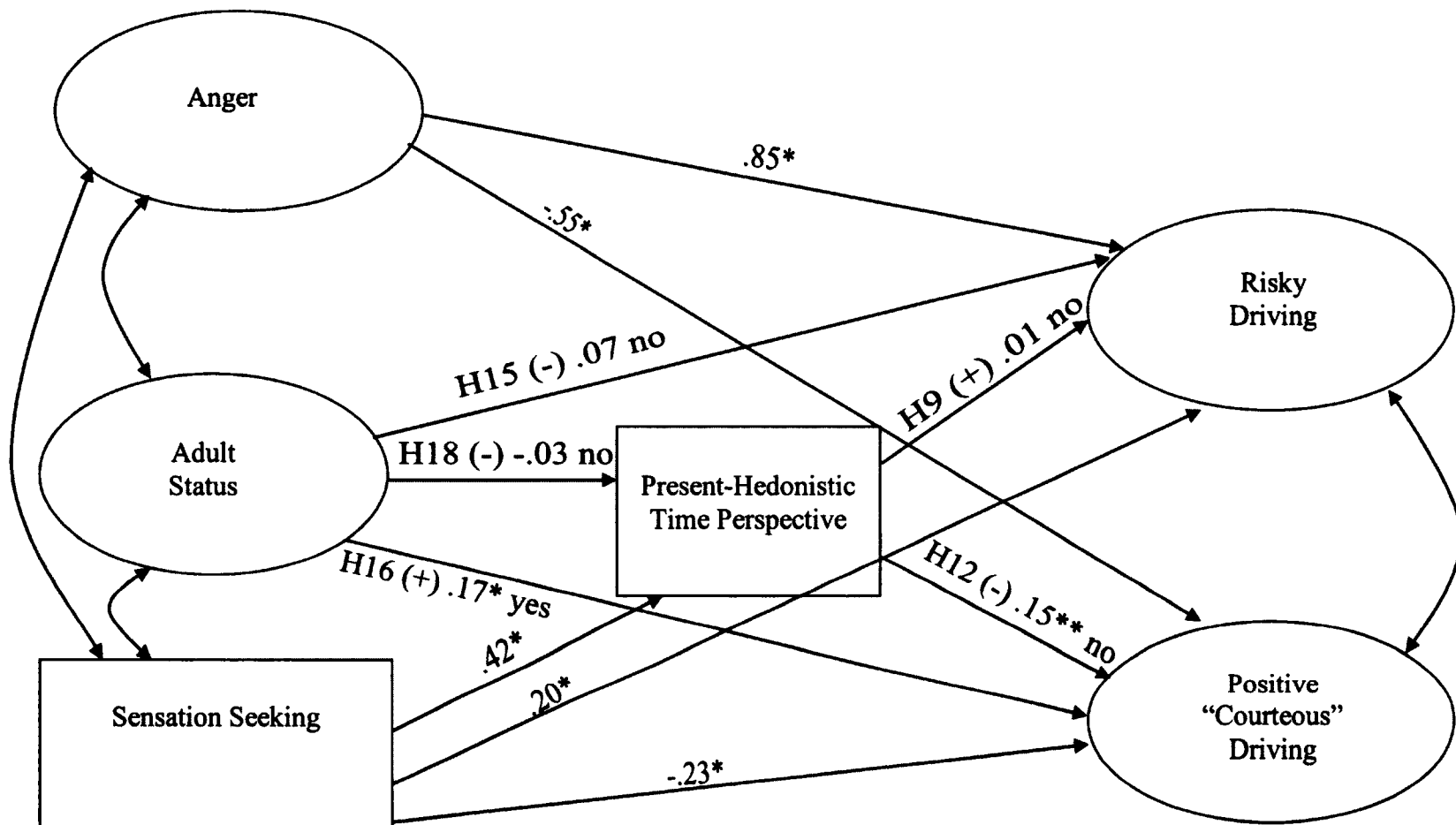


Figure 12. Driving Model with direct effect hypotheses for **present-hedonistic** time perspective with hypothesized relationship direction in parentheses followed by the computed path coefficient and significance, and whether the hypothesis was confirmed.

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

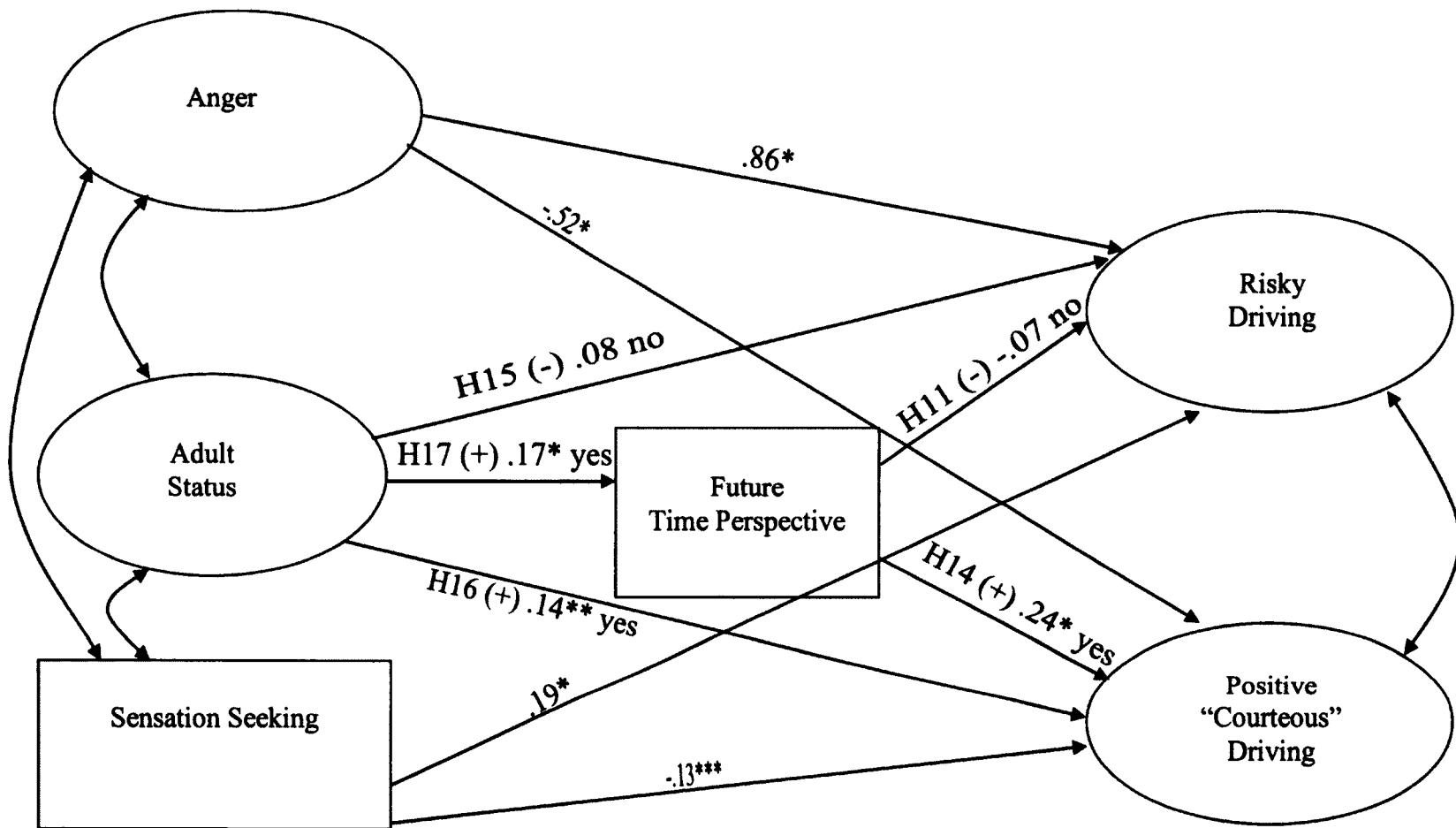


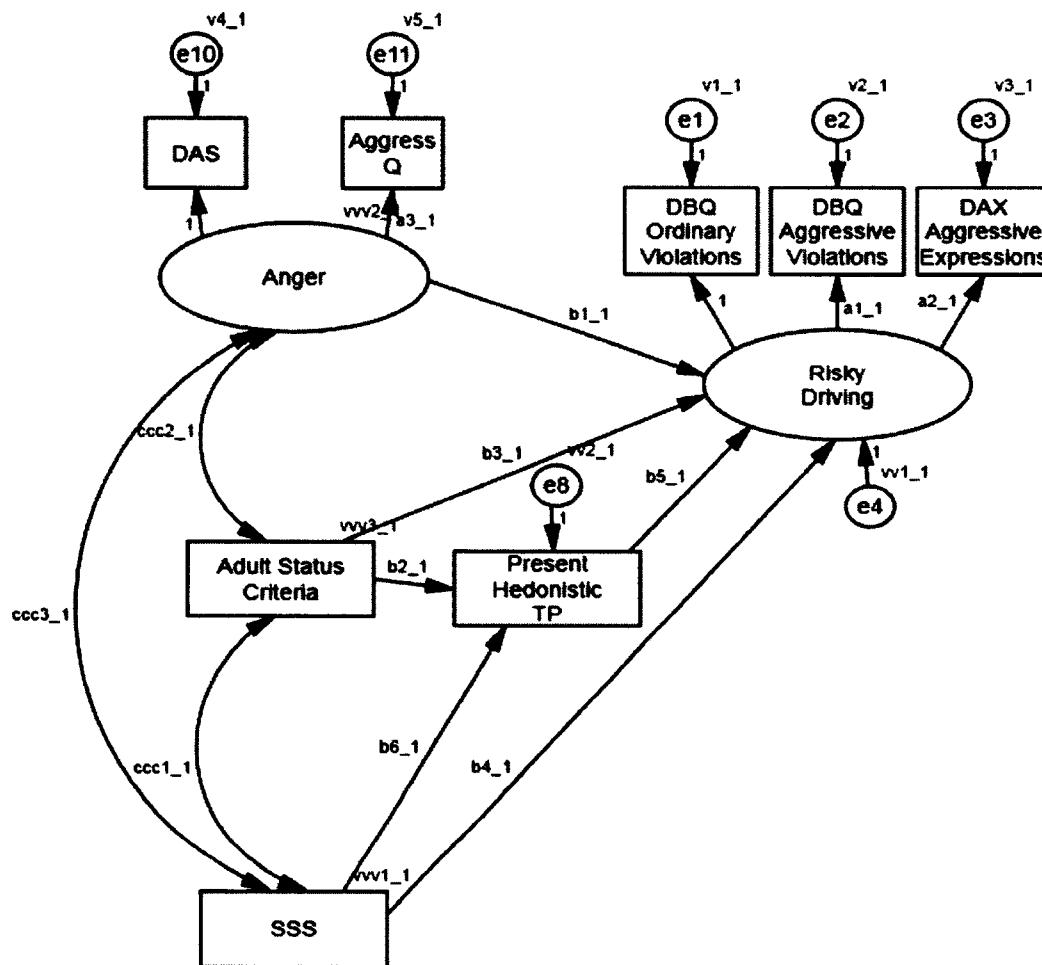
Figure 13. Driving Model with direct effect hypotheses for future time perspective with hypothesized relationship direction in parentheses followed by the computed path coefficient and significance, and whether the hypothesis was confirmed.

* $p < .001$, ** $p < .01$, *** $p < .05$

supported except for the hypothesis that adult status would predict risky driving. For the future time perspective model (Figure 13), all hypotheses were supported except that adult status would predict risky driving and that adult status would predict positive driving. In the present-hedonistic model (Figure 12), all hypotheses tested were not supported except for the hypothesis that adult status is positively related to positive driving behaviors.

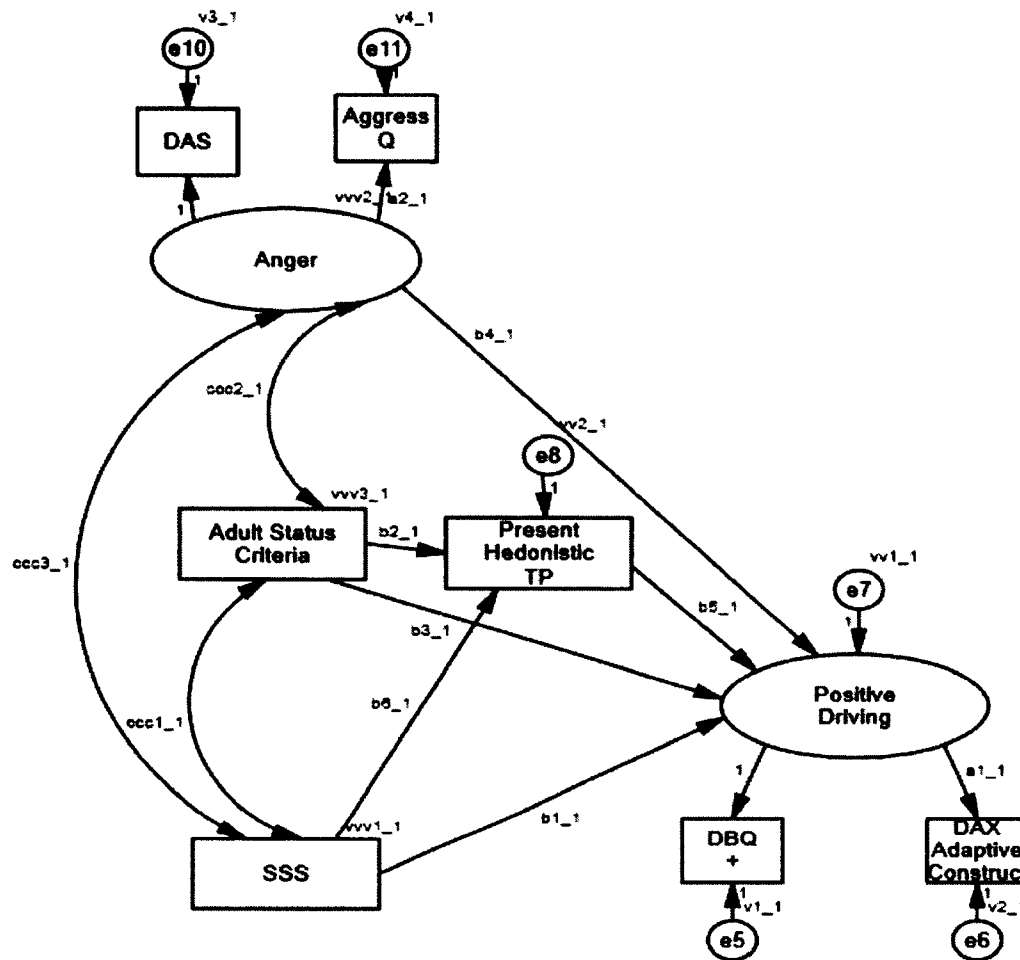
In addition to testing the significance of the relationships in the overall model, gender was tested with the overall driving model to determine if the model worked well for both males and females. This research question compared the response set of men and women to test if the sample data were drawn from the same population (Tabachnick & Fidell, 2007). Although the question intended to test the SEM models used for Hypotheses 9-21, the models would not run in AMOS as a multi-group comparison of gender. To test the model, the criteria risky and positive driving were divided into two models. Although the disturbance between risky and positive driving was very high and the concepts could possibly be combined into one latent variable, the criteria were split between two models because risky and positive driving are treated in the driving literature as two unique concepts (Defenbacher et al., 2002; Özkan & Lajunen, 2005). See Figures 14 and 15 for the new models.

Once the criteria were separated, gender was compared. The multiple group models involved testing different model comparisons. The first model was an unconstrained multiple group model with no equality constraints on any parameters that compared males with females. A χ^2 test was then performed. This model was the



Unconstrained	Measurement	Structural
model	weight model	weight model
No equality constraints	$a1_1=a1_2$ $a2_1=a2_2$ $a3_1=a3_2$	$a1_1=a1_2$ $a2_1=a2_2$ $a3_1=a3_2$ $b1_1=b1_2$ $b2_1=b2_2$ $b3_1=b3_2$ $b4_1=b4_2$ $b5_1=b5_2$ $b6_1=b6_2$

Figure 14. SEM model with Risky Driving criterion only for gender group comparisons. Model path comparisons are indicated beside the figure. The last number for the parameters is either 1 to indicate the male model or 2 to indicate the female model. Note that the present fatalistic and future models did not contain the path from sensation seeking to time perspective.



Unconstrained model	Measurement weight model	Structural weight model
No equality constraints	a1_1=a1_2 a2_1=a2_2	a1_1=a1_2 a2_1=a2_2 b1_1=b1_2 b2_1=b2_2 b3_1=b3_2 b4_1=b4_2 b5_1=b5_2 b6_1=b6_2

Figure 15. SEM model with Positive Driving criterion only for gender group comparisons. Model path comparisons are indicated beside the figure. The last number for the parameters is either 1 to indicate the male model or 2 to indicate the female model. Note that the present fatalistic and future models did not contain the path from sensation seeking to time perspective.

baseline against which the more constrained models were tested. (See Table 29 for χ^2 values for each of the time perspective models.)

Next, each time perspective model was tested with equality constraints on the measurement weights that were not already set to 1. Again, a χ^2 test was performed. Because this set of models represents nested models, a χ^2 difference test was run. (More constrained models, i.e., fewer free parameters are nested within less constrained models, i.e., more free parameters.) If the second model's fit was no worse than the baseline model, then the results were not significantly different between males and females. If the test was significant, specific parameters that were different in the groups would be located (areas of poor fit) and the specific across-group parameter constraints released one by one with nested, χ^2 difference tests conducted after each change. The next nested model evaluated the structural weights. The structural weight model includes the equality constraints of the measurement weights plus the equality constraints of the direct pathways. As can be seen in Table 29, none of the more constrained time perspective models had χ^2 difference test values above the cutoff values. The constrained models were not significantly different than the unconstrained models. Thus, the models fit the data for both males and females and the overall model tested in Hypotheses 9-21 can be used for males and females.

Table 29

Comparison of the Risky and Positive Driving Constrained Models and Gender Groups for the Time Perspective Models

Model	Risky Driving						Positive Driving					
	Present-		Present-		Future TP		Present-		Present-		Future TP	
	fatalistic TP		hedonistic TP				fatalistic TP		hedonistic TP			
	df	χ^2	df	χ^2	df	χ^2	df	χ^2	df	χ^2	df	χ^2
Unconstrained model (1) - male vs. female (no equality constraints)	30	98.0	28	60.3	30	88.5	18	60.9	16	32.9	18	51.7
Measurement weights (2) constrained model (equality constraints)	33	98.5	31	62.1	33	89.9	20	64.0	18	36.9	20	54.1
Difference test (2-1)	3	0.5	3	1.8	3	1.4	2	3.1	2	4.0	2	2.4
Structural weights (3) constrained model (equality constraints)	38	104.1	37	64.1	38	92.5	25	65.3	24	38.3	25	55.1
Difference test (3-2)	5	5.6	6	2.0	5	2.6	5	1.3	6	1.4	5	1.0

Note: $N = 544$. χ^2 cutoff value for $df(3)$ is 7.81, $df(5)$ is 11.07, $df(6)$ is 12.59.

CHAPTER IV

DISCUSSION

Time perspective, emerging adulthood, and risky and positive driving behaviors were examined, along with the personality variables anger and sensation seeking, to help better define their complex relationships. An SEM model was developed to explore these relationships in a parsimonious system. Before conducting the SEM, the groundwork of this current research concentrated on replicating the results of Zimbardo et al. (1997), who not only demonstrated a relationship between present and future time perspective and risky driving, but also documented the independence of the time perspective constructs. Specifically they found time perspective to be unique when compared to important driving-related variables such as sensation seeking and anger. The replication results from this current work were consistent with Zimbardo et al.'s (1997) original findings.

The main impetus of the current research beyond replication was to examine the relationship of risky driving and time perspective using newer measures of risky driving. Positive driving behaviors and emerging adulthood were additional concepts of study based on their developing importance in the driving research field. These variables along with sensation seeking and anger constituted the SEM models. Individual SEM models were developed for the three time perspectives of interest - present-fatalistic, present-hedonistic, and future.

Results of the SEM models produced both expected and unexpected results. As anticipated, present-fatalistic time perspective predicted both risky and positive driving

behaviors. Also as expected, adult status predicted present-fatalistic and future time perspective. The most surprising results dealt with the relationships between adult status and driving. Although adult status predicted positive driving behaviors, it did not predict risky driving behaviors. The other unexpected results were that present-hedonism was not a significant predictor of risky or positive driving and that overall the present-hedonism construct did not perform as predicted.

This discussion (1) reviews the outcomes of the assessed hypotheses, first focusing on the replications and then on the SEM models, (2) considers the implications of the current research and relates the results to previous findings, (3) discusses possible limitations and future research avenues, and (4) concludes with a general summary of major contributions.

Discussion of Replication Hypotheses

Hypotheses 1-8 represented a replication of research conducted on present and future time perspective and risky driving. Zimbardo et al. (1997) used the original ZTPI and a five-item scale of risky driving with a variety of demographic groups to identify the relationship between time perspective and risky driving. Males were more likely to score higher on present time perspective (Hypothesis 1) and report performing more risky driving behaviors (Hypothesis 3), whereas females were more likely to score higher on future time perspective (Hypothesis 2) and perform fewer risky driving behaviors (Hypothesis 3). In addition, individuals (male or female) who scored higher on present time perspective performed more risky driving behaviors (Hypothesis 4) and conversely, individuals who scored higher on future time perspective performed fewer risky driving behaviors (Hypothesis 6). The relationship between present time perspective and risky

driving was stronger than the relationship between future time perspective and risky driving (Hypothesis 5). The results of Hypotheses 1-5 confirmed the results reported by Zimbardo et al. (1997).

Because the overall SEM driving model aimed to use the newer version of the ZTPI, the relationships between the original present and future time perspectives and the modified present-fatalistic, present-hedonistic, and future time perspective were investigated. The original present time perspective scale correlated strongly with the new present-fatalistic and present-hedonistic scales, with the hedonistic version correlating more strongly with the original present scale. Given that the future scale only changed slightly between versions, the relationship between the two scales was very strong. The uniqueness of the two present time perspective scales and the strong correlation of the future versions endorsed the use of the newer ZTPI time perspectives in the overall SEM driving models.

Hypotheses 7 and 8 investigated the independence of present and future time perspective as predictors of risky driving. Because present and future time perspective both predict risky driving, but in opposite directions, it was thought that perhaps the time perspective variables represented the same concept but in reverse direction of one another. This idea was contradicted with a significant correlation between present time perspective and risky driving even with the effect of future time perspective partialled out. The one variable not included in the model predicting risky driving (predictors included time perspective [both present and future], gender, and the interactions of the time perspectives and gender) was future time perspective. Although Zimbardo et al. (1997) indicated a significant future by gender interaction, it is unclear from their results

whether future time perspective was significant when they tested the same model. Thus based on the provided results, it is uncertain whether the result was replicated.

Given that a strong correlation can indicate colinearity of variables, an analysis tested whether present time perspective and sensation seeking were unique concepts. Present time perspective and sensation seeking were corroborated as unique predictors of risky driving. Gender also played a role where males were more likely to be present oriented and at higher levels of risky driving tended to score higher than females on the present subscale. Overall, the replications represented by Hypotheses 1-8 substantiated the results reported by Zimbardo et al. (1997).

Discussion of SEM Hypotheses: Extensions Offered by this Current Research

Based on the literature, a driving model was conceptualized using the personality variables time perspective, emerging adulthood, anger, and sensation seeking as predictors of risky and positive driving behaviors. Hypotheses 9-22 evaluated the specific relationships. Hypotheses 9-19 investigated the individual pathways between variables of interest; Hypotheses 20 and 21 investigated the mediation among variables with time perspective as the mediator; and the Research Question investigated the viability of the SEM model for males and females.

Hypotheses 9-14 evaluated the relationship between risky driving and each of the time perspectives of interest and positive driving behaviors and each of the time perspectives of interest. Although present-hedonism and future time perspective did not predict risky driving behavior (Hypothesis 9), present-fatalism did predict risky driving. Individuals who were more fatalistic performed more risky driving behaviors (Hypothesis 10). The lack of a relationship between hedonism and risky driving and between future

time perspective and risky driving was an interesting finding given the previous results of Zimbardo et al. (1997) for present and future time perspective and risky driving.

The results regarding positive driving behaviors varied slightly from what was anticipated. As expected, fatalism was related to displaying fewer positive driving behaviors (Hypothesis 13) and a future orientation was related to displaying more positive driving behaviors (Hypothesis 14). Although it was expected that the time perspective of hedonism would be negatively related to positive driving behaviors with more hedonistic individuals displaying fewer courteous driving behaviors, the opposite relationship was found. Hedonism was associated with displaying more courteous driving behaviors (Hypothesis 12). Although hedonism was thought of as being impulsive and wanting to have fun no matter the cost or consequence, it seems that hedonistic behavior was focused on the individual as long as the impulsive behavior did not inconvenience other people. Thus, the fatalistic and future time perspectives and their respective relationships with risky and positive driving behaviors resulted as conjectured. Conversely, the relationship among hedonism and risky driving was not substantiated and contrary to expectation, hedonism was associated with exhibiting more positive driving behaviors.

Hypotheses 15 and 16 investigated the relationship between adult status, and risky and positive driving behaviors, respectively. Whereas it was expected that adults would be less likely to drive dangerously than emerging adults, this relationship was not supported (Hypothesis 15). In contrast, adults were more likely to display courteous driving behaviors than emerging adults (Hypothesis 16). Hypotheses 15 and 16 were tested using the three time perspective models and the results were nearly identical for

each of the models. Thus, while adult status does not predict risky driving, being an adult is related to driving in a more courteous manner.

Hypotheses 17-19 considered the relationship between each of the time perspectives and adult status. Although it was thought that being hedonistic or fatalistic would be associated with emerging adults, hedonism was not related to adult status (Hypothesis 17). Being fatalistic was related to being an emerging adult (Hypothesis 18). Also as expected, looking toward the future was more typical of adults than emerging adults (Hypothesis 19). Overall, hedonism did not present a significant relationship with adult status. Repeated non-significant findings using hedonism indicates that this time perspective may not be the best concept to test with risky driving. Perhaps the overlap between hedonism and sensation seeking resulted in hedonism not being a relevant predictor of risky driving behavior.

Hypotheses 20 and 21 explored the possibility of time perspective being a mediator between adult status and both risky and positive driving. The relationship between adult status and risky driving was mediated by both the present-fatalistic and future time perspectives. This mediation by present-fatalistic and future time perspectives also occurred between adult status and positive driving behaviors. Present-hedonism did not mediate the relationships between adult status and risky driving or adult status and positive driving behaviors. Thus, having a present-fatalistic or future orientation mediates the relationship between adult status and risky (and positive) driving while having a present-hedonistic time perspective did not mediate the relationship between adult status and risky driving.

The last result - the research question, tested the viability of the SEM driving models for males versus females. The overall model did not run when using the gender group comparisons so the criteria (risky and positive driving) were separated into two models with the same predictors. Males and females were then compared using an unconstrained baseline model, a measurement model, and a structural model. The group models did not differ significantly for males or females. Thus, the risky and positive criterion driving by the three time perspective SEM models can be used for an overall sample comprised of males and females, just male samples, or just female samples. This result was surprising given the research indicating gender differences in risky driving, time perspective, anger, and sensation seeking.

Implications of the Research Findings

Time perspective seems to be a personality characteristic that has broad impact and could have an appeal in understanding many aspects of behavior, including risky and courteous driving. Time perspective is related to a variety of risky health-related behaviors, with the early work of Zimbardo and now this study adding evidence that the driving environment should be included. Not only were Zimbardo's results replicated, but within a complex SEM model, time perspective contributed above and beyond the normal covariates (sensation seeking and anger) associated with driving behavior. Specifically, this study's efforts were important to help elicit the relationship between more refined measures of time perspective and risky driving.

From the results, there are three key implications for future research worth further discussion. For one, time perspective had mixed results depending on how the concept was analyzed and with which variables it was compared. Although time perspective is

related to sensation seeking, all of the time perspective models had significant χ^2 difference tests when time perspective was added to the models. While the amount of risky driving variance accounted for the models was not improved by adding time perspective, time perspective added predictive value in the present-hedonistic and future, but not present-fatalistic SEM driving models for positive driving. While the 4-5% of additional variance in positive driving accounted for by adding two of the three perspectives may not seem meaningful, the whole picture should be kept in mind. Nearly half of the variance in positive driving was accounted for with only four variables. Although, the models contained the two major covariates associated with driving behaviors, sensation seeking and anger, time perspective was still able to add an additional 4-5% of variance which is not insignificant in the driving safety literature.

The relationship between time perspective and driving behaviors also differs when exploring their correlations. All of the factor correlations between each of the time perspectives and risky (and positive) driving were significant and stronger than the partial relationships between the same variables. In addition, the partial correlations for present-hedonistic and future time perspectives and risky driving were not significant. Furthermore, the partial correlation between present-hedonism and positive driving was opposite the direction hypothesized. The opposite findings may have resulted from the significant mediation effect of sensation seeking and positive driving by present-hedonistic time perspective; however, further exploration of this relationship is warranted.

While it was thought that time perspective would predict both risky and positive driving, the relationship predominantly with positive driving compels further

investigation. Since time perspective adds value to predicting courteous driving behaviors both as a direct predictor and a mediator, perhaps the concept could be evaluated in time management courses. An ideal place to test modifying time perspective would be in college seminars aimed at teaching time management principles. Time management involves using typical future-oriented ideals such as delaying gratification and planning for the future. In this setting, students could learn the principles and their time perspective could be assessed at regular intervals to evaluate any changes. If time perspective is modifiable, the effect of the change on other criterion such as driving behavior can be evaluated.

Secondly, none of the time perspective models demonstrated a relationship between adult status and risky driving. This was surprising given that being classified as a young adult solely by age is associated with performing more risky driving behaviors such as frequently driving more than 20 miles per hour over the speed limit and not stopping at traffic lights (Bradley & Wildman, 2002). As a post hoc analysis, the factor correlations between adult status versus age and risky and positive driving were explored. The factor correlations between adult status and driving ($r = -.18$ for adult status and risky driving; $r = .34$ for adult status and positive driving) were stronger than those between age and driving ($r = -.05$ for adult status and risky driving; $r = .11$ for adult status and positive driving). As an additional step adult status was replaced by chronological age in the models. The substitution resulted in no R^2 change for risky driving, but a 2-5% decrease in variance accounted for by the models for positive driving. Thus with respect to using either adult status or age, it seems as though adult status

performs better than chronological age both strictly as a factor correlation with risky and positive driving and also within the SEM models for predicting positive driving.

Furthermore, perhaps it is not age or adulthood that is related to risky driving, but rather inexperience. While the current research included demographic questions that assessed how long respondents have had a driver's license and how many miles they drive each week, these questions do not truly assess inexperience. Inexperience is a combination of a myriad of factors including but not limited to length of licensure, time spent on provisional licenses, how frequently someone drives, how many miles are driven per week, type of roadway driven on, and traffic volume. Arnett (2002) identifies inexperience as one of the important factors differentiating the crash rate of 16-17 year olds from those of 18-25 year olds. Although the current research attempted to quantify age using adulthood milestones, it seems as though this is a complex relationship that should be explored further.

Although the relationships among adult status (using age as a proxy), time perspective, and risky driving had been studied previously, the relationship among time perspective and positive driving behaviors, and adult status and positive driving behaviors had not been studied. Again, present-fatalistic and future time perspectives were related to driving behaviors, which in this case was courteous driving behaviors. Although this was expected, the real surprise was that adult status was related to positive driving behaviors, but not related to risky driving behaviors. Thus, being more adult-like was associated with being a more courteous driver. Perhaps the increased responsibilities associated with being an adult such as being financially independent, owning a home, being married, and having children, lead adults to the realization of what is important in

life and that courteous driving behavior may facilitate maneuvering within the driving environment. Even though adult status cannot be changed by a driver improvement class, it may be possible to highlight the idea that being a courteous driver is part of becoming an adult and if someone wants to be thought of as an adult, a good first step would be to become a courteous driver.

Third, the SEM risky and positive criterion models worked equally well for males and females. Although the overall SEM model required the separation of the criteria (risky and positive driving) into two models, these models had good fit for both males and females. This finding was contrary to most driving research comparing males and females. For instance, males recount more risky driving than females (Zimbardo et al., 1997), affirm committing more traffic violations than females (Özkan & Lajunen, 2005), and crash more often than females (NHTSA, 2009b). Although gender was only explored in this study, the driving models appeared to perform equally well with both the male and female groups.

Limitations and Future Research

Several limitations should be addressed to help refine and improve the future of this research program involving time perspective. One possible limitation of the current research was the unequal group sample sizes for males and females and how this unbalanced design may have affected both the overall SEM models and the group comparisons. Females outnumbered males two to one in the SEM model. Although there were a sufficient number of participants from each group (over 150), and therefore the pathways are expected to be reliable (Tabachnick & Fidell, 2001), the result of having unbalanced group sizes allowed the female group to influence the results more than the

male group (Division of Statistics and Scientific Computation, 2012). Although this may be a problem when attempting to compare the results to the general population, the sample sizes obtained for this study mimic the population of the university's participant pool. For now, this researcher argues the results are reliable given the sample sizes obtained and used, and given how the models were robust with the overall, male only, and female only SEM results being consistent.

Based on the strong relationship between risky driving and anger, these two variables were possibly collinear and measured the same construct. Thus, another possible limitation of the SEM model was the inclusion of both risky driving and anger as separate latent variables. Though both variables contain scales which included the word aggression or aggressive, aggressive driving behaviors were included because aggressive driving behaviors are risky driving behaviors. The aggressive driving measures did not measure intent to harm and were used based on their risky driving behaviors only. Anger was included in the model because prior research has indicated that anger contributes to risky driving behaviors (Chliaoutakis et al., 2002) and the angrier someone becomes, the more risks they take driving which leads to more crashes (Iverson & Rundmo, 2002). The direction taken by the current research to treat aggression/anger separately from risky driving despite a strong relationship was justifiable given the above scale differences and historical treatments in the literature. However, continued research in the field should remain vigilant in how aggression, anger, and risky driving are compared in driving models to ensure they remain, indeed, separate construct as measured.

A final possible limitation of the research was the age and recruitment method of participants. Although the age range was restricted to 18 to 30 year olds, the mean age of

respondents was 20.78. Studying emerging adulthood with a skewed age sample may have influenced the interpretation of emerging adulthood's relationship with risky and positive driving and time perspective; however, because age itself was not used, but rather emerging adulthood, the age skew may have been mitigated by the good distribution on the emerging adult continuum. (To help evaluate the effect of adult status versus age, age was substituted into the SEM models. The present-fatalistic and future models ensued decreased goodness of fit indices, while the present-hedonistic model demonstrated no significant differences.) Also, because participants were all recruited from a university, this may have affected adult status resulting in differences if compared to non-students in reaching adult-related milestones (Arnett, 2004). Compared to young adults who do not attend college, college students tend to delay such things as marriage, having children, and purchasing a home. Again, however, this may have been mitigated by the good distribution on the emerging adult continuum. As a possible next step, having age more equally distributed and including non-student participants would increase the generalizability of the results.

General Discussion

The tragic toll of motor vehicle crashes necessitates the importance of devising reliable and valid measures of driver behaviors. The increasing public health concern elicited by risky driving behaviors elevates the importance of examining time perspective and other personality variables which may be related to not only risky driving behaviors, but also positive driving behaviors.

If a person's time perspective along with other known personality variables can be used to help predict risky or positive driving behaviors, interventions can be specifically

tailored to improve driving actions. Starting in driver's education classes, personality measures related to risky driving (e.g., present-fatalistic and future time perspective, anger, and sensation seeking) and positive driving (e.g., emerging adulthood, present-fatalistic and future time perspective) can be administered and the results discussed to enlighten young drivers about their own personal styles. Such an approach has been adopted by the Roads and Traffic Authority of New South Wales who include a section on sensation seeking in their Driver Qualification Handbook (Roads and Traffic Authority - New South Wales, 2011). Along with the measure, an explanation of the scoring, relevant risk taking concepts, and information to help manage risk are included and discussed. Time perspective, specifically - and using the New South Wales model as exemplar - could be included within driver's education could focus on highlighting a person's time perspective and addressing how the characteristic influences driving behavior.

Approaches involving enforcement and engineering strategies may benefit as well. Subsequent research will determine if time perspective specifically can be used by law enforcement and traffic engineers to reduce risky driving and increase positive driving. Although enforcement might focus on future time perspective and rewarding positive driving behaviors and the worthwhile consequences that result and engineering might focus on present-fatalistic time perspective by changing roadway designs such as implementing road diets (narrowing and/or removing lanes) to discourage risky driving, these countermeasures address numerous personality characteristics such as sensation seeking, anger, impulsivity, and conscientiousness.

However, before going too far toward intervention development, additional research remains crucial. Major areas to be further investigated are (1) emerging adulthood and how to measure the concept, (2) how an individual's time perspective can be changed, and (3) how males and females differ on individual concepts such as emerging adulthood and time perspective in relation to risky and positive driving. Although changing one aspect of personality will probably not change behavior, focusing on multiple characteristics may help by continuing to identify the worst offenders for intervention. The research reported here adds another layer to our understanding of risky and positive driving, and has given further evidence that time perspective may, indeed, be a meaningful construct in the pursuit of reducing risk which in turn translate into opportunities to reduce roadway injuries and fatalities.

REFERENCES

- Arbuckle, J. L. (1997). *AMOS User's Guide* (Version 3.6). Chicago: Smallwaters.
- Arbuckle, J. L. (2009). AMOS (Version 19) [Computer Program]. Chicago: SPSS.
- Arnett, J. J. (1996). Sensation seeking, aggressiveness, and adolescent reckless behavior. *Personality & Individual Differences*, 20, 693-702.
- Arnett, J. J. (2000). Emerging adulthood: A theory of development from the late teens through the twenties. *American Psychologist*, 55, 469-480.
- Arnett, J. J. (2001). Conceptions of the transition to adulthood: Perspectives from adolescence through midlife. *Journal of Adult Development*, 8, 133-143.
- Arnett, J. J. (2004). *Emerging adulthood: The winding road from the late teens through the twenties*. New York: Oxford University Press.
- Apostolidis, T., Fieulaine, N., Simonin, L., & Rolland, G. (2006). Cannabis use, time perspective and risk perception: Evidence of a moderating effect. *Psychology and Health*, 21, 571-592.
- Badger, S., Nelson, L. J., & Barry, C. M. (2006). Perceptions of the transition to adulthood among Chinese and American emerging adults. *International Journal of Behavioral Development*, 30, 84-93.
- Benschop, R., & Draaisma, D. (2000). In pursuit of precision: The calibration of minds and machines in late nineteenth-century psychology. *Annals of Science*, 57, 1-25.
doi: 10.1080/000337900296281
- Bentler, P. M. (1998). Causal modeling: New interfaces and new statistics. In J. G. Adair, D. Belanger, & K. L. Dion (Eds.), *Advances in psychological science: Social*,

personal, and cultural aspects, Vol. 1 (pp. 353-370). East Sussex, UK:

Psychology Press.

Blinn-Pike, L., Lokken Worthy, S., Jonkman, J.N., & Rush Smith, G. (2008). Emerging adult versus adult status among college students: Examination of explanatory variables. *Adolescence*, 43(171), 577-591.

Blockey, P. N. & Hartley, L. R. (1995). Aberrant driver behaviour: Errors and violations. *Ergonomics*, 38, 1759-1771.

Bond, M., & Feather, N. (1988). Some correlates of structure and purpose in the use of time. *Journal of Humanistic Psychology*, 33, 12-29.

Boniwell, I., & Zimbardo, P. G. (2004). Balancing time perspective in pursuit of optimal functioning. In P. A. Linley & S. Joseph (Eds.), *Positive psychology in practice* (pp. 165-180). John Wiley & Sons, Inc., Hoboken, N.J.

Bradley, G., & Wildman, K. (2002). Psychosocial predictors of emerging adults' risk and reckless behaviors. *Journal of Youth and Adolescence*, 31, 253-265. doi: 10.1023/A:1015441300026

Buss, A. H., & Perry, M. (1992). The Aggression Questionnaire. *Journal of Personality and Social Psychology*, 63, 452-459.

Byrne, B. M. (2009). *Structural equation modeling with AMOS: Basic concepts, applications, and programming* (2nd ed.). Mahwah, NJ: Lawrence Erlbaum Associates, Inc.

Chliaoutakis, J. E., Demakakos, P., Tzamalouka, G., Bakou, V., Koumaki, M., & Darviri, C. (2002). Aggressive behavior while driving as predictor of self-reported car crashes. *Journal of Safety Research*, 33, 431-443.

- Cottle, M.A. (1976). *Perceiving time*. New York: John Wiley.
- D'Alessio, M., Guarino, A., De Pascalis, V., & Zimbardo, P.G. (2003). Testing Zimbardo's Stanford Time Perspective Inventory (STPI) - Short Form: An Italian study. *Time & Society*, 12, 333-347.
- Deffenbacher, J.L., Lynch, R.S., Oetting, E.R., & Swaim, R.C. (2002). The Driving Anger Expression Inventory: A measure of how people express their anger on the road. *Behaviour Research & Therapy*, 40, 717-737.
- Deffenbacher, J. A., Oetting, E. R., & Lynch, R. S. (1994). Development of a driving anger scale. *Psychological Reports*, 74, 83-91.
- Division of Statistics and Scientific Computation. (2012). AMOS. Retrieved from http://ssc.utexas.edu/software/faqs/amos#Amos_7
- Duangpatra, K. N. K., Bradley, G. L., & Glendon, A. I. (2009). Variables affecting emerging adults' self-reported risk and reckless behaviors. *Journal of Applied Psychology*, 30, 298-309. doi: 10.1016/j.appdev.2008.12.011
- Durlak, J. A. (2009). How to select, calculate, and interpret effect sizes. *Journal of Pediatric Psychology*, 34, 917-928.
- Efron, B., & Tibshirani, R. J. (1993). *An Introduction to the Bootstrap*. New York: Chapman and Hall.
- Gao, S. G., Mokhtarian, P. L., & Johnston, R. A. (2008). Nonnormality of data in structural equation models. *Transportation Research Record: Journal of the Transportation Research Board*, 2082, 116-124.
- Gorman, B. S. & Wessman, A. E. (Eds.). (1977). *The personal experience of time*. Plenum Press, New York.

- Gras, M. E., Sullman, M. J. M., Cunill, M., Planes, M., Aymerich, M., & Font-Mayolas, S. (2006). Spanish drivers and their aberrant driving behaviours. *Transportation Research Part F*, 9, 129-137. doi: 10.1016/j.trf.2005.09.004
- Gulliver, P., & Begg, D. (2007). Personality factors as predictors of persistent risky driving behavior and crash involvement among young adults. *Injury Prevention*, 13, 376-381.
- Hall, P. A., & Fong, G. T. (2003). The effects of a brief time perspective intervention for increasing physical activity among young adults. *Psychology & Health*, 18, 685-706.
- Hartmann, D. & Toguchi Swartz, T. (2007). The new adulthood? The transition to adulthood from the perspective of transitioning young adults. *Advances in Life Course Research*, 11, 253-286.
- Henson, J. M., Carey, M. P., Carey, K. B., & Maisto, S. A. (2006). Associations among health behaviors and time perspective in young adults: Model testing with bootstrapping replication. *Journal of Behavioral Medicine*, 29, 127-137.
- Hornik, J., & Zakay, D. (1996). Psychological time: The case of time and consumer behaviour. *Time & Society*, 5, 358-397.
- Hooper, D., Coughlan, J., & Mullen, M. R. (2008). Structural equation modeling: Guidelines for determining model fit. *The Electronic Journal of Business Research Methods*, 6, 53-60.
- Iversen, H., & Rundmo, T. (2002). Personality, risky driving and accident involvement among Norwegian drivers. *Personality and Individual Differences*, 33, 1251-1263.

- Jessor, R., Turbin, M. S. & Costa, F. M. (1997). Predicting developmental change in risky driving: The transition to young adulthood. *Applied Developmental Science, 1*, 4-16.
- Joireman, J., Anderson, J., & Strathman, A. (2003). The aggression paradox: Understanding links among aggression, sensation seeking, and the consideration of future consequences. *Journal of Personality & Social Psychology, 84*, 1287-1302.
- Jonah, B.A. (1997). Sensation seeking and risky driving: A review and synthesis of the literature. *Accident Analysis & Prevention, 29*, 651-665.
- Keough, K. A., Zimbardo, P. G., & Boyd, J. N. (1999). Who's smoking, drinking, and using drugs? Time perspective as a predictor of substance use. *Basic and Applied Social Psychology, 21*, 149-164.
- Kins, E., & Beyers, W. (2010). Failure to launch, failure to achieve criteria for adulthood? *Journal of Adolescent Research, 25*, 743-777. doi: 10.1177/0743558410371126
- Kontogiannis, T., Kossiavelou, Z., & Marmaras, N. (2002). Self-reports of aberrant behaviour on the roads: Errors and violations in a sample of Greek drivers. *Accident Analysis & Prevention, 34*, 381-399.
- Laghi, F., Baiocco, R., D'Alessio, M., & Gurrieri, G. (2009). Suicidal ideation and time perspective in high school students. *European Psychiatry, 24*, 41-46.
- Lajunen, T., Parker, D., & Summala, H. (1999). Does traffic congestion increase driver aggression? *Transportation Research Part F, 2*, 225-236.

- Lajunen, T., Parker, D., & Summala, H. (2004). The Manchester Driver Behaviour Questionnaire: A cross-cultural study. *Accident Analysis & Prevention*, 36, 231-238.
- Lajunen, T., & Summala, H. (2003). Can we trust self-reports of driving? Effects of impression management on driver behaviour questionnaire responses. *Transportation Research Part F*, 6, 97-107.
- Levy, B., & Earleywine, M. (2004). Discriminating reinforcement expectancies for studying from future time perspective in the prediction of drinking problems. *Addictive Behaviors*, 29, 181-190.
- Marantz Henig, R. (2010, August 22). "What is it about 20-somethings?" *The New York Times Magazine*, pp. MM28.
- Martinez, K. L. H. (2007). Time perspective and risky driving behaviors. Unpublished database.
- McGrath, J., & Kelly, J. (1986). *Time and human interaction: Towards a social psychology of time*. Guildford Press, New York.
- Multivariate Software, Inc. (2006). EQS (Version 6.1) [Computer Program]. Encino, CA: Multivariate Software, Inc.
- National Highway Traffic Safety Administration. (2009a). Fatality Analysis Reporting System Database. Query run from <http://www-fars.nhtsa.dot.gov/QueryTool/QuerySection/SelectYear.aspx>
- National Highway Traffic Safety Administration. (2009b). Traffic Safety Facts 2008 Data. DOT HS 811 170. Retrieved from <http://www-nrd.nhtsa.dot.gov/Pubs/811170.pdf>

- National Highway Traffic Safety Administration. (2009c). Traffic Safety Facts 2008 Data - Overview. DOT HS 811 162. Retrieved from <http://www-nrd.nhtsa.dot.gov/Pubs/811162.PDF>
- National Highway Traffic Safety Administration. (2010). Aggressive Driving. Retrieved from <http://www.nhtsa.gov/Aggressive>
- Nelson, L. J., Padilla-Walker, L. M., Carroll, J. S., Madsen, S. D., McNamara Barry, C., & Badger, S. (2007). "If you want me to treat you like an adult, start acting like one!" Comparing the criteria that emerging adults and their parents have for adulthood. *Journal of Family Psychology, 21*, 665-674.
- O'Brien, R. M. (2007). A caution regarding rules of thumb for variance inflation factors. *Quality and Quantity, 41*, 673-690.
- Olsson, U. H., Foss, T., Troye, S. V., & Howell, R. D. (2000). The performance of ML, GLS, and WLS estimation in structural equation modeling under conditions of misspecification and nonnormality. *Structural Equation Modeling, 74*, 557-595.
- Owsley, C., McGwin, Jr., G., & McNeal, S.F. (2003). Impact of impulsiveness, venturesomeness, and empathy on driving by older adults. *Journal of Safety Research, 34*, 353-359.
- Özkan, T. & Lajunen, T. (2005). A new addition to DBQ: Positive Driver Behaviours Scale. *Transportation Research Part F, 8*, 355-369.
doi:10.1016/j.trf.2005.04.018
- Petry, N. M., Bickel, W. K., & Arnett, M. (1998). Shortened time horizons and insensitivity to future consequences in heroin addicts. *Addiction, 93*, 729-738.

- Porter, B. E. & Berry, T. D. (2001). A nationwide self-report survey of red-light running behavior: Measuring prevalence, predictors, and perceived consequences. *Accident Analysis & Prevention, 33*, 735-741.
- Porter, B. E. & England, K. J. (2000). Predicting red-light running behavior: A traffic safety study in three urban settings. *Journal of Safety Research 31*, 1-8.
- Porter, B. E., Johnson, K. L., & Berry, T. D. (2010). A community-based program to reduce tailgating behavior. In D. Hennessey (Ed.), *Traffic psychology: An international perspective*. New York: Nova Science Publishers, Inc.
- Porter, B. E., Johnson, K. L., Dozier, J. E., & Murphy, E. M. (2010). *2010 seat belt use in Virginia*. Norfolk, Virginia: Old Dominion University for the Virginia Highway Safety Office.
- Porter, B. E., & Murphy, E. M. (2011). *2011 seat belt use in Virginia*. Norfolk, Virginia: Old Dominion University for the Virginia Highway Safety Office.
- Preacher, K. J. & Hayes, A. F. (2008). Asymptotic and resampling strategies for assessing and comparing indirect effects in multiple mediator models. *Behavior Research Methods, 40*, 879-891. doi: 10.3758/BRM.40.3.879
- Rankin, L. A. & Kenyon, D. B. (2008). Demarcating role transitions as indicators of adulthood in the 21st century: Who are they? *Journal of Adult Development, 15*, 87-92. doi: 10.1007/s10804-007-9035-2
- Rappaport, H., Enrich, K., & Wilson, A. (1985). Relation between ego identity and temporal perspective. *Journal of Personality & Social Psychology, 48*, 1609-1620.

- Reason, J., Manstead, A., Stradling, S., Baxter, J., & Campbell, K. (1990). Errors and violations on the roads: A real distinction? *Ergonomics* 33, 1315-1332.
- Reimer, B., D'Ambrosio, L. A., Gilbert, J., Coughlin, J. F., Biederman, J., Surman, C., Fried, R., & Aleardi, M. (2005). Behavior differences in drivers with attention deficit hyperactivity disorder: The driving behavior questionnaire. *Accident Analysis & Prevention*, 26, 996-1004.
- Rimmö, P.-A., & Åberg, L. (1999). On the distinction between violations and errors: Sensation seeking associations. *Transportation Research Part F*, 2, 151-166.
- Roads and Traffic Authority - New South Wales. (2011). Driver Qualification Handbook. Retrieved from http://www.rta.nsw.gov.au/licensing/downloads/driver_qualification_handbook.pdf
- Rothspan, S., & Read, S.J. (1996). Present versus future time perspective and HIV risk among heterosexual college students. *Health Psychology*, 15, 131-134.
- Schreiber, J. B., Stage, J. K., King, J., Nora, A., & Barlow, E. A. (2006). Reporting structural equation modeling and confirmatory factor analysis results: A review. *The Journal of Educational Research*, 99, 323-337.
- Schumacker, R. E., & Lomax, R. G. (2004). *A beginner's guide to structural equation modeling* (2nd ed.). Mahwah, NJ: Lawrence Erlbaum Associates.
- Solar Calendar. (2012). In *Encyclopædia Britannica*. Retrieved from Encyclopædia Britannica Online: <http://www.britannica.com/EBchecked/topic/552874/solar-calendar>

- Sullman, M. J. M., Meadows, M. L., & Pajo, K. B. (2002). Aberrant driving behaviours amongst New Zealand truck drivers. *Transportation Research Part F*, 5, 217-232.
- Tabachnick, B. G. & Fidell, L. S. (2001). *Using multivariate statistics* (4th ed.). Boston: Allyn & Bacon.
- Tabachnick, B. G. & Fidell, L. S. (2007). *Using multivariate statistics* (5th ed.). Boston: Pearson - Allyn & Bacon.
- U.S. Census Bureau. (2009). Population estimates - 2008. Retrieved from <http://www.census.gov/popest/national/asrh/2008-nat-res.html>
- Vingilis, E., Stoduto, G., Macartney-Filgate, M. S., Liban, C. B., & McLellan, B. A. (1994). Psychosocial characteristics of alcohol-involved and nonalcohol-involved seriously injured drivers. *Accident Analysis & Prevention*, 26, 195-206.
- Virginia Department of Motor Vehicles. (2009). 2008 Virginia Traffic Crash Facts. Richmond, VA: Author. Retrieved from http://www.dmvnow.com/webdoc/safety/crash_data/crash_facts/crash_facts_08.asp
- Virginia General Assembly. (2002). Code of Virginia. § 46.2-868.1. Aggressive driving; penalties. Retrieved from <http://lis.virginia.gov/cgi-bin/legp604.exe?000+cod+46.2-868.1>
- Wills, T. A., Sandy, J. M., & Yaeger, A. M. (2001). Time perspective and early-onset substance use: A model based on stress-coping theory. *Psychology of Addictive Behaviors*, 15, 118-125.
- World Health Organization. (2009). 10 facts on global road safety. Retrieved from <http://www.who.int/features/factfiles/roadsafety/en/index.html>

- Xie, C.-Q., & Parker, D. (2002). A social psychological approach to driving violations in two Chinese cities. *Transportation Research Part F*, 5, 293-308.
- Zimbardo, P. G., & Boyd, J. N. (1999). Putting time in perspective: A valid, reliable individual-differences metric. *Journal of Personality & Social Psychology*, 77, 1271-1288. doi: 10.1037/0022-3514.77.6.1271
- Zimbardo, P. G., Keough, K. A., & Boyd, J. N. (1997). Present time perspective as a predictor of risky driving. *Personality and Individual Differences*, 23, 1007-1023.
- Zuckerman, M. (1994). *Behavioral expressions and biosocial bases of sensation seeking*. New York: Cambridge University Press.
- Zuckerman, M. (1996). Item revisions in the Sensation Seeking Scale Form V (SSS-V). *Personality and Individual Differences*, 20, 515.

APPENDIX A

ZIMBARDO TIME PERSPECTIVE INVENTORY

PRESENT-HEDONISTIC, PRESENT-FATALISTIC, AND FUTURE SCALES ONLY

Read each item and, as honestly as you can, answer the following question:
“How characteristic or true is this of you?”

Very Uncharacteristic	Uncharacteristic	Neutral	Characteristic	Very Characteristic
A	B	C	D	E

1. I believe that getting together with one's friends to party is one of life's important pleasures.
2. Fate determines much in my life.
3. I believe that a person's day should be planned ahead each morning.
4. I do things impulsively.
5. If things don't get done on time, I don't worry about it.
6. When I want to achieve something, I set goals and consider specific means for reaching those goals.
7. When listening to my favorite music, I often lose all track of time.
8. Meeting tomorrow's deadlines and doing other necessary work comes before tonight's play.
9. Since whatever will be will be, it doesn't really matter what I do.
10. I try to live my life as fully as possible, one day at a time.
11. It upsets me to be late for appointments.
12. Ideally, I would live each day as if it were my last.
13. I meet my obligations to friends and authorities on time.
14. I make decisions on the spur of the moment.
15. I take each day as it is rather than try to plan it out.
16. It is important to put excitement in my life.
17. I feel that it's more important to enjoy what you're doing than to get work done on time.
18. Before making a decision, I weigh the costs against the benefits.
19. Taking risks keeps my life from becoming boring.
20. It is more important for me to enjoy life's journey than to focus only on the destination.
21. It takes joy out of the process and flow of my activities, if I have to think about the goals, outcomes, and products.
22. You can't really plan for the future because things change so much.
23. My life path is controlled by forces I cannot influence.

24. It doesn't make sense to worry about the future, since there is nothing that I can do about it anyway.
25. I complete projects on time by making steady progress.
26. I take risks to put excitement in my life.
27. I make lists of things to do.
28. I often follow my heart more than my head.
29. I am able to resist temptations when I know that there is work to be done.
30. I find myself getting swept up in the excitement of the moment.
31. Life today is too complicated; I would prefer the simpler life of the past.
32. I prefer friends who are spontaneous rather than predictable.
33. I keep working at difficult, uninteresting tasks if they will help me get ahead.
34. Spending what I earn on pleasures today is better than saving for tomorrow's security.
35. Often luck pays off better than hard work.
36. I like my close relationships to be passionate.
37. There will always be time to catch up on my work.

APPENDIX B**RISKY DRIVING SCALE OF THE HEALTH AND RISK QUESTIONNAIRE**

Using the scale below, indicate how often you engage in each of the following behaviors.

- 0 = Never
- 1 = Rarely
- 2 = Sometimes
- 3 = Often
- 4 = Always

- 1) Taking risks driving
- 2) Car racing
- 3) Speeding
- 4) Taking risks biking
- 5) Driving under the influence

APPENDIX C

DRIVER BEHAVIOR QUESTIONNAIRE (DBQ)

ORDINARY AND AGGRESSIVE VIOLATIONS SCALES

Instructions. Using the scale below, please rate how often you do each the following behaviors when driving. Please click on your corresponding answer.

Never	Hardly ever	Occasionally	Quite often	Frequently	Nearly all the time
A	B	C	D	E	F

1. Sound your horn to indicate your annoyance to another road user.
2. Pull into an intersection so far that the driver with right of way has to stop to let you move out of the way.
3. Disregard the speed limit on a residential road.
4. You get angry at the behavior of another driver and chase that driver so that you can give him/her a piece of your mind.
5. Stay in a lane that you know will be closed ahead until the last minute before forcing your way into another lane.
6. Become impatient with a slow driver in the left lane and pass on the right.
7. Get involved in spontaneous, or spur-of-the-moment, races with other drivers.
8. Drive very close to a car in front of you as a signal that they should go faster or get out of the way.
9. Pass through an intersection even though you know that the traffic light has turned yellow and may go red.
10. Have a strong dislike of a particular type of driver, and indicate your dislike by any means that you can.
11. Ignore speed limits late at night or very early in the morning.
12. Drive even though you realize that your blood alcohol may be over the legal limit.

APPENDIX D

POSITIVE DRIVER BEHAVIORS SCALE

Instructions. Using the scale below, please rate how often you do each the following behaviors when driving. Please click on your corresponding answer.

Never	Hardly ever	Occasionally	Quite often	Frequently	Nearly all the time
A	B	C	D	E	F

1. Avoid close following (tailgating) so you do not disturb the driver in front of you.
2. Less frequently use high beam lights so you do not obstruct the vision of an oncoming driver.
3. Park your car within parking space lines without crossing over into another space.
4. Pay attention to puddles so you do not splash water on pedestrians or other road users.
5. Slow down or maintain speed to help a driver who is passing you.
6. Not sounding your horn to avoid noise.
7. Move over to the right lane to allow a vehicle to pass you.
8. Avoid using the left lane to facilitate the speed of traffic flow.
9. Stop to let pedestrians cross in front of you even if it is your right to keep going.
10. Thank another driver who helped you by waving your hand.
11. Do your best not to be an obstacle for other drivers.
12. Not sounding your horn to disturb the driver in front who has not started moving at a green light.
13. Give your right of way to other drivers.

APPENDIX E

DRIVING ANGER EXPRESSION INVENTORY

Everyone feels angry or furious from time to time *when driving*, but people differ in the ways that they react when they are angry *while driving*. A number of statements are listed below which people have used to describe their reactions when they feel *angry* or *furious*. Read each statement and then click on the appropriate statement indicating how *often* you *generally* react or behave in the manner described *when you are angry or furious while driving*. There are no right or wrong answers. Do not spend too much time on any one statement.

Almost never	Occasionally	Sometimes	Almost always
<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>

Verbal aggressive expression

1. I call the other driver names aloud.
2. I make negative comments about the other driver aloud.
3. I yell questions like "Where did you get your license?"
4. I swear at the other driver aloud.
5. I yell at the other driver.
6. I call the other driver names under my breath.
7. I swear at the other driver under my breath.
8. I make negative comments about the other driver under my breath.
9. I glare at the other driver.
10. I shake my head at the other driver.
11. I give the other driver dirty looks.
12. I think things like "Where did you get your license?"

Personal physical aggressive expression

13. I try to get out of the car and tell the other driver off.
14. I try to force the other driver to the side of the road.
15. I try to get out of the car and have a physical fight with the other driver.
16. I give the other driver the finger.
17. I roll down the window to help communicate my anger.
18. I shake my fist at the other driver.

19. I try to scare the other driver.
20. I bump the other driver's bumper with mine.
21. I make hostile gestures other than giving the finger.
22. I go crazy behind the wheel.
23. I stick my tongue out at the other driver.

Use of vehicle to express anger

24. I drive right up on the other driver's bumper.
25. I drive a little faster than I was.
26. I try to cut in front of the other driver.
27. I follow right behind the other driver for a long time.
28. I speed up to frustrate the other driver.
29. I flash my lights at the other driver.
30. I purposely block the other driver from doing what he/she wants to go.
31. I do to other drivers what they did to me.
32. I drive a lot faster than I was.
33. I slow down to frustrate the other driver.
34. I leave my lights on in the other driver's rear view mirror.

Displaced aggression

35. I yell at the people who are riding with me.
36. I take my anger out on other people riding with me.
37. I don't let go and stay angry a long time.
38. I take my anger out on other people later on.

Adaptive/constructive expression

39. I pay even closer attention to being a safe driver.
40. I think things through before I respond.
41. I try to think of positive solutions to deal with the situation.
42. I try to think of positive things to do.
43. I pay even closer attention to other's driving to avoid accidents.
44. I tell myself it's not worth getting all mad about.
45. I decide not to stoop to their level.
46. I tell myself it's not worth getting involved in.
47. I just try to accept that there are bad drivers on the road.
48. I just try to accept that there are frustrating situations while driving.
49. I tell myself to ignore it.
50. I think about things that distract me from thinking about the other driver.
51. I turn on the radio or music to calm down.
52. I do things like take deep breaths to calm down.
53. I think about things that distract me from the frustration on the road.

APPENDIX F**ADULT STATUS MARKERS**

Using the 5 point scale shown below, indicate how much you agree or disagree with each of the following statements.

- 1 = Strongly disagree
- 2 = Disagree
- 3 = Neither disagree or agree
- 4 = Agree
- 5 = Strongly agree

- 1) I am ready for a serious relationship or marriage.
- 2) I have things I want to do before settling down. (reverse scored)
- 3) I consider myself a self-supporting adult.
- 4) My parents and I have the same religious beliefs.

APPENDIX G

ADULT STATUS CRITERIA

Using the scale shown below indicate the degree to which you believe you have achieved each task statement.

1 = No

2 = In some respects yes and in some respects no

3 = Yes

- 1) Financially independent from parents
- 2) No longer living in parents' household
- 3) Finished education
- 4) Married
- 5) Have at least one child
- 6) Settled into a long-term career
- 7) Purchased a house
- 8) Avoid becoming drunk
- 9) Avoid drunk driving
- 10) Avoid illegal drugs
- 11) Have no more than one sexual partner
- 12) Avoid committing petty crimes like vandalism and shoplifting
- 13) Drive safely and close to the speed limit
- 14) Avoid use of profanity/vulgar language
- 15) Use contraception if sexually active and not trying to conceive a child
- 16) Grown to full height
- 17) Biologically capable of bearing/fathering a child
- 18) Have obtained license and can drive a motor vehicle
- 19) Had sexual intercourse
- 20) Allowed to drink alcohol
- 21) Allowed to smoke cigarettes
- 22) Capable of supporting a family financially
- 23) Capable of caring for children
- 24) Capable of running a household
- 25) Capable of keeping family physically safe
- 26) Accept responsibility for the consequences of your actions
- 27) Established a relationship with parents as an equal adult
- 28) Learned to always to have good control of your emotions
- 29) Become less self-oriented, develop greater consideration for others

APPENDIX H**SENSATION SEEKING SCALE - FORM V**

Directions: Each of the items below contains two choices A and B. Please indicate 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 you dislike least. Do not leave any items blank. It is important you respond to all items with only one choice, A or B. We are interested only in your likes or feelings, 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 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 of the earthy body smells.
5. A. I get bored seeing the same old faces.
B. I like the 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 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 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, videos, or travel slides.
B. Looking at someone's home movies, videos, 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 surfboard riding.
B. I would not like to try surfboard riding.
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 persons who are physically exciting.
B. I like to date persons 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 flighty rich persons 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.

APPENDIX I

DRIVER ANGER SCALE (DAS)

For these questions, imagine that each situation described below is actually happening to you. Rate the amount of anger that you would feel based on the following scale and click on the corresponding amount.

no anger	a little anger	some anger	much anger	very much anger
A	B	C	D	E

1. Someone in front of you does not start up when the light turns green.
2. Someone is driving too fast for the road conditions.
3. A pedestrian walks slowly across the middle of the street slowing you.
4. Someone is driving too slowly in the passing lane holding up traffic.
5. Someone is driving right up on your back bumper.
6. Someone is weaving in and out of traffic.
7. Someone cuts in right in front of you on the freeway.
8. Someone cuts in and takes the parking spot you have been waiting for.
9. Someone is driving slower than reasonable for the traffic flow.
10. A slow vehicle on a mountain road will not pull over and let people by.
11. You see a police car watching traffic from a hidden position.
12. Someone backs right out in front of you without looking.
13. Someone runs a red light or stop sign.
14. Someone coming toward you does not dim their headlights at night.
15. At night someone is driving right behind you with bright lights on.

16. You pass a radar speed trap.
17. Someone speeds up when you try to pass them.
18. Someone is slow in parking and holding up traffic.
19. You are stuck in a traffic jam.
20. Someone pulls right in front of you when there is no one behind you.
21. Someone makes an obscene gesture towards you about your driving.
22. You hit a deep pothole that was not marked.
23. A police car is driving in traffic close to you.
24. Someone honks at you about your driving.
25. Someone is driving way over the speed limit.
26. You are driving behind a truck which has material flapping around in the back.
27. Someone yells at you about your driving.
28. A bicyclist is riding in the middle of the lane and slowing traffic.
29. A police officer pulls you over.
30. You are driving behind a vehicle that is smoking badly or giving off diesel fumes.
31. A truck kicks up sand or gravel on the car you are driving.
32. You are driving behind a large truck and you cannot see around it.
33. You encounter road construction and detours.

APPENDIX J**THE AGGRESSION QUESTIONNAIRE**

Using the 5 point scale shown below, indicate how uncharacteristic or characteristic each of the following statements is in describing you. Click on your corresponding rating.

- 1 = extremely uncharacteristic of me
- 2 = somewhat uncharacteristic of me
- 3 = neither uncharacteristic nor characteristic of me
- 4 = somewhat characteristic of me
- 5 = extremely characteristic of me

1. Some of my friends think I am a hothead.
2. If I have to resort to violence to protect my rights, I will.
3. When people are especially nice to me, I wonder what they want.
4. I tell my friends openly when I disagree with them.
5. I have become so mad that I have broken things.
6. I can't help getting into arguments when people disagree with me.
7. I wonder why sometimes I feel so bitter about things.
8. Once in a while, I can't control the urge to strike another person.
9. I am an even-tempered person.
10. I am suspicious of overly friendly strangers.
11. I have threatened people I know.
12. I flare up quickly but get over it quickly.
13. Given enough provocation, I may hit another person.
14. When people annoy me, I may tell them what I think of them.
15. I am sometimes eaten up with jealousy.
16. I can think of no good reason for ever hitting a person.
17. At times I feel I have gotten a raw deal out of life.
18. I have trouble controlling my temper.
19. When frustrated, I let my irritation show.
20. I sometimes feel that people are laughing at me behind my back.
21. I often find myself disagreeing with people.
22. If somebody hits me, I hit back.
23. I sometimes feel like a powder keg ready to explode.
24. Other people always seem to get the breaks.
25. There are people who pushed me so far that we came to blows.

26. I know that “friends” talk about me behind my back.
27. My friends say that I’m somewhat argumentative.
28. Sometimes I fly off the handle for no good reason.
29. I get into fights a little more than the average person.

APPENDIX K
DEMOGRAPHICS

Instructions. Please indicate your response by clicking on your answer.

1. What is your gender?
A. Male B. Female
2. How would you describe your race?
A. White
B. Black
C. Alaskan Native/Native American
D. Hispanic
E. Asian
F. Multi-racial
G. Other
3. How old are you?
Type in appropriate response.
4. What is your current academic standing in college?
A. Freshman B. Sophomore C. Junior D. Senior
E. Graduate F. Not in college
5. How often do you drive a motor vehicle on a *weekly* basis?
A. every day B. 3-5 times a week C. once or twice a week
D. rarely drive E. I do not drive
6. Approximately how many miles *per week* do you drive?
A. 0 miles B. 1-24 miles C. 25-49 miles
D. 50-99 miles E. 100-199 miles F. 200-299 miles
G. 300 miles or more
7. How many years of driving experience do you have?
Type in appropriate response.
8. Do you have a valid, current driver's license?
A. Yes B. No
9. What type of vehicle do you drive most often?
A. passenger car B. mini-van C. SUV
D. pickup truck E. motorcycle F. other
10. Are you the primary owner of your vehicle? That is, are you responsible for its payments, insurance, title?

A. Yes B. No

11. Have you ever received a ticket for a driving violation?

A. Yes B. No

12. Have you ever been involved in a traffic crash?

A. Yes B. No

13. Were you raised in a one parent home or a two parent home?

A. One parent B. Two parent
C. Two parent with one being a step parent D. Other

14. How often do you wear your safety belt when riding in a vehicle?

A. Always B. Most of the time C. Sometimes
D. Usually don't E. Never

15. Are you a parent?

A. Yes B. No

16. What is your relationship status?

A. Single B. In a relationship C. Engaged D. Married E. Other

17. Do you have a job?

A. Yes B. No

18. Are you employed?

A. Full-time B. Part-time C. No

19. Are you financially independent of your parents/guardian?

A. Yes B. No

APPENDIX L

INFORMATION PAGE

Old Dominion University
College of Sciences
Department of Psychology

Project Title: Project Time (Web-based survey)

Introduction: The purposes of this form are to give you information that may affect your decision whether to say YES or NO to participation in this research, and to record the consent of those who say YES.

Researchers: Bryan E. Porter, Ph.D. (Faculty Advisor; Psychology Department)

Kristie Johnson, M.S. (Graduate Student; Psychology Department)

Description of Research: Several studies have been conducted looking into the how an individual's perspective of time influences subsequent behaviors. None of them have adequately explained how an individual's time perspective influences driving behaviors. This study requires you to fill out several measures concerning perceptions about and self-reported actions involving behaviors while driving and your time management.

If you decide to participate, then you will join a study involving completion of a series of questionnaires administered on the Internet. If you say YES, then your participation will last for 30-60 minutes. The study may be taken and completed on any computer with Internet access. Approximately 300 other individuals will be participating in this study.

Exclusionary Criteria: You must be between the ages of 18 and 30 and have a valid driver's license.

Risks and Benefits:

RISKS: There are very few risks to completing this questionnaire. If you decide to participate in this study, then you may face a risk of experiencing a sense of increased self-awareness regarding your behaviors. The researcher has tried to reduce these risks by keeping all information obtained anonymous. And, as with any research, there is some possibility that you may be subject to risks that have not yet been identified.

BENEFITS: The main benefit to you for participating in this study is that you may also find the questionnaire interesting and you may learn something about yourself in the process. Also, by taking part in this research, you are creating benefits for the researchers as they continue to learn about the different attitudes and behaviors regarding the influence of time perspective on driving behaviors.

Costs and Payments: If you decide to participate in this study and are an Old Dominion University student, you will receive 1 Psychology Department research credit that may be applied to course requirements or extra credit in certain Psychology courses. Equivalent credit may be obtained in other ways. You do not have to participate in this study, or any Psychology Department study, in order to obtain this credit. Non-students will not receive compensation for participating.

New Information: If the researchers find new information during this study that would reasonably change your decision about participating, then they will give it to you.

Anonymity: Your name will not be recorded in connection with the questionnaire you complete. Therefore, your name will not be associated with your responses. Your responses will be completely **anonymous**. All responses will be coded with a number to keep them together, but this number cannot be traced back to you. The results of this

study may be used in reports, presentations and publications, but the researcher will not identify you. You will be asked to provide your SONA identification number during the survey. This research is one of several being conducted by the Behavioral Psychology Research and Analysis Team and your unique SONA id number may be used to link your responses to other driving behavior studies in which you may participate. Even if your response information is linked, your survey responses will remain anonymous and will never be linked with your name.

Withdrawal Privilege: It is OK for you to say NO. Even if you say YES now, you are free to say NO later, and walk away or withdraw from the study - at any time. Your decision will not affect your relationship with Old Dominion University, or otherwise cause a loss of benefits to which you might otherwise be entitled. You may also refuse to answer any question that makes you feel uncomfortable.

Compensation for Illness and Injury: If you say YES, then your consent in this document does not waive any of your legal rights. However, in the event of any problems arising from this study, neither Old Dominion University nor the researchers are able to give you any money, insurance coverage, free medical care, or any other compensation for such injury. In the event that you suffer injury as a result of participation in this research project, you may contact Kristie Johnson or Dr. Bryan E. Porter at 757-683-4458 or Dr. George Maihafer, the current IRB chair, at 757-683-4520 at Old Dominion University, who will be glad to review the matter with you.

Voluntary Consent: By continuing with this survey and clicking on the NEXT button, you are saying several things. You are saying that you have read this page or have had it read to you, that you are satisfied that you understand this page, the research study, and

its risks and benefits. If you have any questions, then the researchers should be able to answer them: Kristie Johnson or Dr. Bryan E. Porter at 757-683-4458

If at any time you feel pressured to participate, or if you have any questions about your rights or this form, then you should call Dr. George Maihafer, the current IRB chair, at 757-683-4520, or the Old Dominion University Office of Research, at 757-683-3460.

And importantly, by clicking the NEXT button, you are telling the researcher YES, that you agree to participate in this study.

Primary Investigator: Dr. Bryan E. Porter; 757-683-4458; bporter@odu.edu

VITA

DEGREES:

- | | |
|------|--|
| 1996 | Bachelor of Arts in Psychology and Biology (Double Major), May 1996
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BOOK CHAPTERS:

- Porter, B. E., Luckett, S., & Martinez, K. L. H. (2008). The relationship between red light running and traffic volume: A research brief. In F. N. Gustavsson (Ed.), *New Transportation Research Progress* (pp. 169-180). New York: Nova Science Publishers, Inc.
- Porter, B. E., Johnson, K. L., & Berry, T. D. (2011). A community-based program to reduce tailgating behavior. In D. Hennessey (Ed.), *Traffic psychology: An international perspective*. New York: Nova Science Publishers, Inc.
- Berry, T, Johnson, K.L., & Porter, B.E. (2011). Speed(ing): A quality control approach. In B. Porter (Ed.), *Handbook of Traffic Psychology*. Waltham, MA: Academic Press.

PAPERS:

- Hebert Martinez, K. L., & Porter, B. E. (2004). The likelihood of becoming a pedestrian fatality and drivers' knowledge of pedestrian rights and responsibilities in the Commonwealth of Virginia. *Transportation Research Part F: Traffic Psychology and Behaviour*, 7(1), 43-58.
- Martinez, K. L. H., & Porter, B. E. (2006). Characterizing red light runners following implementation of a photo enforcement program. *Accident Analysis & Prevention*, 38(5), 862-870.

SELECT TECHNICAL REPORTS:

- Porter, B. E., Martinez, K. L. H., Dozier, J. E., & Braitman, A. L. (2009). *2009 seat belt use in Virginia: Final report*. Virginia Department of Motor Vehicles. (No project number; Final Report; 43 pages; four references cited in text).
- Porter, B. E., Johnson, K. L., Dozier, J. E., & Murphy, E. M. (2010). *2010 seat belt use in Virginia: Final report*. Virginia Department of Motor Vehicles. (No project number; Final Report; 44 pages; four references cited in text).