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Anger Rumination, Stress, and Dangerous Driving Behaviors as Mediators of the Relationship between Multiple Dimensions of Forgiveness and Adverse Driving Outcomes

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by

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ABSTRACT

Anger Rumination, Stress, and Dangerous Driving Behaviors, as Mediators of the Relationship between Multiple Dimensions of Forgiveness and Adverse Driving Outcomes

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Motor-Vehicle crashes are the leading cause of death for teens and young adults. Research and public interventions have primarily examined the impact of external factors related to driving; however, less work has examined internal factors. Limited research has shown a negative association between trait forgiveness of others and both driving anger and driving aggression. The current study replicates previous findings and expands to include multiple dimensions of forgiveness and adverse driving outcomes as a dependent variable. It was predicted that multiple dimensions of forgiveness would be directly and indirectly related to adverse driving outcomes through the mediators of anger rumination, stress, and dangerous driving. Undergraduate students (N=759) at a regional university completed a series of self-report questionnaires online examining driving anger, driving aggression, multiple dimensions of forgiveness, adverse driving outcomes, anger rumination, stress, and dangerous driving behaviors. Hierarchical multiple regression analyses were used to replicate previous findings (analysis 1) and multiple serial mediations as expansion (analysis 2). In replication, trait forgiveness of others was shown to have a negative bivariate correlation with driving anger and driving aggression and to be a significant predictor of driving aggression above that of driving anger (analysis 1). Multiple serial mediation demonstrated an indirect only effect of multiple dimensions of forgiveness on adverse driving outcomes through the various mediators (analysis 2); however, varied relationships were observed. As a result, forgiveness of self and of uncontrollable situations

demonstrated a significant *negative* effect on adverse driving outcomes through the various mediators. However, although, forgiveness of others was found to have a significant *negative* effect through anger rumination and dangerous driving behaviors in serial, it demonstrated a *positive* effect with stress as a mediator. The results support and replicate previous research and demonstrate a significant indirect only effect of multiple dimensions of forgiveness on adverse driving outcomes through the current mediators. The relationships were varied, however. Therefore, multiple dimensions of forgiveness continue to be meaningful variables related to driving anger, driving aggression, and adverse driving outcomes.

DEDICATION

To Amber and Dylan, for your unending love and support, my life, my reason

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CHAPTER 1

INTRODUCTION

Motor-vehicle crashes (MVC) are a significant concern for the health and safety of people worldwide (World Health Organization, 2009). In 2012 more than 33,000 deaths and more than 2.5 million people seen for emergency room visits were attributed to MVC's in the United States alone (CDC, 2014a; NHTSA, 2013). In 2012 the financial cost of medical treatment and loss of productivity related to MVC's in the United States was estimated to be in excess of $80 billion (CDC, 2014b). Young people ages 15-24 are at a significantly elevated risk to be involved in or die as a result of a motor-vehicle crash. More alarming is the fact that MVCs are the leading cause of death for individuals ages 3-34 (NAHIC, 2007; NHTSA, 2009a; West & Naumann, 2011). Therefore, although undergraduate students are often considered a sample of convenience, for this study they serve as the population of interest. Several factors place young people at an elevated risk for crash-related injuries such as inexperience (Kass, Cole, & Stanny, 2007), increased risky driving behaviors (Rhodes & Pivik, 2011), and distracted driving (Wilson & Simpson, 2010). Human error has been found to account for approximately 90% of all MVC's (USDT, 2009). In addition, because of the complexity of driving several factors have been positively correlated with automobile crashes including weather conditions (Andrey, Mills, Leahy, & Suggett, 2003), low-light conditions (Plainis & Murray, 2002), mobile phone use (hand-held and hands-free) (Horrey & Wickens, 2006), text messaging while driving (Drews, Yazdani, Godfrey, Cooper, & Strayer, 2009; Owens, McLaughlin, & Sudweeks, 2011), and aggressive driving (Chliaoutakis et al. 2002). The majority of research and public interventions have focused on decreasing the potential impact of external factors (i.e., in-vehicle sources such as mobile phone use) through improved automobile safety (Robertson, 1996), passing laws that

restrict cell-phone use while driving (Ibrahim, Anderson, Burris, & Wagenaar, 2011) and public health campaigns targeted at decreasing alcohol/substance impaired driving (Ditter et al., 2005). For example, federal standards and non-required changes in motor-vehicle crashworthiness (e.g., airbags, seat belts, collision warning) have been shown to be successful in decreasing adverse driving outcomes (Heaps, 2010). However, given the staggering numbers of MVC's, deaths, and injuries that still persist in the United States and other developed countries, it stands to reason that further empirical research is needed to examine the potential risk factors related to driving outcomes.

Using terminology defined by Posner (1980) both exogenous (i.e., external or outside the driver) and endogenous (i.e., internal or originating from driver's thoughts or cognitive activity) factors have been shown to be associated with serious motor vehicle crashes among adolescent drivers (e.g., Curry, Hafetz, Kallan, Winston, & Durbin, 2011). However, the majority of research has focused on exogenous distractions related to driving (e.g., mobile phone use, in-vehicle displays, and advertisement billboards), with less work published regarding the potential impact of endogenous distractions, such as being engaged in one's own thoughts and concerns while driving (Recarte & Nunes, 2000; 2003). According to Recarte and Nunes (2003), drivers presented with various mental tasks in a driving simulator showed significant impairments in detection, discrimination, and decision making, as compared to a control group. This lead Recarte and Nunes to suggest that endogenous distractions be considered equally as important to driving performance as exogenous distractions. Therefore, given that endogenous distractions are a common experience to most drivers (Recarte & Nunes, 2000) and increasing the mental workload through mental tasks decreases driving performance (Recarte & Nunes, 2003), it seems

logical that decreasing endogenous distractions while driving could have positive implications for driving behaviors and subsequent outcomes.

Forgiveness is one way in which endogenous distractions while driving may be ameliorated (Moore & Dahlen, 2008). Forgiveness, as an inter- and intra-personal process, has been shown to be directly and indirectly related (i.e., mediated by social support, interpersonal functioning, and health behaviors) to health-related outcomes (Toussaint, Worthington, & Williams, 2014; see also Webb, Toussaint, & Conway-Williams, 2012; Worthington, Berry, & Parrott, 2001). Working within the theory of forgiveness and health (Figure 1) proposed by Worthington et al. (2001), it seems likely that forgiveness would be associated with driving outcomes directly and indirectly through various mediators (i.e., increased health behaviors or decreased health-risk behaviors).

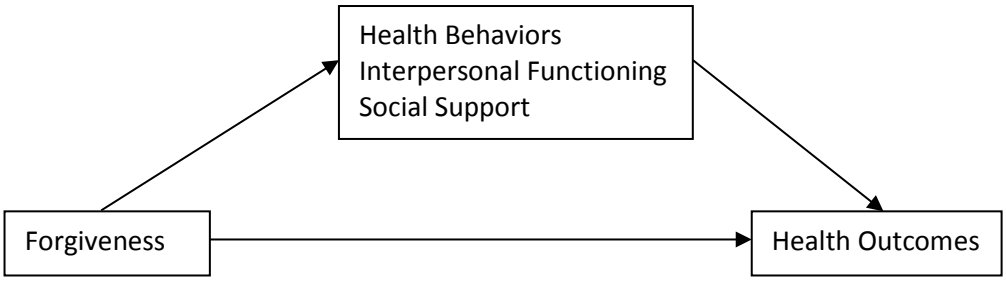


Figure 1. Forgiveness-Mediators-Health Outcomes Worthington et al. (2001)

However, to date (i.e., 11/04/2014) only three empirical studies have been published examining the relationship between forgiveness and adverse driving outcomes or behaviors (i.e., Moore & Dahlen, 2008; Kovácsová, Rošková, & Lajunen, 2014; and Takaku, 2006). Furthermore, only Moore and Dahlen (2008) and Kovácsová, Rošková, and Lajunen (2014) have measured

forgiveness as an independent variable related to driving-related variables. Initial work by Moore and Dahlen (2008) demonstrated a significant inverse relationship between forgiveness of others and both anger expression while driving and aggressive driving behaviors. Most recently, Kovácsová et al. (2014) reported that although trait forgiveness (i.e., of others) was found to be negatively related to anger and hostility it was not found to be a significant predictor of driver aggressive behavior. Furthermore, the relationship between trait forgiveness and aggressive behaviors while driving was fully mediated by anger. Regarding future research, Moore and Dahlen (2008) suggested that research should expand on these findings to include the use of driving simulations, broader age range, regular driving logs, and examination of driving outcomes (i.e., crashes, traffic violations). Therefore, the main aim of the present study was to examine the relationship between multiple dimensions of forgiveness as related to driving outcomes, through the mediators of anger rumination, stress, and dangerous driving behaviors.

Definition and Historical Context of Forgiveness

For thousands of years the concept of forgiveness has been regarded as a core component of all major world religions (monotheistic and polytheistic) as well as espoused by philosophers as a moral virtue (Rye et al., 2000). The psychotherapeutic use of forgiveness has been anecdotally described in the context of: anger and depression (Fitzgibbons, 1986); adults who experienced physical or mental abuse or neglect as children (Hope, 1987); and fractured marital relationships (Worthington & Diblasio, 1990), for example. However, it wasn't until the last 20+ years that the empirical investigation of forgiveness began to take hold. Within that timeframe the empirical study of forgiveness has grown to include developmental studies, the link between forgiveness and health-related outcomes, and intervention studies (Freedman & Chang, 2010). Defining and conceptualizing forgiveness, like many other constructs, has been a barrier to the

study and application of forgiveness. Although a unanimous definition, per se, has not been attained (Yee Ho & Fung, 2011) most researchers agree that forgiveness, particularly in the context of forgiveness of others, is a volitional or motivational coping strategy that develops over time in response to a transgression or transgressor (Toussaint & Webb, 2005). It is composed of both interpersonal and intrapersonal components (Lawler-Row, Scott, Raines, Edlis-Matityahou, & Moore, 2007). The process of forgiveness involves a shift in cognition, behavior, and affect (Enright 1996; Fehr, Gelfand, & Nag, 2010), can be considered as a situational (state) or dispositional (trait) variable, and is multi-dimensional (e.g., of others, self, and uncontrollable situations; by others and God). In contrast, forgiveness is not excusing, condoning, pardoning, or forgetting (Enright, 1996; Exline, Worthington, Hill, & McCullough, 2003).

The majority of forgiveness research has focused on forgiving another for a specific transgression with less work examining the other dimensions of forgiveness (Hall & Fincham, 2005; Jacinto & Edwards, 2011). However, other dimensions of forgiveness (e.g., forgiveness of self, forgiveness of uncontrollable situations, and feeling forgiven by God) have also been found to account for unique variance regarding psychological well-being (Thompson et al., 2005). Health-related outcome variables have been found to correlate differently based on the specific dimension of forgiveness being studied (e.g., Svalina & Webb, 2012; Webb, Robinson, & Brower, 2009, 2011). For example, in the context of alcohol treatment forgiveness of self may be the most consistently important dimension of forgiveness related to alcohol-related concerns (Webb, Robinson, & Brower, 2009, 2011). Furthermore, Webb et al. (2009; 2011) demonstrated that depending on the sample studied forgiveness of others and/or feeling forgiven by God may also be important. Therefore, the relationship between forgiveness and health appears to be a complex and nuanced relationship that requires qualification based on dimension of forgiveness

and aspect of health under consideration (Webb & Brewer, 2010). Furthermore, similar to health, it may be best described as a latent variable; that is, a construct derived from a variety of otherwise broadly related variables (Thoresen, Luskin, & Harris, 1998).

Direct Effects of Forgiveness on Health-related Outcomes

Over the last 20+ years, research examining the relationship between forgiveness and health has shown significant salutary relationships between one's level of forgiveness and health-related outcomes (Toussaint et al., (2014); see also Webb, Toussaint, & Conway-Williams, 2012 for review).Forgiveness, as an emotion-focused coping strategy (Worthington & Scherer, 2004), has been theorized to directly impact health through the "contamination or prevention of *unforgiving* emotions by experiencing strong, positive, love-based emotions as one recalls a transgression" (Worthington et al., 2001, p. 109). *Unforgiveness*, according to Worthington and Wade (1999), is conceptualized as a cluster of negative emotions (i.e. resentment, bitterness, hatred, hostility, residual anger, and fear) experienced after rumination on a perceived wrong done toward another, the self, or a higher power. Rumination on the offense, its consequences, reactions to it, and/or motives is considered a prerequisite for unforgiveness (Worthington et al., 2001). That is, without rumination on an offense unforgiveness may not be relevant. In addition, although forgiveness may work to decrease unforgiveness it may also work to increase positive affect, which has been shown to be positively correlated with better health outcomes (see Cohen and Pressman, 2006). Importantly, forgiveness is only one way among many (e.g., pursuing justice, resolving conflicts, denying responses to offense associated with unforgiveness, projecting blame, etc.) to reduce the negative health effects associated with unforgiveness (Worthington et al., 2001). Therefore, forgiveness is theorized to have a direct effect on health

through the reduction of negative unforgiving emotions as well as the potential to increase positive affect.

Empirical Support for the Direct Effects of Forgiveness on Health

Empirical support suggests that the direct connection between (un) forgiveness and health is greatest in those that are chronically unforgiving or have a disposition toward forgivingness (Worthington et al., 2001). Similarly to other chronic stress conditions, chronic (un)forgiveness is thought to act through a hyper-arousal stress response (Harris & Thoresen, 2005). On a physiological level, unforgiveness as well as its core components (e.g., anger, hostility, stress, and rumination) have been shown to be positively correlated with sympathetic nervous system arousal, facial tension, skin conductance, and cardiovascular reactivity (e.g., Lawler et al., 2003; Witvliet, Ludwig, & Vander Laan, 2001). In sum, research supports the hypothesis that forgiveness is directly related to health outcomes based on its relationship with the process of (un)forgiveness, reductions in physiological reactivity, and increases in positive affect. As a result, it stands to reason that multiple dimensions of forgiveness would have a direct effect on adverse driving outcomes (i.e., MVC's and traffic violations), conceptualized as health outcomes.

Adverse Driving Outcomes as a Health Outcome

Driving, to an experienced driver, is a skill that develops almost to the point of being automatic (Ma & Kaber, 2007). However, driving is a dynamic process that requires the continuous coordination of multiple perceptual, cognitive, and muscular systems (Ma & Kaber, 2007; Soliman & Mathna, 2009). The dynamic nature of the environment requires the driver to continuously perceive, comprehend, and project to future status (Endsley, 1995). Human errors, which account for 90% of MVC's, can occur and lead to injury, paralysis, monetary damage, or

death. The World Health Organization (WHO; 2009) reported that worldwide over 1.2 million people die each year in MVCs and an estimated 20-50 million people suffer non-fatal injuries, thus deeming *road traffic injuries* as a "global health and development problem" (p. iv). In the event of a fatal crash, a motor vehicle crash can be labeled as an "ultimate" health outcome (Blachman & Abrams, 2008; Elder et al., 2010; Wagenaar, Erickson, Harwood, & O'Malley, 2006). Non-fatal crashes may also have a direct effect on the victim's physical and psychological health (e.g., functional impairment and disability), may decrease quality of life, and indirectly affect family members and society at large (Cobiac, Vox, Doran, & Wallace, 2009; Shope & Bingham, 2008). In addition, traffic violations and/or citations are regularly included as a measure of adverse driving outcomes (e.g., Emerson, Johnson, Dawson, Uc, Anderson, & Rizzo, 2012) and may subsequently have a direct and indirect effect on the physical, mental, or social well-being of the driver and society at large. Therefore, according to the definition of health proposed by the WHO, as "a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity" (WHO, 1948, p. 100), and the significant health implications of automobile crashes and traffic violations, we propose that these adverse driving outcomes be defined as a health outcome. Furthermore, defining adverse driving outcomes as a health outcome allows for the relationship between forgiveness and adverse driving outcomes to be tested within the model proposed by Worthington et al. (2001).

Indirect Effects of Forgiveness on Health

In addition to direct effects of forgiveness on health, Worthington et al. (2001) proposed that increases in forgiveness and/or decreases in unforgiveness may have an indirect effect on health through various mediators. According to their model, Worthington et al. suggest that forgiveness and other warmth-based emotions (i.e. gratitude, empathy, humility, and love) may

be linked to better interpersonal functioning, a wider and more fulfilling social network, the fostering and maintenance of successful marriages, and increases in positive health behaviors (e.g., quitting smoking, decreased alcohol consumption). Empirical research has shown support for this original hypothesis as well as extending this model to other potential mediators (e.g., Lawler et al., 2005; Webb, Hirsch, Visser, & Brewer, 2013; Webb et al., 2011). For example, Lawler et al. (2005) found that the relationship between state and trait forgiveness of others and physical health was mediated (fully or partially) by spirituality, social skills, negative affect, and/or stress. Webb et al. (2011) found that mental health mediated the relationship between forgiveness and alcohol-related problems. Webb et al. (2013) found each of the mediators proposed by Worthington et al. (i.e., interpersonal functioning, social support, and health behavior) to play a role in physical and mental health-related outcomes. Therefore, various factors appear to partially or fully mediate the relationship between multiple dimensions of forgiveness and health-related outcomes.

Health Behaviors as a Mediator of the Forgiveness-Health Relationship

In general, health behaviors have been the focus of a growing body of interdisciplinary research (Gochman, 1997). Furthermore, they have been examined as a mediating factor between psychological/social determinants and health outcomes (Gochman, 1997). For example, health behaviors have been found to mediate the relationship between childhood personality traits and adult health outcomes (Hampson, Goldberg, Vogt, & Dubanoski, 2006); hostility and increased risk for coronary heart disease and other life-threatening illnesses (Smith, 1992); socioeconomic position and body mass index (Borodulin, Zimmer, Sippola, Makinen, Laatikainen, & Prattala, 2012); and depression and inflammation (Duivis, de Jong, Penninx, Na, Cohen, & Whooley, 2011). According to Gochman (1982), health behavior is defined as:

> "those personal attributes such as beliefs, expectations, motives, values, perceptions, and other cognitive elements; personality characteristics, including affective and emotional states and traits; and overt behavior patterns, actions and habits that relate to health maintenance, to health restoration, and to health improvement" (p. 169).

In this model, *behavior* is "something that people do or refrain from doing, although not always consciously or voluntarily" (Gochman, 1997, p. 3). Therefore, numerous psychological and social factors may have an indirect effect on health through their influence on health behaviors.

Specifically, health behaviors have been suggested as a distinct mediator through which forgiveness is associated with health (Toussaint & Webb, 2005; Worthington et al. 2001; Worthington & Scherer, 2004). Empirical research supports the mediating role of health behaviors in the connection between dimensions of forgiveness and mental/physical health (e.g., Lawler-Row & Piferi, 2006; Webb et al., 2013). For example, in a study of older adults, the connection between trait forgiveness of others and health (i.e. physical and mental) was mediated (either partially or fully) by health behaviors (Lawler-Row & Piferi, 2006). In addition, the mediating role of health behaviors appears to depend on the dimension of forgiveness and aspect of health under consideration (Svalina & Webb, 2012; Webb et al., 2013*)*. For example, among people attending outpatient physical therapy for various concerns, only forgiveness of self was found to be related to better physical health through its association with health behaviors (Svalina & Webb, 2012). Similarly, Webb et al. (2013*)* found, in a sample of undergraduate students from rural Southern Appalachia (N=363), that forgiveness of self and forgiveness of others was associated with somatic complaints and mental health status through health behaviors, yet was only associated with physical health status through social support. One hypothesis for the association of forgiveness on health behaviors is that forgiveness may free up cognitive,

behavioral, and emotional resources/energy to more actively engage in health promoting behaviors (Temoshok & Chandra, 2000; Temoshok & Wald, 2005; Webb et al., 2013). In sum, the relationship between forgiveness and health behaviors has been found to be positively correlated with health behaviors; however, is nuanced depending on dimension of forgiveness under consideration, .and therefore, may have implications for driving behaviors.

Dangerous Driving as a Health-risk Behavior

Definition of dangerous driving. Several terms (i.e., reckless driving, risky driving, aggressive driving, and road rage) have been used to describe and define adverse driving behaviors. For example, Dula and Gellar (2003) found that the terms "aggressive driving" and "road rage" had been used by laypersons and researchers "sometimes synonymously and sometimes disparately" (p. 559). They stated that there was considerable overlap and confusion between variables which may have led to confounding within and between variables (Dula & Gellar, 2003). Furthermore, Dula and Ballard (2003) suggest that the term "aggressive driving" had been used in the literature base to define three distinct constructs namely: 1) intentional acts of physical, verbal, or gestures of aggression; 2) negative emotions (e.g., anger) while driving; and 3) risk taking behaviors. Therefore, in an attempt to clarify and operationally define adverse driving behaviors, Dula and Ballard (2003) proposed a three factor model they termed 'dangerous driving'. The construct of dangerous driving behaviors is comprised of aggressive driving, risky driving, and negative emotions while driving.

Aggressive driving. According to Dula and Ballard (2003), aggressive driving behaviors (AD) are defined as intentional acts of bodily and/or psychological aggression toward other drivers, passengers, and/or pedestrians. Some examples of aggressive driving include: screaming or yelling at another driver, using rude hand gestures, tailgating, and/or flashing the headlights

with intent of harming (physically or psychologically) another. Driving aggression, as broadly defined, has been found to be a contributing factor in approximately56% of all fatal crashes (AAA, 2009). It has been positively correlated with environmental/road conditions (Hennessy & Wiesenthal, 1999; Sansone & Sansone, 2010); age and gender (Shinar & Compton, 2004); psychological variables such as anger, anxiety, and boredom (Berdoulat, Vavassori, &Sastre, 2012; Dahlen, Martin, Ragan, & Kuhlman, 2005; Dula, Adams, Miesner, & Leonard, 2010); and personality characteristics such as sensation seeking and impulsivity (Dahlen, Edwards, Tubre, Zyphur, & Warren, 2012). Anger or negative emotions (e.g., frustration and rage) have been found to be only moderately correlated (r=.40) with driving aggression (Nesbit, Conger, and Conger, 2007). This finding suggests that aggressive driving can occur in the presence or absence of anger and vice versa. For example, a driver may derive pleasure from harming or infringing on the rights of others and therefore, drive aggressively in the absence of anger. Conversely, anger may be experienced by a driver yet expressed in several alternative ways including being displaced or manifested in an adaptive/constructive manner (Deffenbacher, Lynch, Oetting, & Swaim, 2002). Therefore, according to Dula and Ballard (2003) aggressive driving is an intentional act of aggression toward another while driving whether in the presence of, or absence of anger.

Risky driving behaviors. Risky driving behaviors (RD) are defined as dangerous behaviors performed while driving without intent to harm self or others (Dula and Ballard, 2003). For example, using a cellular phone while driving, speeding, swerving in-and-out of traffic, or passing in a no-passing zone may be potentially dangerous behaviors, but are not considered aggressive in the absence of intent to harm. Risky driving behaviors can have significant economic and health costs. For example, speeding-related crashes alone account for

11,674 fatalities and $40 billion per year (NHTSA, 2008). In 2011 alone, cellular phone use while driving was found to be the most common driver distraction resulting in fatal crashes. More specifically, cellular phone use while driving accounted for 21% of distracted driver's ages 15-19 involved in a fatal crash. In response, many states have passed legislation restricting the use of hand-held mobile phones and/or texting while driving (Ibrahim, Anderson, Scott, Burris, & Wagenaar, 2011). However, research demonstrates significant deficits in driving performance for both hand-held and hands-free cellular phone usage (Strayer &Johnston, 2001). Furthermore, exogenous factors, such as using a cellular phone while driving, have been found to be positively correlated with additional risky driving behaviors such as increased speeding, tailgating, and/or running red lights (Morgan and Mannering, 2011; Weng & Meng, 2012). Therefore, risky driving behavior is a distinct, yet sometimes interrelated, construct from aggressive driving.

Negative emotions while driving. Negative emotions, thoughts about daily affairs, and concerns while driving, are experiences common to most all drivers (Recarte & Nunes, 2000). Negative emotions and thoughts experienced while driving may have a negative effect on driving performance by taxing attentional resources (Cai & Lin, 2011). According to Eysenck (1982), attention is "a general purpose limited capacity that can be flexibly allocated in many different ways in response to task demands" (p. 28). When attention is allocated inwardly due to verbal and spatial imagery tasks (Recarte & Nunes, 2000), negative emotions while driving (Cai & Lin, 2011), variations in situation awareness (Kass, Cole, & Stanny, 2007), and/or negative self-appraisal (Matthews et al., 1998) it leads to increased cognitive workload, decreased driving performance, and can lead to visual tunneling (Briggs, Hole, & Land, 2011). Negative emotions may be generated by stimuli directly related to the driving environment (e.g., anger at another driver for cutting you off) or indirectly related (e.g., cell-phone conversation, rumination over

recent break-up). In sum, negative emotions while driving (NE) that originate from driving or non-driving stimuli can be negatively associated with driving and therefore, are considered a dangerous driving behavior.

Defining dangerous driving as a health-risk behavior. Dangerous driving behaviors can pose a significant risk to the health and well-being of the individual and society at large. Dangerous driving behaviors (e.g., driving under the influence, aggressive driving, speeding, distracted driving, and/or mobile phone use while driving) have been shown to be negatively associated with driving performance and increase the risk of being involved in a MVC (Rhodes & Pivik, 2011). Due to the significant effect of dangerous driving behaviors on health outcomes, dangerous driving behaviors have been defined in the literature as a health-risk behavior (e.g., Blachman & Abrams, 2008; Delnevo, Abatermarco, & Gotsch, 1996). In addition, it conforms to the definition of health behavior proposed by Gochman (1997; see also Gochman, 1982, 1988) which defines health behavior as personal attributes, personality characteristics, affective/emotional states, and/or overt behavior patterns associated with health. 'Dangerous driving behaviors' conforms to this definition as an overt behavior pattern, action, or habit that relates to health maintenance. Furthermore, according to Gochman's definition of health behavior, negative emotions while driving, non-driving cognitions, and errors in attention could be defined as personal attributes that affect health maintenance. Therefore, this dissertation proposes that the definition of health-risk behavior, in the context of driving, be extended to include any behavior (i.e., overt or covert) that occurs while driving that subsequently affects health-related driving outcomes (i.e., MVCs and traffic violations), thus including dangerous driving behaviors as a health-risk behavior.

Relationship between Forgiveness, Dangerous Driving and Driving Outcomes

Direct effect of forgiveness on dangerous driving behaviors. Empirical support, outside the context of driving, suggests that interpersonal forgiveness is negatively correlated with trait anger (Carson et al., 2005; Gisi & Carl, 2000; Konstam, Chernoff, & Deveney, 2001) and aggressive behaviors (Eaton & Struthers, 2006; Webb, Dula, & Brewer, 2012). Based on these reports it stands to reason that the negative emotions related to (un)forgiveness may contribute to instances of aggressive and risky behaviors while driving and subsequently affect driving outcomes. Therefore, a literature search was conducted in November 2014 (PubMed and PsycINFO) with the keywords: "forgiveness" and "driving". Results from the search revealed a total of 8 possible articles (PubMed=5 articles; PsycINFO=8 articles) of which only three peer-reviewed articles (i.e., Takaku et al., 2006; Moore & Dahlen, 2008; and Kovácsová, Rošková, & Lajunen, 2014) explicitly examined the relationship between forgiveness and driving, and only two (Moore & Dahlen, 2008 and Kovácsová et al., 2014) examined forgiveness as an independent variable.

Specifically, Moore and Dahlen (2008) examined the link between trait tendency to forgive others (i.e., Trait Forgiveness Scale; TFS) and driving anger, driving anger expression, and aggressive driving behaviors using self-report measures. Bivariate correlations demonstrated an inverse relationship between the tendency to forgive others and driving anger, maladaptive forms of driving anger expression, risky driving, and aggressive driving as well as a positive correlation with adaptive/constructive driving anger expression. A hierarchical multiple regression analysis (i.e., sex, age, and weekly miles driven entered in step 1; driving anger entered in step 2; and tendency to forgive others and consideration of future consequences entered at step 3) indicated that the overall effect of tendency to forgive others and consideration

of future consequences was negatively correlated with aggressive driving behavior and driving anger expression above and beyond driving anger (" $R^2 = .05 - .09$, $p < .01$). More specifically, based on standardized regression coefficients trait forgiveness of others (TFS) was found to be a significant predictor of aggressive driving behavior ($^2 = -.18$, $p < .01$), physically aggressive expression ($^2 = -.18$, $p < .01$), vehicle for aggressive expression ($^2 = -.17$, $p < .01$), and verbally aggressive expression ($^2 = -.21$, $p < .01$). These findings support the utility of trait forgiveness of others as a predictor of aggressive driving behaviors.

More recently and post dissertation proposal (October 2012) Kovácsová et al. (2014) published an article examining the relationship between forgivingness (Trait Forgiveness Scale; Berry, Worthington, O'Connor, Parrott, & Wade, 2005), driving anger (Driving Anger Scale; Deffenbacher, Getting, & Lynch, 1994), driving aggression (Driving Anger Indicators Scale; Lajunen and Parker as cited in Kovácsová et al., 2014), hostility (New-Buss; Gidron, Davidson, & Ilia, 2001), and aggression (Buss Perry Aggression Questionnaire; Buss & Perry, 1992). Results from the study demonstrated a significant inverse correlation between trait forgiveness of others and hostility, general anger, driving anger, 'aggressive warnings' (e.g., flashing headlights), and 'hostile aggression and revenge' (e.g., ramming a vehicle), respectively. However, when a mediation analysis was conducted the relationship between trait forgiveness and 'aggressive warnings (self)' was fully mediated by a third variable namely driving anger. Therefore, suggesting that driving anger plays a meaningful role in the relationship between trait forgiveness of others and aggressive driving behaviors.

Multiple dimensions of forgiveness related to driving. To date, no published articles have examined the relationship between multiple dimensions of forgiveness (e.g., forgiveness of self; forgiveness of others; and forgiveness of uncontrollable situations) and driving. However, a

handful of studies have examined the relationship between multiple dimensions of forgiveness and driving-related constructs (e.g., aggression, rumination, and anger). Of particular interest to driving-related research, Webb, Dula, and Brewer (2012) found that forgiveness of others was the most critical dimension of forgiveness related to aggression in general but forgiveness of self played an equal role regarding hostility. Furthermore, Thompson et al. (2005) demonstrated negative bivariate correlations between multiple dimensions of forgiveness (i.e., of self, of others, and of uncontrollable situations) and trait anger, rumination, and negative affect, but only forgiveness of others and forgiveness of uncontrollable situations were negatively correlated with vengeance and hostile automatic thoughts. Due to the connection between forgiveness of self and forgiveness of uncontrollable situations to trait anger, rumination, negative affect, and hostility, it stands to reason that they may, in addition to forgiveness of others, have implications for driving behaviors and outcomes. Therefore, multiple dimensions of forgiveness were included for analysis in this dissertation.

Direct effect of dangerous driving on driving outcomes. In general, dangerous driving behaviors, as assessed by the Dula Dangerous Driving Index (DDDI), have been found to be positively correlated with self-reported number of traffic violations and causing MVCs (Dula & Ballard, 2003). More specifically, sub components of dangerous driving have been shown to negatively affect driving performance and/or driving outcomes. For example, aggressive driving has been found to affect driving performance and lead to adverse driving outcomes (e.g., Chliaoutakis et al. 2002; Dahlen et al., 2012). In addition, non-driving cognitive activities (e.g., negative emotions while driving) that divert attention away from driving may play a role in accentuating the effect of external or environmental factors such as a decreased ability to recognize and respond to hazardous situations (Johan & Dawson, 1987). For example, Dula,

Martin, Fox, and Leonard (2011) found that in a driving simulator participants engaged in a more emotional cell phone call emitted more dangerous driving behaviors than those in a mundane or no call condition. Furthermore, in a driving simulation an emotional cell-phone call was shown to be associated with driving performance for up to five minutes after hang-up (Redelmeier & Tibshirani, 1997). Therefore, dangerous driving behaviors (i.e., aggressive driving, risky driving, and negative emotions while driving) have been shown to collectively and independently be negatively associated with driver performance and driving outcomes during self-report and simulator-based studies.

Forgiveness, dangerous driving behaviors, and driving outcomes. In sum, multiple dimensions of forgiveness have been shown to be positively associated with health-related outcomes both directly and indirectly through mediators (e.g., social support, interpersonal functioning, and health behaviors). Driving is a potentially hazardous activity that can have short and long-term consequences and meets the definition of a health outcome. Dangerous driving behaviors have been shown to be positively correlated with MVCs and fatalities; therefore meeting the criteria for a health-risk behavior. Limited research by Moore and Dahlen (2008) and Kovácsová et al. (2014) demonstrated that forgiveness is positively correlated with anger, hostility, and aggressive driving behaviors. However, neither article examined the relationship between multiple dimensions of forgiveness and driving anger expression, nor did either include adverse driving outcomes (i.e., traffic violations, or MVCs). Therefore, more work is needed to examine the relationship between multiple dimensions of forgiveness and driving outcomes as mediated by the health-risk behavior, dangerous driving behaviors (Figure 2).

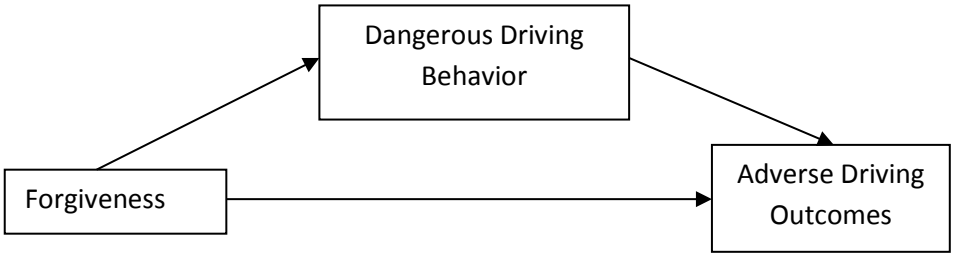


Figure 2. Forgiveness-Dangerous Driving Behavior-Driving Outcomes Model

Other Potential Mediators of the Forgiveness-Driving Outcome Relationship

As previously stated, multiple dimensions of forgiveness have been shown to be directly and indirectly related to health outcomes through various mediators. Of note, the aforementioned association of forgiveness with health may, in strict terms, be more accurately described as indirect in all cases rather than both direct and indirect. However, it may be that the particular associations among (un)forgiveness, stress, and rumination in the context of health are sufficiently intertwined, such that the depiction of a direct relationship may be conceptually useful (Toussaint & Webb, 2005). That is, constructs such as stress and rumination may operate hand in hand with the process of (un)forgiveness, whereas other more distinct variables may operate as *clear and distinct* mediators. In sum, empirical support has been demonstrated connecting multiple dimensions of forgiveness to health-related outcomes both directly and indirectly, but limited research has been conducted to parse out the relationship of forgiveness with stress and rumination. Therefore, this study aims to independently examine anger rumination and stress as mediators of the relationship between forgiveness and adverse driving outcomes.

Rumination as a Mediator

Definition and conceptualization of rumination. Rumination is defined as repetitive thoughts around a common theme (e.g., negative emotion, stressful event, traumatic experience) that are not based on current environmental demands (Smith & Alloy, 2009). Rumination is positively correlated with negative emotions and thought to serve as an experientially avoidant emotion regulation strategy (Alloy et al., 2000; Martin & Tesser, 1996; Smith & Alloy, 2009). For example, rumination, compared to re-appraisal, has been positively correlated with greater anger experience, more cognitive perseveration, and greater sympathetic nervous system activation (Ray, Wilhelm, & Gross, 2008). In addition, rumination has been shown to be positively correlated with blood pressure and inattention; found to interfere with executive processes; negatively correlated with task-switching speed (Campbell, Labelle, Bacon, Faris, & Carlson, 2012; Watkins & Brown, 2002; Whitmer & Gotlib, 2012); shown to interfere with task performance (Lyubomirsky, Kasri, & Zehm, 2003) and task switching (Yee Lo, Lau, Cheung, & Allen, 2012); and has been linked to depression and anxiety (e.g. Nepon, Flett, Hewitt, & Molnar, 2011; Starr & Davila, 2012). Therefore, rumination may have implications for dangerous driving behaviors; however, little work has been done examining the relationship between rumination and driving.

At the time of the dissertation proposal (October 2012), a review of the literature revealed only one study briefly theorizing about the connection between rumination and driving (Trick, Enns, Mills, & Vavrik, 2004), since then an additional study has been published examining this relationship (Suhr & Nesbit, 2013). Trick et al. referred to Matthews et al. (1998) which demonstrated that driver's high on negative self-appraisal tended to spend more time thinking about their driving performance (i.e., rumination) which was associated with driving

performance. More recently, Suhr and Nesbit (2013) published an article examining the role of trait rumination in the relationship between anger and aggressive driving behavior. Suhr and Nesbit (2013) found a significant positive correlation between anger rumination and driving anger, and self-reported driving aggression, respectively. Of note, no significant effect was found between general ruminative response styles and either driving anger or driving aggression, suggesting that *anger* rumination provides a specific effect. Further analysis revealed that the induction of anger rumination mediated the relationship between driving anger and driving aggression. However, when drivers were presented with a cognitive distraction task, anger rumination was no longer observed to mediate the relationship between driving anger and driving aggression. Therefore, Suhr and Nesbit (2013) demonstrated that anger rumination has a significant mediating effect on the relationship between driving anger and driving aggression and furthermore, anger rumination may affect the way drivers interpret and respond to driving situations (i.e., with or without aggression).

Forgiveness, rumination, and driving. A search of the literature base (PsycINFO, June 2014) revealed zero published articles examining the relationship between forgiveness and driving behaviors or outcomes as mediated by rumination. However, forgiveness, outside the context of driving, has been shown to be negatively correlated with rumination (Berry et al., 2005; Berry, Worthington, Parrott, O'Connor, & Wade, 2001). That is, higher levels of forgiveness of others have been shown to be correlated with lower levels of rumination. Recent findings by Suhr and Nesbit (2013) suggest that anger rumination is an important factor in the relationship between driving anger and aggressive driving expression. Therefore it stands to reason, though not yet empirically tested, that multiple dimensions of forgiveness would be associated with decreased anger rumination, which in turn, would be associated with decreased

driving aggression, and then with a decrease in adverse driving outcomes. Similarly, when a driver is ruminating on negative emotions in response to experiencing an offense (i.e., (un)forgiveness – whether in the moment of driving or otherwise) the resultant effect on driving may be attenuated by forgiveness.

Stress

Definition and conceptualization of stress. Stress, according to the transactional model of stress (Lazarus & Folkman, 1984), is derived from both the cognitive demands and appraisal of the situation and the coping mechanisms available to the individual. Driving has been shown to increase physiological arousal (e.g., mean heart rate, respiration) in both on-road and driving simulators and therefore, may be considered a 'stressful event' (Johnson et al., 2011). Stress while driving can be generated from conditions in the immediate driving environment such as road condition, traffic congestion, residence in a large metropolitan area, or as spill over from other non-driving life stressors, for example, recent relocation, job-related stressors, financial issues, and/or relationship problems (e.g. Norris, Matthews, Riad, 2000; Wickens & Wiesenthal, 2005). For example, in a community sample of Japanese workers, work-related stress was found to be associated with increased feelings of anger that was shown to carry over to driving (McLinton & Dollard, 2010). Stress related or unrelated to current driving environment, has been shown to be positively correlated with unsafe driving behaviors such as lapses in attention, errors in driving, and traffic violations (Westerman & Haigney, 2000); found to be positively correlated with crash involvement and/or severity (Rowden, Matthes, Watson, & Biggs, 2011); and has been shown to exacerbate pre-existing psychological conditions and characteristics such as anxiety and anger (e.g. Clapp et al., 2011; Mclinton & Dollard, 2010). Furthermore, cumulative stress history has been shown to be a predictor of the development of anxious driving behaviors

in individuals involved in MVCs (Clapp et al., 2011). Therefore, previous stress history and/or current stressors (i.e., driving and non-driving) may lead to increases in driving anxiety and driving anger as well as potentially affect driving performance.

Forgiveness, stress, and driving. A significant amount of work has been done on the relationship between stress and adverse driving (Rowden et al., 2011). That is, stress related or unrelated to the driving environment has been shown to be associated with driving performance and has been positively correlated with MVCs (e.g. Norris et al., 2000). However, no studies to date have examined the role of forgiveness as a potential factor in the stress-dangerous driving behaviors-driving outcome relationship. As with rumination, forgiveness has been demonstrated to be one way among many in which the stress associated with unforgiveness can be neutralized (Lawler et al., 2003; Witvliet et al., 2001). Therefore, it stands to reason that forgiveness may be a viable tool to decrease the stress (i.e. in the immediate driving environment or non-driving related stressors) associated with unforgiveness in the context of driving. In turn, less stress while driving may lead to a decrease in dangerous driving behaviors and subsequently a decrease in adverse driving outcomes.

Purpose and Hypotheses

The purpose of this dissertation was to first replicate the findings of Moore and Dahlen (2008) by demonstrating significant and predictive relationships between trait forgiveness and anger expression while driving, aggressive driving behaviors, and risky driving behaviors, respectively; and to further specify Moore and Dahlen's findings by excluding 'Consideration of Future Consequences' from the regression analyses, therefore isolating trait forgiveness of others.

Analysis 1: Hypotheses

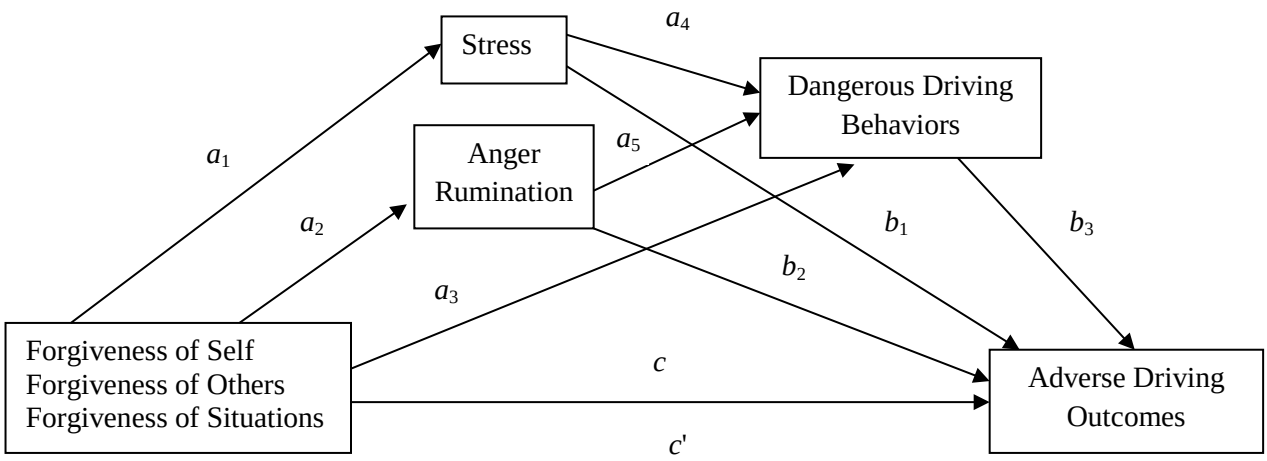
Hypothesis 1.1) Significant negative correlations would be found between trait forgiveness and driving anger and negative driving anger expression, respectively.

Hypothesis 1.2) A significant positive correlation would be revealed between trait forgiveness and the driving anger expression subscale-adaptive/constructive anger expression.

Hypothesis 1.3) A significant negative correlation would be found between trait forgiveness and the Dula Dangerous Driving Index Subscales-aggressive driving and risky driving.

Hypothesis 1.4) Based on hierarchical multiple regression, trait forgiveness would significantly account for the variance in negative anger expression, above and beyond that of age, gender, miles driven per week, and driving anger.

Second, this dissertation was conducted to extend the forgiveness-health model proposed by Worthington et al. (2001) to include driving outcomes as a health outcome and dangerous driving behaviors as a health-risk behavior, and to specifically examine the relationship between multiple dimensions of forgiveness and adverse driving outcomes, as mediated (i.e., serially) by anger rumination, stress, and dangerous driving behaviors (Figure 3).



a_1 = basic association of Forgiveness with Stress
a_2 = basic association of Forgiveness with Anger Rumination
a_3 = basic association of Forgiveness with Dangerous Driving Behaviors
a_4 = basic association of Stress with Dangerous Driving Behaviors
a_5 = basic association of Anger Rumination with Dangerous Driving Behaviors
b_1 = basic association of Stress with Adverse Driving Outcome
b_2 = basic association of Anger Rumination with Adverse Driving Outcome
b_3 = basic association of Dangerous Driving Behaviors with Adverse Driving Outcome

ab = total indirect effect
a_1b_1 = specific indirect effect of Forgiveness on Adverse Driving Outcome through Stress
a_2b_2 = specific indirect effect of Forgiveness on Adverse Driving Outcome through Anger Rumination
a_3b_3 = specific indirect effect of Forgiveness on Adverse Driving Outcome through Dangerous Driving Behaviors
$a_1a_4b_3$ = specific indirect effect of Forgiveness on Adverse Driving Outcome through Stress and Dangerous Driving Behaviors
$a_2a_5b_3$ = specific indirect effect of Forgiveness on Adverse Driving Outcome through Anger Rumination and Dangerous Driving Behaviors

c = total effect of Forgiveness with Adverse Driving Outcome, without accounting for any Mediators Variables
c' = direct effect of Forgiveness with Adverse Driving Outcome, after accounting for all Mediator Variables

Figure 3. A Model of the Association of Forgiveness with Adverse Driving Outcomes: Anger Rumination, Stress, and Dangerous Driving Behaviors as Mediators

Analysis 2: Hypotheses

Hypothesis 2.1) Multiple dimensions of dispositional forgiveness would be uniquely and significantly correlated with anger rumination, stress, dangerous driving behaviors, and adverse driving outcomes in an inverse fashion.

Hypothesis 2.2) Anger Rumination, Stress, and Dangerous Driving Behaviors would be

positively correlated, at a significance level of *p* d.05, with each other.

Hypothesis 2.3) Anger Rumination, Stress, and Dangerous Driving Behaviors would be positively correlated, at a significance level of *p* d.05, with self-reported adverse driving outcomes (i.e., traffic violations and MVC's) within the last 12 months and last 5 years.

Hypothesis 2.4a) The relationship between multiple dimensions of dispositional forgiveness and adverse driving outcomes would be fully or partially mediated by:

2.4a) anger rumination and dangerous driving behaviors, such that higher levels of forgiveness will be associated with lower levels of rumination which will in turn, be associated with lower levels of dangerous driving behaviors, which will then be associated with lower adverse driving outcomes.

2.4b) stress and dangerous driving behaviors, such that higher levels of forgiveness will be associated with lower levels of stress which will in turn be associated with lower levels of dangerous driving behaviors, which will then be associated with lower adverse driving outcomes.

Hypothesis 2.5) The relationship between forgiveness and driving-related outcomes, as mediated by rumination, stress, and dangerous driving behaviors, will be relatively different based on the dimensions of forgiveness and driving outcome under consideration. That is, the pattern of associations will not be identical for each dimension of forgiveness measured.

CHAPTER 2

METHODS

Procedures: Analysis 1 and 2

Permission to conduct this study was issued by the institutional review board (IRB) of East Tennessee State University prior to data collection. Cross-sectional data was collected from undergraduate students at a four-year regional university in eastern Tennessee; rural southern Appalachia. The students had the opportunity to participate in this study, among many, for course credit through a secure online survey system (SONA). While participation in the study was otherwise anonymous, respondents were registered to access their SONA account and were therefore, administered a unique identifying code number only accessible by the SONA accounts administrator. The participants completed the online survey as part of a larger group of questionnaires (item total = 359). No specific time restrictions were enacted on the completion of the questionnaire and students were allowed to withdraw from the study at any point without penalty. Appropriate course credit was issued to participants at the completion of the questionnaire packet via SONA.

In total, 759 participants completed the online questionnaire adequately enough to receive course credit. However, inspection of the responses given by the participants revealed potential errors. For example, some participants were found to respond in a repetitive fashion (i.e., selecting all 4's), to select "no response" (i.e., 99) for most or all of the questions, and to provide impossible answers (i.e., number of days driven per week = 19). In addition, multiple participants failed to and/or chose not to answer one or more individual items within a given scale. Therefore, with supervisory consultation, the decision was made to clean the data to attempt to retain as many participants as possible, while also minimizing error in the sample.

First, participant data was visually scanned for potential random responding as well as unrealistic or unreasonable responses, and these participants were removed from further analysis (N=712); Second, a statistical filter was used prior to further analyses to limit the sample to only those participants ages 18-24 (N=560).Third, individual mean substitution (Osborne, 2013; Widaman, 2006) was completed for each of the dissertation-related scales; such that, the mean of the nonmissing values was calculated for each scale, but only for those participants that had nonmissing values for at least half of the items on a scale (e.g., three out of six nonmissing values for each of the Heartland Forgiveness subscales and four out of seven nonmissing values on the DASS-21:stress subscale). Essentially this is identical to substituting the participant's mean score on the individual scale for the missing data, but only for those that completed at least half of the items (Widaman, 2006). Those that did not complete at least half of the items on all of the specific measures in analyses were excluded (analysis 1: N=492; analysis 2: N=476).

Analysis 1: Replication of Moore and Dahlen (2008)

Analysis 1: Participants

After initial cleaning and filtering of the data set, as described above, a total of 492 undergraduate students were included in the replication analysis (Table 1). The sample consisted of undergraduate students (i.e., 45% 1st year, 20% 2nd year, 19% 3rd year, and 16% 4th year) ages 18 to 24 (M = 19.78, SD = 1.66). The sample consisted of 67% female, 32% male, and <1% transgender. The ethnicity/race of the sample was primarily Caucasian/white (82%) with much lower percentages of African-American/black (6%), biracial-multiracial (5%), Hispanic American (3%), Asian American (1%), and American Indian (0.6%). The average time for completion of the questionnaire was 39.74 minutes (SD = 17.3) with a range from 8 to 129 minutes. Of note, the decision was made with supervisory consultation, not to exclude

participants based on time of completion. The participants reported driving an average of 9 hours per week (*M* = 9, *SD* = 11.73, *Range = 0 to 110)* and an average of 148 miles per week (*M* = 148, *SD* = 175.61, *Range = 0 to 2000).*

Table 1

Analysis 1: Demographic Information

Variable	Sample (*n* = 492)
Gender (*n*)	
Male	159
Female	330
Age	
M	19.78
SD	1.66
Year in College	
M	2.07
SD	1.13
Ethnicity (*n*)	
Caucasian	403
African American/Black	27
Hispanic American	14
Other	26
Years as a Licensed Driver	
M	3.97
SD	1.77
Hours a Week Driven	
M	8.94
SD	11.60
Miles per Week Driven	
M	148.61
SD	177.93

Analysis 1: Measures

Demographic and driving-related information. Demographic information relevant to the current study (e.g., miles driven per week, type of vehicle, and number of years as a licensed driver) was collected utilizing questions sampled from the Unsafe Driving Behaviors Questionnaire (NHTSA.doc.gov; Appendix A). Driving outcomes were assessed by asking participants to report the specific number of: MVC's in the last year/five years as the driver and those considered "at fault" and the number of traffic citations last year/five years (i.e. speeding, reckless driving, stop light/sign infractions, DWI/DUI, and other tickets). Having participants report the number of MVCs and/or traffic violations is a commonly used method to assess driving outcomes (e.g. Dula & Ballard, 2003; Fabiano et al., 2011; Fischer, Barkley, Smallish, & Fletcher, 2007; Lonczak, Neighbors, & Donovan, 2007). Further, a high level of accuracy (83% and 85%) has been observed between self-reported and police reported traffic violations and crashes, respectively (Boufous et al., 2010). Therefore, adverse driving outcomes were assessed using the participant's self-reported number of traffic violations and crashes within the last year and five years.

Trait Forgiveness of Others. The Trait Forgiveness Scale (Berry et al., 2005; Appendix B) is a 10-item subset of the 15-item Trait Forgiveness-unforgiveness Scale (Berry & Worthington, 2001). The Trait Forgiveness Scale (TFS) is aimed at assessing an individual's self-appraisal of his or her proneness to forgive others for interpersonal transgressions. Participants are asked to rate the degree to which they agree or disagree with the statements on a 5-point Likert scale ranging from "1 = Strongly Disagree" to "5 = Strongly Agree." Examples of the statements include "people close to me probably think I hold a grudge too long" and "I can usually forgive and forget an insult." The scale includes reserve scored items and higher scores

indicate higher trait forgiveness. In the pilot and follow-up studies (Berry et al., 2005) Cronbach•s alpha coefficients (±) ranged from .74 to .80 suggesting acceptable internal consistency. To test the validity of the measure Berry et al. administered the measure to romantic couples (N=54) to complete on themselves and their partner. Berry et al. found that the correlation between the self-ratings and the other ratings were statistically significant (r (51) = .35, $p<.01$). Furthermore, a moderate and statistically significant correlation was found between self-ratings on the TFS and the Transgression narrative Test of Forgiveness, which are considered to test the same construct (Berry et al., 2005). Similar to Berry et al. (2005) additional research using the TFS (Burnette, Taylor, Worthington, & Forsyth, 2007) has found Cronbach's alpha for estimated reliability to be .75 among a sample (N=213) of undergraduate students. Data from the current study further suggests an adequate internal consistency (± = .83).

Driving Anger. The Deffenbacher Driving Anger Scale (DAS; Deffenbacher et al., 1994) short-form measures the tendency to become angry while driving (Appendix C). Participants are asked to imagine a situation in which each of the statements was actually happening and to rate the amount of anger that it would provoke using a Likert scale from "1 = not at all" to "5 = very much." Example items include, "a slow vehicle on a mountain road will not pull over and let people by" and "someone speeds up when you try to pass him/her." A higher score on the driving anger scale indicates a higher reported amount of anger, by the driver, that would be provoked by each situation. The DAS-short consists of 14 items that have shown adequate internal consistency (± = .80) and been shown to be a valid predictor of aggressive driving behaviors and crash-related outcomes (Deffenbacher, Huff, Lynch, Oetting, & Salvatore, 2000). Analysis from the current study demonstrated excellent internal consistency (± = .90).

Driving Anger Expression. The Driving Anger Expression Inventory (DAX; Deffenbacher et al., 2002) is a 49-item measure that assesses a participant's mode of expressing anger while driving (Appendix D). Participant's are asked to rate "how often you generally react or behave in the manner described when you are angry or furious while driving." Example items include, "I roll down the window to help communicate my anger", "I purposely block the other driver from doing what he/she wants to do", and "I swear at the other driver under my breath." Participants rate the frequency of these behaviors when angry or furious while driving on a Likert scale from "0 = Almost Never" to "3 = Almost Always." The measure is divided into four subscales (Verbal Anger Expression, Physical Anger Expression, Vehicular Anger Expression, and Adaptive Anger Expression). In the overall measure score the Adaptive Anger Expression items are reverse scored, such that a higher overall score indicates a higher level of negative driving anger expression. Independently the four sub-scales have been shown to have adequate internal consistency (± = .80 to .90) and to correlate in the expected direction with trait anger, aggression, and angry or risky driving behaviors (Deffenbacher et al., 2002). Excellent internal consistency was revealed from the current study (± = .91).

Dangerous Driving Behaviors. Dangerous driving behaviors were measured using the Dula Dangerous Driving Index (DDDI; Dula & Ballard, 2003; Appendix E). The DDDI is a 31-item self-report measure developed to assess a driver's likelihood to drive dangerously. It is comprised of three subscales (i.e. Aggressive Driving, Negative Emotional Driving, and Risky Driving) as well as provides a total dangerous driving behaviors score. Participants are asked to rate, using a 5-point Likert scale (A=never, B=rarely, C=sometimes, D=often, and E=always), the frequency of which they engage in specific driving behaviors. Example items include, "I will race a slow moving train to a railroad crossing", "When I get stuck in a traffic jam, I get very

irritated “, and “When someone cuts me off, I feel I should punish him/her.” Higher scores on this measure indicate higher level of dangerous driving behaviors. Initial findings in a sample of undergraduate students (Dula & Gellar, 2003) suggest good internal consistency with regard to the subscales aggressive driving (± = .84), negative emotions while driving (± = .85), and risky driving (± = .83), as well as the DDDI Total Score (± = .92). Reflecting its validity, subscales of the DDDI were found to be significantly correlated with other measures of similar constructs (i.e. trait anger, aggression, anger expression, and negative emotions) in the predicted direction. Furthermore, the DDDI was shown to account for differences between traffic offenders and non-offenders (Willemsen, Dula, Declercq, & Verhaeghe, 2008). Finally, the DDDI has been translated into and validated in French (Richer & Bergeron, 2012), Dutch (Willemsen et al., 2008), and Romanian (Iliescu & Sârbescu, 2013) among other languages. The results from the current study demonstrated an excellent internal consistency (± = .95).

Analysis 2: Forgiveness and Driving Outcomes as Mediated by Anger Rumination, Stress, and Dangerous Driving Behaviors

Analysis 2: Participants

Similar to analysis 1, the decision was made to include all participants that met the initial filter and not to exclude participants based on time to complete the questionnaire. Consistent with the previously described data cleaning procedures a total of 476 undergraduate students were included in the subsequent analyses (Table 2). The sample consisted of undergraduate students (45% 1st year, 20% 2nd year, 19% 3rd year, and 16% 4th year) aged 18-24 (*M* = 19.77, *SD* = 1.66) who completed at least half of the questions within each scale and/or subscale analyzed. The sample consisted of 67% female, 32% male, and <1% transgender. The

ethnic/racial make-up of the sample was 83% white/Caucasian, 5% black/African American, 4% biracial/multiracial, 3% Hispanic American, 1% Asian American, 0.4% American Indian.

Table 2

Analysis 2: Demographic Information

Variable	Sample (n = 476)
Gender (n)	
Male	151
Female	323
Transgender	2
Age	
M	19.77
SD	1.66
Year in College	
M	2.06
SD	1.13
Ethnicity (n)	
Caucasian	395
African American/Black	24
Hispanic American	13
Other	44
Years as a Licensed Driver	
M	3.99
SD	1.76
Hours a Week Driven	
M	8.92
SD	11.72
Miles per Week Driven	
M	146.53
SD	175.72

The average time to complete the set of questionnaires according to the current sample was 40 minutes (*M* = 39.72, *SD* = 17.45) with a range from 8 to 129 minutes. With regards to driving demographics, the current sample reported driving for an average of 4 years (*M* = 3.99, *SD* =1.76), 146 miles per week (*M* = 146.62, *SD* =175.36), and 9 hours per week (*M* = 8.94, *SD* =11.70). Of note, the number of reported traffic violations and MVC's was not normally distributed and a number of participants reported zero incidents for: a) tickets/warnings with the last 12 months (67%), b) tickets/warnings within the last 5 years (40%), c) MVC's within the last 12 months (78%), and d) MVC's within the last 5 years (55%).

Analysis 2: Measures

Demographic and driving-related information. The same demographic questions were used from analysis 1.

Multiple Dimensions of Forgiveness. The Heartland Forgiveness Scale (HFS; Appendix F) was used to assess multiple dimensions of dispositional forgiveness (Thompson et al., 2005). The HFS is an 18-item self-report measure that consists of three subscales with six items each: 1) forgiveness of self, 2) forgiveness of others, and 3) forgiveness of uncontrollable situations. Example items include, "I hold grudges against myself for negative things I've done", "If others mistreat me, I continue to think badly of them", and "I eventually make peace with bad situations in my life." The negative items are reverse scored so that a higher score indicates a higher trait level of forgivingness. Each item is scored on a 7-point Likert scale from "1=Almost Always False of Me" to "7=Almost Always True of Me." Good psychometric properties have been shown in multiple samples of college students at a large, public, mid-western university (Thompson et al., 2005). Internal consistency for the individual subscales and the total score were as follows: Forgiveness of Self (± = 0.72 - 0.75), Forgiveness of Others (± = 0.78 - 0.81),

Forgiveness of Uncontrollable Situations (± = 0.79 - 0.82), and Total (± = 0.86 - 0.87). In addition, acceptable test-retest reliability was observed at a 3-week interval. Finally, in support of its validity, the HFS was found to be significantly correlated with other measures of forgiveness, psychological variables, and personality factors in an expected manner. The current study demonstrated an internal consistency for the complete scale consistent with previous findings (± = 0.91). Further analysis also revealed adequate internal consistency for each of the subscales such that: forgiveness of self (± = 0.82), forgiveness of others (± = 0.83), and forgiveness of uncontrollable situations (± = 0.83).

Stress. Stress was measured using the stress subscale of the Depression Anxiety Stress Scales 21 (DASS-21; Appendix G), a short form of the 42-item DASS (Lovibond & Lovibond, 1995). The DASS-21 consists of three 7-item self-report scales taken from the full version of the DASS. Using a 4-point Likert scale, from "0 = Did not apply to me at all" to "3 = Applied to me very much, or most of the time", participants rate the extent to which each statement has been experienced over the last week. Example items include, "I found myself getting upset by quite trivial things", and "I felt that I was using a lot of nervous energy", with higher scores indicating higher levels of stress over the last week. Based on a sample of 1,794 members of the general adult UK population (Henry & Crawford, 2005), internal consistency for the Stress subscale was found to be excellent (± = .90). In addition, good convergent and discriminate validity has been demonstrated with regard to the DASS-21 and its subscales (Henry & Crawford, 2005). Based on the current study, the internal consistency was excellent for the complete DASS-21 scale (± = 0.95) and for the stress subscale (± = 0.87).

Anger Rumination. Rumination was measured using the Anger Rumination Scale (ARS; Sukhodolsky, Golub, & Cromwell, 2001; Appendix H). The ARS is a 19-item measure that was

developed to assess the tendency to think about current anger-provoking situations as well as anger episodes that happened in the past. Example items include, “I re-enact the anger episode in my mind after it has happened”, “I ruminate about my last anger experiences”, and “I analyze events that make me angry.” Higher scores on the measure indicate higher overall anger rumination. Analysis of the 19 items best fit a four factor model: 1) angry afterthoughts, 2) thoughts of revenge, 3) angry memories, and 4) understanding of causes. Participants were asked to rate each item on a 4-point Likert scale ranging from “1=almost never” to “4=almost always” in correspondence with their beliefs about themselves. Based on an initial sample of suburban university students (Sukhodolsky et al., 2001), the ARS was found to have adequate internal consistency (± = 0.93) and test-retest reliability (r = 0.77) over a 1-month period. In addition and reflecting its validity the ARS was found to be significantly correlated, in the predicted direction, with state-trait anger expression, negative affectivity, mood repair, life satisfaction, and social desirability. The ARS was found to have excellent internal consistency (± = 0.95) based on the current study sample.

Dangerous Driving Behaviors. The Dula Dangerous Driving Index (DDDI; Appendix E) was previously described in the measures section of Analysis 1. Results from the current study are consistent with analysis 1 and previous reports of adequate internal consistency both as a whole (± = 0.94) and individually for each subscale (negative emotions while driving, ± = 0.85; risky driving behaviors, ± = 0.89; and aggressive driving behaviors, ± = 0.87).

Social Desirability. The Marlowe Crowne Social Desirability (Reynolds Short Form-13, Form C) was used to measure social desirability. The Marlowe-Crowne Social Desirability Scale (Crowne & Marlowe, 1960; Appendix I) was developed to help researchers identify and control for participants that were attempting to “fake good” or present themselves in a favorable light.

The scale was developed based on a number of personality inventory questions that would meet the criteria of “cultural approval” and to have “minimal abnormal implications if responded to in either the socially desirable or undesirable directions” (Crowne & Marlowe, 1960, p. 350). Examples of questions on the original long form included “I am always careful about my manner of dress” and “I am always willing to admit it when I make a mistake” (Crowne & Marlowe, 1960, p. 351). Crowne and Marlowe (1960) found significant correlations (*N* = 120) between the social desirability scale and the MMPI Scales measuring validity (i.e., K, L, F), all in the expected direction. Analysis of the final form of the complete scale, using Kuder-Richardson formula 20, was .88, representative of adequate internal consistency. In an attempt to make the Crowne-Marlowe-Crowne Social Desirability scale shorter and more efficient, Reynolds (1982) analyzed 3 short-forms of the measure (*N* = 608). As a result of factor analysis, Reynolds (1982) selected questions from the long-form to achieve an optimal internal consistency. Reynolds created three forms he termed Form A (11 items), Form B (12 items), and Form C (13 items). Form C, according to Reynolds (1982), was found to demonstrate an acceptable level of reliability (±= .76) and was comparable to the reliability of the standard long-form. In addition, the 13 item short form (i.e., Form C) was found to correlate positively with the Edwards Social Desirability Scale. Further analysis of the Reynolds short forms, in a Canadian undergraduate sample (*N* = 232), revealed an adequate internal consistency for each of the three forms and specifically for Form C (±= .62). Participants are asked to respond either •True• or •False• for each of the 13 items. Examples of the items on the Form C include” No matter who I’m talking to, I’m always a good listener”, and “I’m always willing to admit it when I make a mistake.” Using reverse scoring of particular items, higher scores on the measure are indicative of

responding in a socially desirable way. The current study demonstrated adequate internal consistency for the 13-item social desirability scale short-form (±= .73)

CHAPTER 3

RESULTS

Analysis 1: Results - Replication of Moore and Dahlen (2008)

Analysis 1: Bivariate Correlations

Bivariate correlations were generated on the scales for replication (Table 3). Results from the bivariate correlations demonstrate a significant inverse relationship between trait forgiveness of others and the Deffenbacher Driving Anger Scale (r = -.30, p d .01); negative subscales (physical aggression, verbal aggression, and vehicular aggression) of the Driving Anger Expression Scale (r = -.23, p d .01; r = -.32, p d .01; r = -.34, p d .01); and Dula Dangerous Driving Index risky driving subscale (r = -.29, p d .01) and aggressive driving subscale (r = -.35, p d .01), respectively. In addition, a significant positive correlation was observed between trait forgiveness of others and the positive subscale (adaptive/constructive expression) of the Driving Anger Expression Scale (r = .22, p d .01). These findings replicate and support those reported by Moore and Dahlen (2008) as well as extending the previous study to the use of an alternate measure of risky driving and aggressive driving (i.e., Dula Dangerous Driving Index subscales).

Table 3

Bivariate Correlations for Trait Forgiveness, Driving Anger, Driving Expression, and Risky and Aggressive Driving (N = 492)

Variable	TFS	DAS	DrivExp-Vrb	DrivExp-Phys	DrivExp-Veh	DrivExp-Adpt	DDDI-Agg	DDDI-Risk
TFS								
DAS	-.30**							
DrivExp-Vrb	-.23**	.52**						
DrivExp-Phys	-.32**	.27**	.45**					
DrivExp-Veh	-.34**	.44**	.60**	.71**				
DrivExp-Adpt	.22**	-.08	-.08	-.04	-.17**			
DDDI-Agg	-.35**	.46**	.62**	.64**	.78**	-.25**		
DDDI-Risk	-.29**	.36**	.45**	.67**	.71**	-.15**	.79**	

**Correlation is significant at the 0.01 level (2-tailed).
TFS-Trait Forgiveness Scale,
DAS-Driving Anger Scale,
DrivExpVerb-Driving Anger Expression-Verbal,
DrivExp-Phys-Driving Anger Expression Physical,
DrivExp-Veh-Driving Anger Expression-Vehicle,
DrivExp-Adpt-Driving Anger Expression Adaptive,
DDDI-Agg-Dula Dangerous Driving Index Aggressive Driving Subscale,
DDDI-Risk-Dula Dangerous Driving Index Risky Driving Subscale

Analysis 1: Multiple Hierarchical Regressions

Multiple hierarchical regressions were conducted as outlined in Moore and Dahlen (2008). As specified, respondent age, gender, and number of miles driven per week were entered on Step 1 as control variables; The Driving Anger Scale was entered on Step 2; and the Trait Forgiveness Scale was entered on Step 3. Contrary to Moore and Dahlen (2008), only trait forgiveness of others and not "consideration of future consequences" (as it was not included in the overall study/data collection) was entered into Step 3. This modification was intended to further specify trait forgiveness as a predictor variable for negative driving anger expression,

risky driving, and aggressive driving. Results from the current study parallel those described by Moore and Dahlen (2008) such that trait forgiveness of others was shown to be predictive of each of the four anger expression scales, aggressive driving, and risky driving (R^2 ” = .01 to .06, *p* d .05) above that of the control variables and the Driving Anger Scale (Table 4). Therefore, the current results were consistent with Moore and Dahlen’s findings and serve as a further extension.

Table 4

Summary of Hierarchical Regressions (N = 492)

Variable	R^2	• R^2	’
DDDI Aggressive Driving Behavior Subscale			
Step 1	.01	.01	
Age			-.02
Sex			.11*
Miles Driven per Week			.01
Step 2	.23	.22**	
Driving Anger Scale			.47***
Step 3	.28	.05**	
Trait Forgiveness Scale			-.23***
DDDI Risky Driving Behavior Subscale			
Step 1	.03	.03**	
Age			-.02
Sex			.18*
Miles Driven per Week			.01
Step 2	.17	.14**	
Driving Anger Scale			.38***
Step 3	.21	.04**	
Trait Forgiveness Scale			-.20***
Driving Anger Expression-Verbal			
Step 1	.00	.00	
Age			.01
Sex			-.01
Miles Driven per Week			-.05
Step 2	.27	.27**	
Driving Anger Scale			.52***
Step 3	.28	.01*	
Trait Forgiveness Scale			-.08*
Driving Anger Expression-Physical			
Step 1	.01	.01	
Age			-.05
Sex			.11*
Miles Driven per Week			-.01
Step 2	.09	.07**	
Driving Anger Scale			.27***
Step 3	.15	.06**	
Trait Forgiveness Scale			-.26***
Driving Anger Expression-Vehicular			
Step 1	.01	.01	
Age			-.09*
Sex			.07
Miles Driven per Week			-.00
Step 2	.21	.20**	
Driving Anger Scale			.44***
Step 3	.25	.05**	
Trait Forgiveness Scale			-.22***

* *p* d .05; ** *p* d .01; *** *p* d . 001

DDDI-Dula Dangerous Driving Inventory

Table 4, continued

Summary of Hierarchical Regressions (N = 492)

Variable	R^2	• R^2	^{2}
Driving Anger Expression-Adapt/Construct			
Step 1	.02	.02	
Age			.09*
Sex			-.10*
Miles Driven per Week			.04
Step 2	.03	.01	
Driving Anger Scale			-.08
Step 3	.06	.04**	
Trait Forgiveness Scale			.20***

* *p* d .05; ** *p* d .01; *** *p* d . 001

Analysis 1: Summary of Results

Hypothesis 1.1. *Significant negative correlations would be found between trait forgiveness and driving anger and negative driving anger expression, respectively.* Bivariate correlations were calculated based on the current sample of undergraduate students and were found to replicate findings by Moore and Dahlen (2008). Specifically, trait forgiveness of others was found to negatively correlate with driving anger and negative driving aggression expression.

Hypothesis 1.2. *A significant positive correlation would be revealed between trait forgiveness and the driving anger expression subscale-adaptive/constructive anger expression.* Similarly to results by Moore and Dahlen (2008), a positive, statistically significant correlation was revealed between trait forgiveness of others and adaptive/constructive anger expression.

Hypothesis 1.3. *A significant negative correlation would be found between trait forgiveness and the Dula Dangerous Driving Index Subscales-aggressive driving and risky driving.* To utilize a more focused definition of aggressive driving, the subscales of aggressive driving and risky driving behaviors was examined using the Dula Dangerous Driving Index. Bivariate correlations demonstrated significant negative relationships between trait forgiveness

of others and each of the two dangerous driving behaviors subscales (i.e., aggressive driving and risky driving).

Hypothesis 1.4. *Based on hierarchical multiple regression, trait forgiveness would significantly account for the variance in negative anger expression, above and beyond that of age, gender, miles driven per week, and driving anger.* Multiple hierarchical regression analyses were conducted, as prescribed by Moore and Dahlen, with age, gender, and miles driven per week in step 1, driving anger in step 2, and trait forgiveness, of others, in step 3. The current study further isolated trait forgiveness of others as a construct of interest by eliminating 'consideration of future consequences' from step 3. Driving aggression expression (four subscales), risky driving behaviors, and aggressive driving behaviors were individually included in the study as dependent variables. Results from the current study were consistent with Moore and Dahlen (2008) such that trait forgiveness of others was found to be a significant predictor of each of the dependent variables above that of age, gender, miles driven per week, and driving anger.

Analysis 2: Results – Multiple Serial Mediation

Analysis 2: Bivariate Correlations

Bivariate correlations among all variables were calculated to examine the zero-order associations among variables as well as used to assist with interpretation of subsequent mediation models (Table 5). The Heartland Forgiveness Scale, Anger Rumination Scale, Depression Anxiety and Stress-Stress subscale, and the Dula Dangerous Driving Index were all scored so that higher scores would be indicative of higher levels of each variable (i.e., higher forgiveness, anger rumination, stress, and dangerous driving behaviors).

Table 5

Bivariate Correlations for Anger Rumination, Stress, Forgiveness, Dangerous Driving, and Adverse Driving Outcomes

Variable	ARS	DASS-Str	DDDI	HFS-S	HFS-O	HFS-Sit	Tick 12mth	Tick 5yr	MVC 12mth	MVC 5yr
ARS										
DASS-Str	.56**									
DDDI	.49**	.37**								
HFS-S	-.44**	-.40**	-.22**							
HFS-O	-.46**	-.29**	-.31**	.50**						
HFS-Sit	-.48**	-.43**	-.29**	.69**	.63**					
Tick12mth	.03	.05	.15**	-.06	-.07	-.03				
Tick5yr	.10*	.15**	.24**	-.01	-.07	-.06	.49**			
MVC12mth	.01	.06	.11*	-.05	-.06	-.04	.15**	.12**		
MVC5yr	.00	.06	.13**	.04	.01	.04	.13**	.26**	.59**	

*Correlation is significant at the .05 level (2-tailed).
**Correlation is significant at the .01 level (2-tailed).
ARS-Anger Rumination Scale,
DASS-Str-Depression Anxiety and Stress Scale 21,
DDDI-Dula Dangerous Driving Index,
HFS-S-Heartland Forgiveness Scale-Self,
HFS-O-Heartland Forgiveness Scale-Other,
HFS-Sit-Heartland Forgiveness Scale-Situations,
Tick12mth-Total Tickets and Warnings Within Last 12 Months,
Tick5yr-Total Tickets and Warnings Within Last 5 Years,
MVC12mth-Total Number of Motor Vehicle Crashes Involved in Within Last 12 Months,
MVC5yr- Total Number of Motor Vehicle Crashes Involved in Within Last 5 years

Review of the bivariate correlations revealed significant negative correlations between each of the forgiveness subscales (i.e., of self, of others, of uncontrollable situations), and anger rumination (r = -.44, -.46, -.48, p d .01), stress (r = -.40, -.29, -.43, p d .01), and dangerous driving behaviors (r = -.22, -.31, -.29, p d .01), respectively. In addition, significant positive correlations were observed between dangerous driving behaviors and both anger rumination (r = .49, p d .01) and stress (r = .37, p d .01) as well as between anger rumination and stress (r = .56, p d .01). With regards to adverse driving outcomes, significant positive relationships were found between: the total number of tickets/warnings reported within the last 12 months and dangerous driving behaviors (r = .15, p d .01); the total number of tickets/warnings reported within the last

5 years and anger rumination (r = .10, p d .05), stress (r = .15, p d .01), and dangerous driving behaviors (r = .24, p d .01), respectively; total number of motor vehicle crashes involved in, as the driver, within the last 12 months and dangerous driving behaviors (r = .11, p d .05); and total number of motor vehicle crashes involved in, as the driver, within the last 5 years and dangerous driving behaviors (r = .13, p d .01). All of the significant correlations were in the expected direction based on previous research and hypotheses. However, of note, no significant bivariate relationships were observed between dimensions of forgiveness and adverse driving outcomes.

Analysis 2: Multiple Serial Mediation Analyses

Description of Preacher and Hayes mediation analyses. For the primary analyses of this study, multivariable analyses were conducted using the statistical mediation methods described by Hayes and colleagues. That is, serial mediation analyses (Hayes, 2013; Hayes, Preacher, & Myers, 2011; see also Preacher & Hayes, 2008) were employed in the testing of the overall model portrayed in Figure 3. The analyses were based on the three dimensions of dispositional forgiveness (i.e. of self, others, and uncontrollable situations) as independent variables (IVs) and the four driving-related outcomes (i.e. total traffic violations last 12 months; total traffic violations last 5 years; number of MVCs as driver in the last 12 months; number of MVCs as driver in the last 5 years) as the dependent variables (DVs), accounting for the indirect effects of rumination, stress, and dangerous driving behaviors as mediator variables (MVs). When using mediation analysis, a series of effects can be observed 1) total effect, 2) direct effect, 3) full mediation, 4) partial mediation, and 5) indirect only effect. A *total effect* occurs when there is a statistically significant relationship between the IV and the DV without controlling for any MVs. A *direct effect* is observed when the relationship between the IV and the DV is statistically significant while accounting for any MVs. A *full mediation* effect is when the

significant total effect between the IV and the DV is reduced to a non-significant direct effect when accounting for the MVs. A *partial mediation* effect is when the significant relationship between the IV and the DV (total effect) is reduced while accounting for MVs, but the relationship between IV and DV (direct effect) remains statistically significant. Finally, an *indirect only effect* occurs when neither the total or direct effect of the relationship between the IV and the DV is significant; however, the relationship between the IV and DV through the MV(s) is significant.

According to Baron and Kenny's (1986) classic article, mediation can be assumed to exist under specific conditions: 1) a statistically significant direct effect must be observed between the IV and DV, 2) the regression of the DV on the mediator and the IV must be significant, and 3) the regression of the DV on both the IV and the mediator must result in a significant reduction of the association observed in condition 1. Further, they argued that each condition must be met in sequence, such that, if the first condition is not met, then further analysis is not warranted. In contrast to Baron and Kenny (1986), Preacher and Hayes (2008) argued that an initial direct effect does not have to exist between the IV and the DV for an indirect effect to be tested. In sum, in the absence of a direct effect of the IV on the DV, the IV can significantly affect the DV entirely through a mediator. As a result, the Baron and Kenny method might lead to an increase in the potential for a Type-II error (i.e. not finding a significant relationship, when one actually exists).

Mediation analyses are not conducive to power analyses conducted with popular software tools such as G*Power (Faul, Erdfelder, Lang, & Buchner, 2007). However, based on the general rule of thumb (i.e. no less than10 participants per IV) in regression-based analyses (Peduzzi, 1996) a sample of 110-220 participants (based on 11 IVs) was necessary in order to attain

sufficient statistical power for the analyses proposed in this study. In addition, the methods developed by Hayes and colleagues (e.g., Hayes, 2013 Hayes, Preacher, & Myers, 2011; see also Preacher & Hayes, 2008) use the statistical method of *bootstrapping* when assessing the indirect effect(s). Very briefly, bootstrapping relies on a method of resampling the data *k* times (with *k* at least 10,000) to better estimate the distribution of the population under investigation. For example, a particular case could be selected not at all, once, twice, or several times during each bootstrap sample. This process both negates the need to assume normality in the shape of the sampling distribution and enhances statistical power for detecting indirect effects in the model (Hayes et al., 2011). Therefore, based on previous work demonstrating an indirect only effect of dimensions of forgiveness on aspects of health (e.g. Webb et al., 2013) and the utility of bootstrapping to enhance statistical power, it seems prudent to use the methods prescribed by Hayes and colleagues.

Description of study specific mediation analyses. In order to examine the mediating effect of anger rumination, stress, and dangerous driving behaviors on the relationship between forgiveness and adverse driving outcomes, a series of mediation analyses were conducted using the macro 'PROCESS' published by Hayes (2013). Prior to analyses and consistent with work by Moore and Dahlen (2008) it was determined that age, sex, and miles driven per week would be included in the analyses as control variables. In addition, a measure of social desirability was included to potentially minimize and control for the social desirability bias. Finally, hours driven per week were included as a control variable, as it stands to reason, that both miles driven and time driven per week are relevant factors related to adverse driving outcomes.

For each driving-related outcome (DVs) a separate serial mediation analysis, controlling for age, sex, miles driven per week, hours driven per week, and social desirability, was

conducted for each dimension of forgiveness (as IVs) and anger rumination, stress, and dangerous driving behaviors – total score (as MVs) (Figure 3). Consistent with Hayes' (2013) methods, when multiple IVs are included in the overall analysis, each, in turn, is placed in the IV role and the others are included in the list of control variables in a series of individual analyses that are integrated into the overall analysis. Similarly, as anger rumination and stress were analyzed as parallel MVs with dangerous driving behaviors included in serial, in a set of analyses, stress was included in the list of control variables, while anger rumination was included as the MV, and vice versa. This method allows for analysis of each variable in the context of one another and thereby, interpretation of an integrated overall analysis.

Analysis 2: Results of Mediation Analyses

Results of the mediation analyses were varied based on the dimension of forgiveness, mediators, and driving outcomes in each. Overall, the total explanatory power of the model including control and active variables was only significant for the prediction of tickets/warnings within the last 5 years (R^2 = .13p d .0001) and MVCs within the last 5 years (R^2 = .05, pd .05). As a result, although the mediation-based results for each of the four driving outcomes are presented in Tables 6 – 9; hereinafter, only the results for the statistically significant DV-based models will be discussed. In the context of adverse driving outcomes within the past five years (i.e., traffic violations or MVCs) none of the three dimensions of forgiveness (i.e., of self, of others, of uncontrollable situations) were found to have a significant total or direct effect on any of the adverse driving outcomes (Tables 8 – 9).

Table 6

The Association of Forgiveness with Tickets/Warnings in the Last 12 Months: Anger Rumination, Stress, and Dangerous Driving Behaviors as Mediators

	Forgiveness of Self		Forgiveness of Others		Forgiveness of Situations	
	(n = 476); R^2 = .0400; p = .1280					
	coefficient	*p* value	coefficient	*p* value	coefficient	*p* value
a_1	-.07	.0067**	.07	.0240*	-.08	.0121*
a_2	-.04	.0783†	-.10	.0001****	-.05	.0572†
a_3	.04	.1922	-.05	.1530	-.03	.5239
a_4	.14	.0441*	.14	.0441*	.14	.0441*
a_5	.35	.0000****	.35	.0000****	.35	.0000****
b_1	.08	.5276	.08	.5276	.08	.5276
b_2	-.13	.3774	-.13	.3774	-.12	.3774
b_3	.28	.0147*	.28	.0147*	.28	.0147*
$c_{:\text{Stress}}$	-.09	.1837	-.09	.1867	.05	.4841
$c_{:\text{AngRum}}$	-.08	.2273	-.09	.1483	.06	.4036
c'	-.09	.1666	-.08	.2147	.07	.3570

	Effect	95CI		Effect	95CI		Effect	95CI	
$ab_{:\text{Stress}}$	**.0032**	-.0231	.0303	**-.0067**	-.0355	.0184	**-.0173**	-.0562	.0093
$ab_{:\text{AngRum}}$	**.0127**	-.0071	.0427	**-.0115**	-.0507	.0241	**-.0060**	-.0406	.0238
a_1b_1	**-.0055**	-.0292	.0090	**.0051**	-.0077	.0303	**-.0065**	-.0356	.0104
a_2b_2	**.0059**	-.0038	.0301	**.0133**	-.0119	.0512	**.0071**	-.0051	.0367
a_3b_3	**.0114**	-.0029	.0412	**-.0144**	-.0448	.0017	**-.0076**	-.0402	.0126
$a_1a_4b_3$	**-.0028***	-.0108	-.0003	**.0026***	.0002	.0111	**-.0033***	-.0130	-.0003
$a_2a_5b_3$	**-.0046***	-.0152	-.0003	**-.0104***	-.0254	-.0029	**-.005***	-.0180	-.0004

Analyses controlled for …

a_1 = basic association of Forgiveness with Stress
a_2 = basic association of Forgiveness with Anger Rumination
a_3 = basic association of Forgiveness with Dangerous Driving Behaviors
a_4 = basic association of Stress with Dangerous Driving Behaviors
a_5 = basic association of Anger Rumination with Dangerous Driving Behaviors
b_1 = basic association of Stress with Adverse Driving Outcome
b_2 = basic association of Anger Rumination with Adverse Driving Outcome
b_3 = basic association of Dangerous Driving Behaviors with Adverse Driving Outcome

ab = total indirect effect
a_1b_1 = specific indirect effect of Forgiveness on Adverse Driving Outcome through Stress
a_2b_2 = specific indirect effect of Forgiveness on Adverse Driving Outcome through Anger Rumination
a_3b_3 = specific indirect effect of Forgiveness on Adverse Driving Outcome through Dangerous Driving Behaviors
$a_1a_4b_3$ = specific indirect effect of Forgiveness on Adverse Driving Outcome through Stress and Dangerous Driving Behaviors
$a_2a_5b_3$ = specific indirect effect of Forgiveness on Adverse Driving Outcome through Anger Rumination and Dangerous Driving Behaviors

c = total effect of Forgiveness with Adverse Driving Outcome, without accounting for any Mediators Variables
c' = direct effect of Forgiveness with Adverse Driving Outcome, after accounting for all Mediator Variables

95CI = Bias-corrected 95% Confidence Interval
$^{*}p \leq .05$; $^{**}p \leq .01$; $^{***}p \leq .001$; $^{****}p \leq .0001$; $^{\dagger} \leq .10$

Table 7

The Association of Forgiveness with Motor Vehicle Crashes as Driver in the Last 12 Months: Anger Rumination, Stress, and Dangerous Driving Behaviors as Mediators

	Forgiveness of Self		Forgiveness of Others		Forgiveness of Situations	
	(n = 476); R^2 = .0164; p = .1757					
	coefficient	p value	coefficient	p value	coefficient	p value
a_1	-.07	.0067**	.07	.0240*	-.08	.0121*
a_2	-.05	.0783†	-.10	.0001****	-.05	.0572†
a_3	.04	.1922	-.05	.1530	-.03	.5239
a_4	.14	.0441*	.14	.0441*	.14	.0441*
a_5	.35	.0000****	.35	.0000****	.35	.0000****
b_1	.15	.1405	.15	.1405	.15	.1405
b_2	-.16	.1541	-.16	.1541	-.16	.1541
b_3	.21	.0722	.21	.0722	.21	.0722
$c_{:\text{Stress}}$	-.04	.4886	-.06	.2299	-.00	.9797
$c_{:\text{AngRum}}$	-.02	.6851	-.07	.2074	.02	.7352
c'	-.03	.5313	-.06	.2365	.02	.7259

	Effect	95CI		Effect	95CI		Effect	95CI	
$ab_{:\text{Stress}}$	**-.0042**	-.0273	.0191	**.0010**	-.0238	.0245	**-.0206***	-.0585	-.0005
$ab_{:\text{AngRum}}$	**.0125**	-.0022	.0389	**-.0017**	-.0390	.0354	**-.0008**	-.0344	.0238
a_1b_1	**-.0106**	-.0336	.0003	**.0098**	-.0003	.0353	**-.0125**	-.0439	.0003
a_2b_2	**.0074**	-.0007	.0298	**.0168**	-.0017	.0504	**.0089**	-.0009	.0347
a_3b_3	**.0085**	-.0018	.0372	**-.0107**	-.0422	.0013	**-.0056**	-.0369	.0083
$a_1a_4b_3$	**-.0021***	-.0091	-.0001	**.0019***	.0000	.0094	**-.0024***	-.0439	-.0001
$a_2a_5b_3$	**-.0034**	-.0132	.0000	**-.0077**	-.0422	.0013	**-.0041**	-.0156	.0000

Analyses controlled for …
a_1 = basic association of Forgiveness with Stress
a_2 = basic association of Forgiveness with Anger Rumination
a_3 = basic association of Forgiveness with Dangerous Driving Behaviors
a_4 = basic association of Stress with Dangerous Driving Behaviors
a_5 = basic association of Anger Rumination with Dangerous Driving Behaviors
b_1 = basic association of Stress with Adverse Driving Outcome
b_2 = basic association of Anger Rumination with Adverse Driving Outcome
b_3 = basic association of Dangerous Driving Behaviors with Adverse Driving Outcome

ab = total indirect effect
a_1b_1 = specific indirect effect of Forgiveness on Adverse Driving Outcome through Stress
a_2b_2 = specific indirect effect of Forgiveness on Adverse Driving Outcome through Anger Rumination
a_3b_3 = specific indirect effect of Forgiveness on Adverse Driving Outcome through Dangerous Driving Behaviors
$a_1a_4b_3$ = specific indirect effect of Forgiveness on Adverse Driving Outcome through Stress and Dangerous Driving Behaviors
$a_2a_5b_3$ = specific indirect effect of Forgiveness on Adverse Driving Outcome through Anger Rumination and Dangerous Driving Behaviors

c = total effect of Forgiveness with Adverse Driving Outcome, without accounting for any Mediators Variables
c' = direct effect of Forgiveness with Adverse Driving Outcome, after accounting for all Mediator Variables

95CI = Bias-corrected 95% Confidence Interval
$^{*}p \leq .05$; $^{**}p \leq .01$; $^{***}p \leq .001$; $^{****}p \leq .0001$; $^{\dagger} \leq .10$

Table 8

The Association of Forgiveness with Tickets/Warnings in the Last 5 Years: Anger Rumination, Stress, and Dangerous Driving Behaviors as Mediators

	Forgiveness of Self		Forgiveness of Others		Forgiveness of Situations	
	(n = 476); R^2 = .1278; *p* d .0001					
	coefficient	*p* value	coefficient	*p* value	coefficient	*p* value
a_1	-.07	.0067**	.07	.0240*	-.08	.0121*
a_2	-.04	.0783†	-.10	.0001****	-.05	.0572†
a_3	.04	.1922	-.05	.1530	-.03	.5239
a_4	.14	.0441*	.14	.0441*	.14	.0441*
a_5	.35	.0000****	.35	.0000****	.35	.0000****
b_1	.45	.0624†	.45	.0624†	.45	.0624†
b_2	-.11	.6836	-.11	.6836	-.11	.6836
b_3	.88	.0002***	.88	.0002***	.88	.0002***
$c_{:\text{Stress}}$	.03	.8452	-.09	.5897	-.10	.6127
$c_{:\text{AngRum}}$	.06	.6677	-.15	.3511	-.06	.7492
c'	.03	.8077	-.08	.6106	-.03	.8870
	Effect	95CI		Effect	95CI		Effect	95CI	
$ab_{:\text{Stress}}$	**-.0057**	-.0782	.0719	**-.0064**	-.0868	.0655	**-.0711**	-.1654	.0039
$ab_{:\text{AngRum}}$	**.0263**	-.0333	.0951	**-.0641**	-.1649	.0129	**-.0339**	-.1276	.0419
a_1b_1	**-.0323***	-.0904	-.0016	**.0298***	.0022	.0877	**-.0379***	-.1031	-.0051
a_2b_2	**.0052**	-.0176	.0427	**.0118**	-.0467	.0724	**.0063**	-.0216	.0545
a_3b_3	**.0351**	-.0147	.1069	**-.0441**	-.1219	.0106	**-.0232**	-.1070	.0447
$a_1a_4b_3$	**-.0085***	-.0277	-.0010	**.0079***	.0004	.0285	**-.0100***	-.0336	-.0009
$a_2a_5b_3$	**-.0140***	-.0396	-.0006	**-.0318***	-.0665	-.0126	**-.0169***	-.0471	-.0013

Analyses controlled for …

a_1 = basic association of Forgiveness with Stress
a_2 = basic association of Forgiveness with Anger Rumination
a_3 = basic association of Forgiveness with Dangerous Driving Behaviors
a_4 = basic association of Stress with Dangerous Driving Behaviors
a_5 = basic association of Anger Rumination with Dangerous Driving Behaviors
b_1 = basic association of Stress with Adverse Driving Outcome
b_2 = basic association of Anger Rumination with Adverse Driving Outcome
b_3 = basic association of Dangerous Driving Behaviors with Adverse Driving Outcome

ab = total indirect effect
a_1b_1 = specific indirect effect of Forgiveness on Adverse Driving Outcome through Stress
a_2b_2 = specific indirect effect of Forgiveness on Adverse Driving Outcome through Anger Rumination
a_3b_3 = specific indirect effect of Forgiveness on Adverse Driving Outcome through Dangerous Driving Behaviors
$a_1a_4b_3$ = specific indirect effect of Forgiveness on Adverse Driving Outcome through Stress and Dangerous Driving Behaviors
$a_2a_5b_3$ = specific indirect effect of Forgiveness on Adverse Driving Outcome through Anger Rumination and Dangerous Driving Behaviors

c = total effect of Forgiveness with Adverse Driving Outcome, without accounting for any Mediators Variables
c' = direct effect of Forgiveness with Adverse Driving Outcome, after accounting for all Mediator Variables

95CI = Bias-corrected 95% Confidence Interval
$^{*}p \leq .05$; $^{**}p \leq .01$; $^{***}p \leq .001$; $^{****}p \leq .0001$; $^{\dagger} \leq .10$

Table 9

The Association of Forgiveness with Motor Vehicle Crashes as Driver in the Last 5 Years: Anger Rumination, Stress, and Dangerous Driving Behaviors as Mediators

	Forgiveness of Self		Forgiveness of Others		Forgiveness of Situations	
	(n = 476); R^2 = .0512; p = .0336					
	coefficient	p value	coefficient	p value	coefficient	p value
a_1	-.07	.0067**	.07	.0240*	-.08	.0121*
a_2	-.04	.0783†	-.10	.0001****	-.05	.0572†
a_3	.04	.1922	-.05	.1530	-.03	.5239
a_4	.14	.0441*	.14	.0441*	.14	.0441*
a_5	.35	.0000****	.35	.0000****	.35	.0000****
b_1	.20	.0836	.20	.0836	.20	.0836
b_2	-.15	.1966	-.15	.1966	-.15	.1966
b_3	.27	.0498*	.27	.0498*	.27	.0498*
$c_{:\text{Stress}}$	-.00	.9886	-.01	.8262	.04	.5420
$c_{:\text{AngRum}}$	.02	.7790	-.02	.6927	.07	.3559
c'	.00	.9371	-.02	.8087	.07	.3362

	Effect	95CI		Effect	95CI		Effect	95CI	
$ab_{:\text{Stress}}$	**-.0060**	-.0341	.0267	**.0020**	-.0316	.0306	**-.0270***	-.0674	-.0014
$ab_{:\text{AngRum}}$	**.0133**	-.0050	.0434	**-.0082**	-.0528	.0257	**-.0043**	-.0452	.0211
a_1b_1	**-.0142***	-.0414	-.0004	**.0132***	.0005	.0414	**-.0167***	-.0477	-.0012
a_2b_2	**.0068**	-.0016	.0275	**.0153**	-.0054	.0450	**.0081**	-.0019	.0328
a_3b_3	**.0109**	-.0024	.0453	**-.0136**	-.0492	.0019	**-.0072**	-.0440	.0107
$a_1a_4b_3$	**-.0026***	-.0115	-.0002	**.0024***	.0001	.0122	**-.0031***	-.0134	-.0001
$a_2a_5b_3$	**-.0043***	-.0161	-.0001	**-.0098***	-.0263	-.0016	**-.0052***	-.0187	-.0002

Analyses controlled for …
a_1 = basic association of Forgiveness with Stress
a_2 = basic association of Forgiveness with Anger Rumination
a_3 = basic association of Forgiveness with Dangerous Driving Behaviors
a_4 = basic association of Stress with Dangerous Driving Behaviors
a_5 = basic association of Anger Rumination with Dangerous Driving Behaviors
b_1 = basic association of Stress with Adverse Driving Outcome
b_2 = basic association of Anger Rumination with Adverse Driving Outcome
b_3 = basic association of Dangerous Driving Behaviors with Adverse Driving Outcome

ab = total indirect effect
a_1b_1 = specific indirect effect of Forgiveness on Adverse Driving Outcome through Stress
a_2b_2 = specific indirect effect of Forgiveness on Adverse Driving Outcome through Anger Rumination
a_3b_3 = specific indirect effect of Forgiveness on Adverse Driving Outcome through Dangerous Driving Behaviors
$a_1a_4b_3$ = specific indirect effect of Forgiveness on Adverse Driving Outcome through Stress and Dangerous Driving Behaviors
$a_2a_5b_3$ = specific indirect effect of Forgiveness on Adverse Driving Outcome through Anger Rumination and Dangerous Driving Behaviors

c = total effect of Forgiveness with Adverse Driving Outcome, without accounting for any Mediators Variables
c' = direct effect of Forgiveness with Adverse Driving Outcome, after accounting for all Mediator Variables

95CI = Bias-corrected 95% Confidence Interval
$^{*}p \leq .05$; $^{**}p \leq .01$; $^{***}p \leq .001$; $^{****}p \leq .0001$; $^{\dagger} \leq .10$

Only forgiveness of others was found to be significantly associated with anger rumination in a negative fashion (forgiveness of others, a_2: unstandardized B = -.10, $p \leq .0001$). A significant negative correlation was observed between stress and both forgiveness of self (a_1: unstandardized B = -.07, $p \leq .01$) and forgiveness of uncontrollable situations (a_1: unstandardized B = -.08, $p \leq .05$). A significant positive association was observed between forgiveness of others and stress (a_1: unstandardized B = .07, $p \leq .05$). Both stress and anger rumination were found to be significantly and positively associated with dangerous driving behaviors ($a_{4 \text{ and } 5}$: unstandardized B = .14, $p \leq .05$; B = .35, $p \leq .0001$, respectively). Neither stress nor anger rumination were found to be significantly associated with any of the adverse driving outcomes (b_1 and b_2). Dangerous driving behaviors (b_3) was found to be significantly associated with both tickets/warnings within the last 5 years (unstandardized B = .88, $p \leq .001$), and MVCs within the last 5 years (unstandardized B = .27, $p \leq .05$).

Although no total (c) or direct (c') effects were found between any of the dimensions of forgiveness and the adverse driving outcomes, significant indirect only effects were observed through the proposed mediators. A total indirect effect was observed only for forgiveness of uncontrollable situations on MVCs within the last 5 years (ab = -.03) in the context of stress and dangerous driving behaviors as mediators. Significant specific indirect effects were found, as follows:

1. Tickets/Warnings within the last 5 years
    a. Forgiveness of self and forgiveness of uncontrollable situations were found to have a significant negative indirect only effect on Tickets/Warnings within the last 5 years through only stress (a_1b_1 = -.0323, 95 CI: -.0904 to -.0016 and a_1b_1 = -.0379, 95 CI: -.1031 to -.0051, respectively), such that higher levels of

forgiveness of self or forgiveness of uncontrollable situations lead to less stress, which in turn leads to fewer Tickets/Warnings within the last 5 years.

b. Forgiveness of others was found to have a significant positive indirect only effect on Tickets/Warnings within the last 5 years through only stress (a_1b_1 = .0298, 95 CI: .0022 to .0877), such that higher levels of forgiveness of others lead to higher levels of stress, which in turn lead to more Tickets/Warnings within the last 5 years.

c. Forgiveness of self and forgiveness of uncontrollable situations were found to have a significant negative indirect only effect on Tickets/Warnings within the last 5 years through stress and dangerous driving behaviors ($a_1a_4b_3$ = -.0085, 95 CI: -.0277 to -.0010; and $a_1a_4b_3$ = -.0100, 95 CI: -.0336 to -.0009; respectively), such that higher levels of forgiveness of self or forgiveness of uncontrollable situations lead to less stress, in turn fewer dangerous driving behaviors, and therefore, fewer Tickets/Warnings within the last 5 years.

d. Forgiveness of others was found to have a significant positive indirect only effect on Tickets/Warnings within the last 5 years through stress and dangerous driving behaviors ($a_1a_4b_3$ = .0079, 95 CI: .0004 to .0285), such that higher levels of forgiveness of others lead to higher levels of stress, which in turn lead to more dangerous driving behaviors, and therefore, more Tickets/Warnings within the last 5 years.

e. Forgiveness of self, forgiveness of others, forgiveness of uncontrollable situations were found to have a significant negative indirect only effect on Tickets/Warnings within the last 5 years through anger rumination and

dangerous driving behaviors ($a_2a_5b_3$ = -.0140, 95 CI: -.0396 to -.0006; $a_2a_5b_3$ = -.0318, 95 CI: -.0665 to -.0126; and $a_2a_5b_3$ = -.0169, 95 CI: -.0471 to -.0013; respectively), such that higher levels forgiveness of self, forgiveness of others, or forgiveness of uncontrollable situations lead to less anger rumination, which in turn lead to less dangerous driving behaviors, and therefore, fewer Tickets/Warnings within the last 5 years.

2. MVCs within the last 5 years
    a. Forgiveness of self and forgiveness of uncontrollable situations were found to have a significant negative indirect only effect on MVCs within the last 5 years through only stress (a_1b_1 = -.0142, 95 CI: -.0414 to -.0004; and a_1b_1 = -.0167, 95 CI: -.0477 to -.0012; respectively), such that higher levels of forgiveness of self or forgiveness of uncontrollable situations, lead to less stress, and therefore, fewer MVCs within the past 5 years.
    b. Forgiveness of others was found to have a significant positive indirect only effect on MVCs within the last 5 years through only stress (a_1b_1 = .0132, 95 CI: .0005 to .0414), such that higher levels of forgiveness of others, lead to more stress, and therefore, more MVCs within the past 5 years.
    c. Forgiveness of self and forgiveness of uncontrollable situations were found to have a significant negative indirect only effect on MVCs within the last 5 years through stress and dangerous driving behaviors ($a_1a_4b_3$ = -.0026, 95 CI: -.0115 to -.0002}; and $a_1a_4b_3$ = -.0031, 95 CI: -.0134 to -.0001; respectively),such that higher levels of forgiveness of self or forgiveness of

uncontrollable situations, lead to less stress, in turn fewer dangerous driving behaviors, and therefore, fewer MVCs within the last 5 years.

d. Forgiveness of others was found to have a significant positive indirect only effect on MVCs within the last 5 years through stress and dangerous driving behaviors ($a_1a_4b_3$ = .0024, 95 CI: .0001 to .0122), such that higher levels of forgiveness of others, lead to higher levels of stress, which in turn lead to more dangerous driving behaviors, and therefore, more MVCs within the last 5 years.

e. Forgiveness of self, forgiveness of others, forgiveness of uncontrollable situations were found to have a significant negative indirect only effect on MVCs within the last 5 years through anger rumination and dangerous driving behaviors ($a_2a_5b_3$ = -.0043, 95 CI: -.0161 to -.0001; $a_2a_5b_3$ = -.0098, 95 CI: -.0263 to -.0016; and $a_2a_5b_3$ = -.0052, 95 CI: -.0187 to -.0002; respectively),such that higher levels forgiveness of self, forgiveness of others, or forgiveness of uncontrollable situations, lead to less anger rumination, which in turn lead to less dangerous driving behaviors, and therefore, fewer MVC's within the last 5 years.

Analysis 2: Summary of Results

Hypothesis 2.1. *Multiple dimensions of dispositional forgiveness would be uniquely and significantly correlated with anger rumination, stress, dangerous driving behaviors, and adverse driving outcomes in an inverse fashion.* Based on bivariate correlations, hypothesis 2.1 was partially supported, such that forgiveness (i.e., of self, of others, and of uncontrollable situations) was found to be significantly correlated, in a negative fashion, with anger rumination, stress, and

dangerous driving behaviors. However, none of the three dimensions of forgiveness were found to be significantly correlated with any of the adverse driving outcomes.

Hypothesis 2.2. *Anger Rumination, Stress, and Dangerous Driving Behaviors would be positively correlated, at a significance level of p d.05, with each other.* Based on bivariate correlations, hypothesis 2.2 was fully supported, such that both anger rumination and stress, independently, were found to be significantly correlated with dangerous driving behaviors in a positive fashion. That is, higher levels of stress and anger rumination were each found to be related to higher reported levels of dangerous driving behaviors.

Hypothesis 2.3. *Anger Rumination, Stress, and Dangerous Driving Behaviors would be positively correlated, at a significance level of p d .05, with self-reported adverse driving outcomes (i.e., traffic violations and MVCs) within the last 12 months and last 5 years.* Based on bivariate correlations, Hypothesis 2.3 was partially supported, such that dangerous driving behavior was found to be positively correlated with each of the adverse driving outcome measures. However, anger rumination and stress, independently, were only significantly correlated with tickets/warnings within the last 5 years, in a positive fashion.

Hypotheses 2.4a and 2.4b. *The relationship between multiple dimensions of dispositional forgiveness and adverse driving outcomes would be fully or partially mediated by anger rumination and dangerous driving behaviors…fully or partially mediated by stress and dangerous driving behaviors.* Based on mediation analyses, Hypothesis 2.4 was only partially supported. No direct or total effect was observed between any of the dimensions of forgiveness and the adverse driving outcomes. A total indirect effect was only found for forgiveness of uncontrollable situations on MVCs within the last 5 years, with stress and dangerous driving behaviors as mediators. Overall, indirect only effects were found for each of the dimensions of

forgiveness on Tickets/Warnings within the last 5 years and MVCs within the last 5 years through each: stress only; stress and dangerous driving behaviors, in serial; and anger rumination and dangerous driving behaviors, in serial. However, of note, a positive effect (as opposed to a negative effect for forgiveness of self and forgiveness of uncontrollable situations) was found for forgiveness of others on the two adverse driving outcomes through stress only, and stress and dangerous driving behaviors, in serial. These positive effects are contrary to hypotheses and possible explanations will be discussed in the discussion section.

Hypothesis 2.5. *The relationship between forgiveness and driving-related outcomes, as mediated by anger rumination, stress, and dangerous driving behaviors, will be relatively different based on the dimensions of forgiveness and driving outcome under consideration.* Hypothesis 2.5 was fully supported, such that the effect on adverse driving outcomes was varied based on the dimension of forgiveness and mediators under consideration.

CHAPTER 4

DISCUSSION

MVCs are the leading cause of death for individuals ages 15-24, and therefore, represent a significant health concern (NAHIC, 2007; West & Naumann, 2011). Growing interest exists in the identification and cultivation of positive traits, such as compassion, forgiveness, and happiness, as they relate to physical and mental health (for a review, see Lopez & Snyder, 2009). Forgiveness in particular, has been found to have direct and indirect effects on health outcomes through various mediators (for a review, see Webb, Toussaint, & Conway-Williams, 2012). However to date, little research has been published examining the link between forgiveness and driving. Current findings from this study support and expand on the model proposed by Worthington et al. (2001) which outlines the direct effect of forgiveness on health outcomes as well as indirect effects through various mediators (i.e., health behavior, social support, and interpersonal functioning). Furthermore, the current study provides theoretical and statistical support for adverse driving outcomes as a health outcome and dangerous driving behaviors as health-risk behavior.

Summary of Results

In general, the results from the current study were found to partially support the stated hypotheses. In replication of previous work (i.e., Moore & Dahlen, 2008), the current study found that forgiveness of others again was associated with driving anger, driving anger expression, aggressive driving, and risky driving behaviors in the predicted direction. Moreover, when including additional dimensions of forgiveness in analyses consistent with Moore and Dahlen each dimension of forgiveness measured was found to correlate with driving related variables (i.e., driving anger, driving aggression, dangerous driving behaviors) in the predicted

direction; however, no significant correlations were observed between the multiple dimensions of forgiveness and any of the adverse driving outcomes. Similarly, expanding upon the work of Moore and Dahlen and testing a larger model of the association of forgiveness with health (Worthington et al., 2001), as applied to dangerous driving behaviors (conceptualized as a health behavior) and adverse driving outcomes (conceptualized as health-related outcomes), forgiveness (of self, of others, and of uncontrollable situations) was found to have a significant indirect effect on adverse driving outcomes over the past five years (but not the past 12 months) through the mediators of anger rumination, stress, and dangerous driving behaviors; however, no direct or total effect was observed between any of the dimensions of forgiveness and the adverse driving outcomes. Finally and as predicted, the relationship between forgiveness and adverse driving outcomes was varied based on the dimension of forgiveness, mediator(s), and adverse driving outcomes under examination. Of note, a significant *positive* indirect only effect was found between forgiveness of others and MVCs *and* tickets/warnings within the past 5 years through stress as a mediator as well as through stress and dangerous driving behaviors as mediators, to be discussed further. In general, findings suggest that forgiveness of self and forgiveness of uncontrollable situations have a salutary association with adverse driving outcomes over the past 5 years through the mediators of anger rumination, stress, and dangerous driving behaviors. In addition, forgiveness of others appears to have a similar association with adverse driving outcomes over the past 5 years through anger rumination and dangerous driving behaviors; however, a deleterious association when including stress as a mediator. Therefore, based on current findings and in support of previous research, forgiveness appears to be a significant, largely salubrious, factor in dangerous driving behaviors and adverse driving outcomes.

Implications for Driving Anger, Driving Aggression, and Dangerous Driving Behaviors

Limited research has been published directly examining the relationship between forgiveness and driving related variables (i.e., Kovácsová, Rošková, & Lajunen, 2014, Moore & Dahlen, 2008, and Takaku, 2006). Of these three studies only two have directly examined the relationship between forgiveness (i.e., forgiveness of others, only) as an independent variable and driving related variables (i.e., Kovácsová et al., 2014, and Moore & Dahlen, 2008). Consistent with these two previous studies the current study found multiple dimensions of forgiveness (forgiveness of others, forgiveness of self, and forgiveness of uncontrollable situations) to be associated with less driving anger expression, less driving aggression, and fewer dangerous driving behaviors. These findings have theoretical and practical implications for the role of forgiveness in driving anger/aggression and expand on the current understanding of the relationship between forgiveness, driving anger, and driving aggression in the literature.

First, as expected, a positive bivariate correlation was found between driving anger and driving aggression which is consistent with previous research (e.g., Deffenbacher et al., 2002; and Nesbit et al., 2007). Furthermore, correlations were significant, yet moderate, suggesting there is not a one-to-one correlation between driving anger and driving aggression. In addition, trait forgiveness was found to be negatively associated with driving anger and driving aggression which is consistent with previous research outside the context of driving, such that a negative correlation has been demonstrated between multiple dimensions of forgiveness and anger (e.g., Berry et al., 2005; and Lawler, Karremans, Scott, Edlis-Matityahou, & Edwards, 2008) as well as a variety of forms of aggression (Webb, Dula, and Brewer, 2012). Similarly, the current findings support the limited research in the context of driving which demonstrates a negative relationship between forgiveness, specifically of others, and both driving anger and driving aggression

(Kovácsová et al., 2014; Moore & Dahlen, 2008). When hierarchical analyses were conducted the results were consistent with Moore and Dahlen's findings, such that forgiveness of others was a significant predictor of driving aggression above and beyond that of driving anger. In conjunction, these findings continue to support the meaningful relationship between forgiveness of others and driving aggression. For example, the more forgiving an individual is of others, in general, the less likely they are to engage in aggressive behaviors while driving. This could have significant implications for reducing the frequency and/or intensity of aggressive behaviors of individual while driving. This is particularly meaningful given that driving aggression, broadly defined, is a contributing factor in approximately 56% of fatal crashes (AAA, 2009). Therefore, the current findings further supports previous research which indicates that forgiveness is a meaningful variable related to driving anger and driving aggression.

Second, moderate positive bivariate correlations were found between the various dimensions of forgiveness and between multiple dimensions of forgiveness, driving anger, and driving aggression. A moderate correlation between dimensions of forgiveness is consistent with previous research outside the context of driving (e.g., Thompson et al., 2005). In addition, the current findings expand on previous research to suggest that in addition to trait forgiveness of others, forgiveness of self and forgiveness of uncontrollable situations are meaningfully related to both driving anger and driving aggression. Again, these findings are consistent with forgiveness research outside the context of driving which has demonstrated that different dimensions of forgiveness have been shown to account for unique variance on measures of psychological well-being (e.g. Thompson et al., 2005). Therefore, this research study provides further support for the necessity of measuring and accounting for multiple dimensions of forgiveness when examining psychological and health related constructs. Furthermore, it

expands on the current understanding of forgiveness (i.e., of others) as it relates to driving anger and driving aggression to suggest that other dimensions of forgiveness (i.e., forgiveness of self and forgiveness of uncontrollable situations) are meaningful variables related to driving and therefore, need to be included in future studies. Together, these findings suggest that it is not just a lack of forgiveness of other individuals (i.e., drivers) that is associated with driving aggression and driving anger, but also one's forgiveness toward oneself as well as the ability to forgive uncontrollable situations.

Third, the term 'aggressive driving', according to Dula and Gellar (2003), has been used inconsistently in the research leading these researchers to develop a more precise measure of dangerous driving behaviors that includes aggressive driving as a subscale. Expanding on the work by Moore and Dahlen (2008), the current findings demonstrated a significant positive correlation between the Dula Dangerous Driving Index (DDDI)-aggressive driving subscale and each of the Deffenbacher Driving Anger Expression (DAX) scale maladaptive subscales; a negative correlation with the DAX adaptive expression subscale; and a significant negative correlation with trait forgiveness (i.e., of others). In addition, hierarchical regression analysis, with DDDI-aggressive driving subscale as the dependent variable, was found to be similar to the DAX used by Moore and Dahlen. These findings further substantiate the findings that forgiveness of others is a significant predictor of driving aggression above and beyond that of the control variables (i.e., age, sex, and miles driven per week) and driving anger (Moore and Dahlen, 2008). Furthermore, the current results expand on previous findings by replicating results using an alternate measure of driving aggression that was developed to be more precise and consistent, regarding definitional quality. In sum, trait forgiveness of others was found to be negatively correlated with driving aggression, using two distinct measures of driving aggression,

and to account for the variance of the construct of aggressive driving above that of the control variables and driving anger.

In sum, these findings serve as the first known replication of Moore and Dahlen's (2008) previous findings. They further suggest that forgiveness of others is a meaningful variable related to driving anger and driving aggression. Theoretically, these findings provide further support for 1) the complex relationship between driving anger and driving aggression, 2) driving aggression has not been found to have a one-to-one positive correlation with driving anger, and therefore, 3) support for the utilization of the DDDI aggressive driving subscale to assess for driving aggression, as it may better account for the overlap between the negative emotion of anger and the behavior of aggression. Overall, the current findings support the notion that individuals, who are more forgiving, particularly of others, are less likely to engage in aggressive behaviors while driving.

Implications for Worthington's Model of Forgiveness and Health

Building on the findings of Moore and Dahlen (2008) and Kovácsová et al. (2014), the second analysis was developed to further examine the model of forgiveness and health proposed by Worthington et al. (2001). Forgiveness, as an emotion-focused coping strategy (Worthington & Scherer, 2004), has been hypothesized to affect health outcomes directly and through various mediators. These mediators include interpersonal functioning, social support, and health behaviors (Worthington, 2001). The theory has been supported in several studies examining forgiveness and multiple health-related outcomes outside the context of driving (e.g., Lawler et al., 2005; Webb et al., 2013; Webb et al., 2011). The current study is the first known study to use Worthington's model of forgiveness and health as applied to driving related behaviors and outcomes. To achieve this, dangerous driving was defined as a health-risk behavior and adverse

driving outcome(s) (i.e., traffic violations/citations, and motor-vehicle crashes) was defined as a health outcome. Results from the current study, provided partial support for the theory proposed by Worthington et al. (2001) such that no direct effect of forgiveness on the health outcome of adverse driving outcomes was observed. However, there was an indirect only relationship through the mediators of anger rumination, stress, and dangerous driving behaviors. These findings, though partially consistent with Worthington's model, provide important theoretical and practical implications for future research.

Unforgiveness has been defined by Worthington and colleagues as a cluster of negative emotions (i.e., resentment, bitterness, hostility, hatred, anger, and fear) that develop in response to rumination on a perceived wrong (Worthington, Sandage, & Berry, 2000; Worthington & Wade, 1999). Unforgiveness is thought to act similarly to chronic stress through the hyper-arousal stress response (Harris & Thoresen, 2005). Results from the current study demonstrated a moderate negative bivariate correlation between each of the dimensions of forgiveness and both anger rumination and stress. These results further support the theory that forgiveness is one way, among many, to ameliorate the negative emotions and rumination that define unforgiveness. However, by definition, unforgiveness is assumed to be intertwined with the constructs of stress, anger, and rumination (Toussaint & Webb, 2005); however, Worthington et al.'s theoretical model does not include stress, anger, or rumination as potential mediators, therefore, assuming that forgiveness affects health through these constructs without direct study. Findings from the current study are contrary to the current assumption of not accounting for anger rumination and stress. The findings suggest added utility in examining stress and anger rumination as mediators of the relationship between forgiveness and health outcomes. The current study demonstrated that both anger rumination and stress are unique and meaningful

mediators of the relationship between forgiveness and adverse driving outcomes. The current findings suggest that although a *direct* effect of forgiveness on health outcomes, through the amelioration of unforgiveness, may be conceptually useful, these findings suggest that when included as mediators anger rumination and stress alter the relationship between forgiveness and adverse driving outcomes in varied ways. For example, when controlling for anger rumination and including stress as a mediator a *positive* indirect only relationship was observed through stress on adverse driving outcomes. Whereas, in contrast, with anger rumination as a mediator and controlling for stress, a *negative* indirect only relationship was observed between forgiveness of others and adverse driving outcomes.

In sum, the current results suggest that the model proposed by Worthington et al. (2001) is a useful model in examining the relationship between forgiveness and driving outcomes. Similar to other research outside the context of driving, forgiveness does not appear to have a direct impact on some health outcomes; however, functions through various mediators. In addition, results from the current study demonstrate that including stress and anger rumination as unique mediators varied the relationship between dimensions of forgiveness and adverse driving outcomes, and including these as unique mediators may be theoretically and practically useful. Therefore, further research is needed to parse out the role of both stress and anger rumination as mediators of the relationship between forgiveness and health outcomes.

Implications for Adverse Driving Outcomes

To date, only three research articles have been published examining the association between forgiveness and dangerous driving behaviors (Takaku et al., 2006; Moore & Dahlen, 2008; and Kovácsová, Rošková, & Lajunen, 2014), and none examining the relationship between multiple dimensions of forgiveness and adverse driving outcomes. Therefore, the current study

supports and expands on the current literature to include multiple dimensions of forgiveness as well as adverse driving outcomes as a dependent variable. The current findings have specific implications for the direct and indirect association of forgiveness on adverse driving outcomes, collection of data related to adverse driving outcomes, and the role of multiple dimensions of forgiveness related to driving.

Direct and Indirect Effects of Forgiveness on Adverse Driving Outcomes

Contrary to stated hypotheses, no total and no direct effect was observed for the relationship between any of the dimensions of forgiveness and any of the adverse driving outcomes; however, an indirect only effect was observed for adverse driving outcomes within the past 5 years. Although not as predicted, the current results are consistent with other research examining multiple dimensions of forgiveness and health outcomes outside the context of driving (e.g., Webb et al., 2013; Webb et al., 2011), such that multiple dimensions of forgiveness have been found to have an indirect only relationship with various health outcome measures (e.g., Webb et al., 2011). These findings further support the use of mediation statistical methods described by Hayes and colleagues. Given that no direct effect was observed between forgiveness and adverse driving outcomes, methods described by Baron and Kenny would not have indicated examining the indirect relationship and potentially missing meaningful information. Therefore, the current findings further support the role that forgiveness plays in health outcomes through an indirect only effect, one which could have been easily missed using alternate mediation analyses.

Collection of Data for Adverse Driving Outcomes

In contrast to stated hypotheses, a significant effect of the model was found only for adverse driving outcomes (i.e., MVC's and tickets/warnings) within the *past 5 years* and no significant effect of the model was found for adverse driving variables within the *past 12 months*. Although inconsistent with stated hypothesis, the findings are logical after reviewing the participant data. The current results indicated a very low number of reported adverse driving outcomes within the past 5 year period and fewer within a 12 month period. It is likely that these types of adverse driving outcomes are a relatively infrequent occurrence for any one individual. Therefore, an implication from this study is that an individual's reported number of adverse driving outcomes over the past 5 years may be a better indicator of dangerous driving behaviors than over a 12 month period. In addition, reported adverse driving outcomes over the past 5 years may have greater variability and therefore, allow for greater statistical power to examine differences on other variables. Finally, based on current findings self-reported adverse driving outcomes, although easily queried, may not be the best indicator of adverse driving outcomes. Other examples may include in-vehicle cameras to assess for near misses, technology to assess risky driving (e.g., GPS speed data), and use of driving simulators. In combination, it appears future studies, examining adverse driving outcomes, would benefit from querying adverse driving outcomes over the past 5 years if seeking self-report data, and developing novel ways to assess adverse driving outcomes.

Role of Multiple Dimensions of Forgiveness on Driving Outcomes

The current study expanded on previous research, which only examined forgiveness of others in the context of driving anger and driving aggression (i.e., Moore and Dahlen, 2008; and Kovácsová et al., 2014), to include forgiveness of self and forgiveness of uncontrollable

situations in association therewith. Previous research has demonstrated that multiple dimensions of forgiveness (i.e., of self and of others) are varied in their relationship to personality traits (Ross et al., 2004), facets of anger rumination (Barber, Maltby, & Macaskill, 2005), and stress (e.g., Lawler et al., 2005; and Thompson et al., 2005). In addition, research outside the context of driving has demonstrated varied relationships between multiple dimensions of forgiveness and health outcomes based on dimension of forgiveness, health outcome, and mediator studied (e.g., Webb, Dula, & Brewer, 2012). As predicted, the current findings further demonstrate the varied association between multiple dimensions of forgiveness and health outcomes, specifically adverse driving outcomes.

Dimensions of forgiveness on adverse driving through anger rumination. Based on previous research and current findings, it appears that multiple dimensions of forgiveness (i.e., of self, of others, and of uncontrollable situations) are indirectly related to adverse driving outcomes through anger rumination and dangerous driving behaviors in serial. These findings are supported by Barber et al. (2005) which demonstrated that both forgiveness of others and forgiveness of self were related to anger rumination, however, that anger memories were the most associated with forgiveness of self, whereas, revenge thoughts were most associated with forgiveness of others. In conjunction these findings suggest that although multiple dimensions of forgiveness are related to anger rumination, they are likely to impact driving outcomes through distinct facets of anger rumination. For example, a driver may be engaged in anger rumination related to a violation by another individual (e.g., being cut off in traffic); as the perpetrator or directed toward the self (e.g., telling off a co-worker); or at the situation (e.g., being stuck in traffic). It would stand to reason that these three instances could potentially impact driving performance in different ways (e.g., driving aggression, inattention, and/or risky driving

behaviors). Therefore, a meaningful association between forgiveness and adverse driving outcomes has been shown through anger rumination and dangerous driving behaviors; however, it is likely that the specific pathway through facets of these mediators is varied based on dimension of forgiveness examined.

Dimensions of forgiveness on adverse driving through stress. As previously stated, an unexpected and unexplained irregularity was observed between forgiveness of others and adverse driving outcomes within the past 5 years, with only stress as a mediator; and with stress and dangerous driving behaviors as mediators, in serial. Based on previous research in this area (Moore and Dahlen, 2008; Kovácsová et al.. 2014) and current findings demonstrating: 1) positive bivariate correlations between each of the dimensions of forgiveness, 2) negative bivariate correlations between dimensions of forgiveness and anger rumination, stress, and dangerous driving behaviors, and 3) findings that forgiveness of self and forgiveness of uncontrollable situations demonstrated a *negative* relationship with adverse driving outcomes through stress, it was expected that forgiveness of others would also have a *negative direct* association with adverse driving; however, the opposite was observed. Although, no specific research is available that would explain this relationship it is possible, for the sake of future research, to speculate on this irregularity. It is possible that when anger rumination is controlled for, in addition to the other control variables, it significantly alters the relationship between forgiveness of others and stress and therefore, driving-related variables. The confound of 'pseudo-forgiveness' may be a possible explanation for the irregular and unexpected results. Pseudo-forgiveness "occurs when an offender fails to acknowledge wrongdoing and accept responsibility" (Hall & Fincham, 2005, p. 626). Therefore, the measure of forgiveness of others, after accounting/controlling for rumination and anger, key components of the definition of

unforgiveness, may actually be a better indicator of pseudo-forgiveness. For example, respondents may indicate a high level of forgiveness of others without truly experiencing the negative emotions and rumination associated with unforgiveness. They may also use other strategies such as denial or retribution (pseudo-forgiveness; see Hall & Fincham, 2005) instead of true forgiveness which may on the surface appear resolute, but may in fact create unrecognized/unacknowledged stress. In addition, it is possible that increased levels of reported forgiveness of others may create a significant amount of stress to the victim, after accounting for the variance attributed to anger rumination. For example, an individual that tends to be more regularly forgiving of others, may in fact absorb some of the responsibility for the wrong-doing, and thus may acquire more stress. In addition, extraneous variables such as self-esteem, assertiveness, personality factors (e.g., narcissism), etc. may be important and unaccounted for variables in this research study. Although speculation of this irregularity may be useful in future research designs it is relatively unclear, at this point, as to why this unexpected relationship was found.

In sum, the current findings further support and expand on previous research related to forgiveness and driving particularly multiple dimensions of forgiveness and adverse driving outcomes. The current findings suggest that forgiveness, though not directly related to adverse driving outcomes, is indirectly related through the mediators of anger rumination, stress, and dangerous driving behaviors. This association between forgiveness and adverse driving outcomes is varied based on dimension of forgiveness, mediator(s), and adverse driving outcome being examined. Therefore, the current study suggests that 1) future research should utilize statistical methods sensitive to indirect only effects, 2) examine adverse driving outcomes across

multiple time periods (e.g., 12 months, 5 years) through multimodal methods, and 3) account for and measure forgiveness as a multidimensional construct.

Limitations

Although the current findings are consistent with previous research, in general, and provide further support for the relationship between forgivingness and driving, the results are not without limitation. First, data from the current study was collected using a cross-sectional sampling design. The self-report data was collected over the course of three college semesters using an online, anonymous self-report questionnaire. Cross-sectional analysis is a limiting factor because of the inability to adequately control for possible confounding variables (e.g., attention to task, cell-phone use, etc.). The current study was not a controlled experimental design and only variables of interest are theoretically controlled for (e.g., age, driving history, etc.), leaving various other possibly extraneous variables unaccounted for. Furthermore, cross-sectional designs are limited in their ability to definitively assign cause and effect relationships between variables. Although, multiple regression analyses were conducted, suggesting a directional relationship between the current variables, it is possible that variations in the cause-effect direction may exist. For example, it is possible that engaging in dangerous driving behaviors (e.g., risky driving) might lead to more anger rumination and therefore, lower levels of forgiveness, which in turn could lead to increased adverse driving outcomes. In addition, approximately 65% of those that initially completed the questionnaire for extra credit were not included in the final analyses based on exclusions previously stated. It may be that those that did not adequately complete the questionnaire are in some way different (e.g., more impulsive) than those that were included. Therefore, the use of a cross-sectional study design was useful in

obtaining a large sample size in a rather short length of time; however, it represents a limitation to the current findings.

Second, the current series of analyses were conducted utilizing an undergraduate college sample that was awarded extra credit for participation. The original participant pool (N = 712), those who completed an adequate amount of the study to receive extra credit, was significantly reduced (N = 492-analysis 1, and N = 476-analysis 2) when accounting for impossible/unrealistic answers and/or failure to complete at least ½ of the items in a scale to be included in the analyses. The participants lost from the study, had they taken the time to adequately and realistically complete the study, may have provided unique and potentially meaningful data. Based on generalizations, it is likely that undergraduate students, especially those concerned with extra credit, may be significantly different from the general population ages 18-24. Furthermore, the sample was drawn from a regional university that is located in a small metro county (CDC, 2014c) within a predominately rural region. It is reasonable to assume that the driving conditions experienced by most drivers in the sample, would not be comparable to a medium to large urban county. Therefore, limitations exist regarding the generalizability of these findings.

Third, a low number of reported adverse driving outcomes were reported by the participants included in the analyses. As previously stated: 67% of the sample did not have a ticket/warning within the last 12 months; 40% did not report having had a ticket/warning within the last 5 years; 78% reported not having any MVCs in the last 12 months; and 55% reported zero MVCs in the last 5 years. These results suggest that the majority of the sample, if accurately responding, have had few if any adverse driving outcomes in the last 12 months and/or 5 years. These results may be characteristics unique to the current sample (i.e., college students attending

a non-urban regional university) and may significantly limit the ability to generalize the findings to other drivers.

Fourth, the current study relied specifically on participant self-report of traffic violations and MVCs. Although this is a commonly used way to obtain adverse driving outcomes (e.g. Dula & Ballard, 2003; Fabiano et al., 2011; Fischer et al., 2007; Lonczak, Neighbors, & Donovan, 2007) it represents a significant limitation to the current study. As stated by Boyce and Gellar (2002) the traffic safety literature has serious "short-comings" due to an "over-reliance" on the use of self-report data (p. 52). In general, this type of inquiry relies on the individual's memory of previous episodes and honesty in accurately reporting information. In addition, self-report data may be susceptible to socially desirable responding. For example, Lajunen, Corry, Summala, & Hartley (1997) reported a significant negative correlation between driver social desirability and reported MVCs, incident of speeding, and overtaking frequency; such that, those drivers who scored higher on the social desirability measure reported fewer socially undesirable driving behaviors. Although an attempt to control for social desirability was included in analysis 2, results may still be susceptible to this response bias. In the current study, social desirability was found to have a significant negative bivariate correlation with anger rumination (r = -.444, p d .01), stress (r = -.394, p d .01), and dangerous driving behaviors (r = -.307, p d .01). Therefore stating that individuals responding in a more socially desirable way reported a lower level of anger rumination, stress, and/or dangerous driving behaviors. In addition, a significant positive relationship was observed for social desirability and each of the dimensions of forgiveness, such that individuals who had higher levels of social desirability reported more forgiveness of self (r = .291, p d .01), forgiveness of others (r = .383, p d .01), and/or forgiveness of uncontrollable situations (r = .349, p d .01). However, no significant correlation was observed between social

desirability and any of the adverse driving outcomes. Support has been shown for the use of the Driver Social Desirability Scale (Lajunen et al., 1997) which may help to better account for driving specific social desirability and may be useful in future research studies.

Fifth, driving is considered a complex skill that develops almost to the point of being automatic (Ma & Kaber, 2007). The automatic and at times habitual nature of driving may impact an individual's awareness and therefore, responses on a self-report measure. Furthermore suggesting, that a driver who regularly engages in risky driving behaviors may over estimate their driving ability and underestimate frequency and/or intensity of risky driving behaviors (see Deery, 1999 for review and theoretical conceptualization). In addition, drivers overall tend to report a higher level of safe driving behaviors and fewer dangerous/risky driving behaviors. For example, Horswill, Waylen, and Tofield (2004) found that drivers rated themselves as safer, more skillful, slower, and less accident liable than their peers and the average driver. The current study found similar results. For example, when asked to rate their overall level of driving skill on a Likert scale from 1 (could not be worse) to 7 (could not be better), the mean score was 5.01 (*SD* =1.01) with a mode of 5, suggesting an overall elevated impression of self-reported driving skill. Furthermore, skill rating was found to be significantly correlated with forgiveness of uncontrollable situations in a positive manner (r = .103, p d .05), and negatively with stress (r = -.100, p d .05), suggesting that drivers who rate their skill as higher, report a higher level of forgiveness of uncontrollable situations and lower stress. In sum, these findings suggest that drivers tend to overestimate their driving skill and may underestimate, or be unaware of, dangerous driving behaviors.

Sixth, a significant challenge in measuring forgiveness is distinguishing true forgiveness from pseudo-forgiveness (Tangney et al., 2005). For example, in to the context of forgiveness of

self, Fisher and Exline (2006) found that taking responsibility for a given action, accompanied with self-forgiveness, was associated with higher pro-social behaviors as compared to those who did not accept responsibility and quickly absolved feelings of guilt. Researchers have suggested that in contrast to pseudo-forgiveness, true forgiveness requires the offender to acknowledge and take responsibility for the wrongdoing (Hall & Fincham, 2005), and is initiated from feelings of guilt, shame, anger, personal distress, and/or remorse (Rangganandhan & Todorov, 2010; Wilson, Milosevic, Carroll, Hart, & Hibbard, 2008; Wohl, Deshea, & Wahkinney, 2008). Although pseudo-forgiveness may work to alleviate some of the negative consequences of (un)forgiveness, it may not help the individual to become fully aware of or accept the consequences of theirs or others' actions (Hall & Fincham, 2005). This lack of awareness may lead drivers to engage or continue to engage in risky/dangerous driving behaviors, even in the face of adverse driving outcomes.

Finally, because of the lack of research in this area, it is likely that a third-variable may better/additionally account for the variance explained by the multiple dimensions of forgiveness on adverse driving outcomes, through anger rumination, stress, and dangerous driving behaviors. For example, recent research suggests that mindfulness (defined as a health behavior) is a significant mediator of the relationship between dimensions of forgiveness and physical and mental health (Webb, Phillips, Bumgarner, & Conway-Williams, 2013). In addition, mindfulness has been found to be significantly related to driver situation awareness in a driving simulator (Kass, VanWormer, Mikulas, Legan, & Bumgarner, 2011). Indeed, statistically significant bivariate correlations were observed in a follow-up analysis of this study, such that the Mindful Attention and Awareness Scale (Brown & Ryan, 2003) was positively correlated with each dimension of forgiveness (i.e., of self, r = .413, p d .01; of others, r = .250, p d .01; and of

uncontrollable situations, r = .371, p d .01), and negatively correlated with anger rumination (r = -.479, p d .01), stress (r = -.520, p d .01), dangerous driving behaviors (r = -.287, p d .01), and tickets/warnings within the last 12 months (r = -.094, p d .05) and 5 years (r = -.100, p d .05). These results are not surprising, given the nature of driving as a complex/dynamic skill that requires attention and awareness, and in the context of previous research related to mindfulness and driving. In addition to mindfulness, other factors such as cell-phone use while driving, alcohol and/or substance use, deficits in attention (i.e., Attention-deficit Hyperactivity Disorder, ADHD), emotion regulation, intelligence level, and/or personality traits may be factors related to adverse driving outcomes. Therefore, further research is needed to account for the potential impact of a third variable related to forgiveness and adverse driving outcomes.

Future Research

Research examining the relationship between forgiveness and health has expanded over the past 20+ years. Based on the current study and previous research, multiple dimensions of forgiveness appear to be significantly related to driving behaviors and adverse driving outcomes. However, to date very little research has been published in this area (i.e., three studies) and further research is needed.

First, the current and previous research findings were based on self-report data. According to Boyce and Gellar (2002), the use of self-report data is a significant deficit in the driving literature. Therefore, further research should examine the relationship between forgiveness and adverse driving outcomes through the use of actual Department of Motor Vehicle records/legal records and/or in a simulated driving environment. Driving simulation would allow for consistency of the driving environment and as a way to compare participant's performance with their peers. A driving simulator would also provide the ability to increase the

number and likelihood of adverse driving outcomes as well as track various driving behaviors (e.g., speeding, lane deviations, reaction time, and divided attention tasks). Furthermore, it might be possible to manipulate the setting to increase levels of (un)forgiveness, driving aggression, and/or stress. For example, prior to or during the driving scenario, participants could be asked to think of or write about an incident that provokes (un)forgiveness. The insertion of a priming task would serve to induce a temporary state of unforgiveness and driving performance could be compared to a control group. In addition, the controlled environment would allow for the tracking of external/physiological measures, such as heart rate, skin conductance, electroencephalogram (EEG), neuroimaging, and/or eye tracking. Therefore, the use of a driving simulation and/or real-life driving data would allow for a more robust and potentially accurate measure of driving performance and driving outcomes.

Second, more research is needed in the area of developing measures to distinguish pseudo-forgiveness and true-forgiveness. As previously stated, distinguishing true forgiveness from pseudo-forgiveness has been cited as a significant confound for forgiveness researchers (Tangney et al., 2005). Forgiveness, by definition, is one way to alleviate the negative symptoms associated with (un)forgiveness such as rumination, anger, and negative feelings, thoughts, and behaviors (e.g., Toussaint & Webb, 2005). Therefore, for forgiveness to be necessary and granted (e.g., to self, to others, to uncontrollable situations) the construct of unforgiveness must first exist, and the victim would be required to experience these negative feelings, etc. prior to the process of forgiveness. In theory, an individual could report a high level of forgiveness (e.g., forgiveness of self), when in reality, they are not experiencing any negative effects and therefore, automatically letting themselves off the hook (Hall & Fincham, 2005). Forgiveness, contrary to some lay definitions, is not condoning, excusing, or forgetting (Enright, 1996; Exline et al.,

2003). Worthington and Scherer (2004) state that forgiveness is both a decisional and emotional process. For example, the decision to forgive could be granted (i.e., decisional), but the negative emotions continue to persist (i.e., emotional). It is likely that some people may consider themselves to be "forgiving" of others, but instead use other coping strategies to minimize or reduce the negative effects of (un)forgiveness. For example individuals may use denial, retribution, and/or transference (Hall & Fincham, 2005) and thus may not be actually engaging in 'true forgiveness'. Therefore, further research is needed to develop and validate measures that account for the confound of true- vs. pseudo-forgiveness (Hall & Fincham, 2005). For example, future assessment of forgiveness, in addition to forgiveness specific measures, might include a battery of items that query the various factors that constitute (un)forgiveness (e.g., anger rumination, stress, guilt, and/or negative affect) and therefore, providing added control of pseudo-forgiveness (see Fisher & Exline, 2006, regarding pseudo-forgiveness and self-forgiveness).

Third, based on the connection between forgiveness and health as well as recently between forgiveness and driving, it may be optimal to incorporate forgiveness into a comprehensive driver education program. Forgiveness group trainings are available (Worthington, 2006) that can be completed in as little as six hours. It is possible that specific components may be extracted or modified to increase forgiveness inside and outside the driving context. This type of course may be particularly useful for young drivers. In addition, the course could provide exercises/simulations that demonstrate the effect of unforgiveness (i.e., negative emotions and rumination) on driving. Finally, this type of program could potentially utilize self-report measures of forgiveness, anger rumination, stress, and dangerous driving behaviors to increase awareness of these connections as well as applied to driving performance. Therefore,

further research into the driving-specific components of forgiveness as well as possible ways to train drivers to increase forgivingness, both inside and outside (e.g., Worthington, 2006a, 2006b) the driving context, is warranted.

Finally, further statistical analyses, possibly utilizing the existing data set, may be feasible and prudent. For example, it may be possible to further isolate the significant pathways through which dimensions of forgiveness work on adverse driving outcomes through various mediators or subscales of the DDDI. For example, conducting similar multiple regression analyses parsing out the subscales of the DDDI (i.e., negative emotions while driving, aggressive driving, and risky driving). This might provide more specific points of data to further isolate the relevant mediators of the indirect relationship between multiple dimensions of forgiveness and adverse driving outcomes. In addition, it may be possible to further parse out the data to examine males vs. females, high-risk vs. low-risk drivers, as well as controlling for other possible confounding variables (e.g., attention, mindfulness, personality factors, etc.).

Conclusion

The current findings further support the meaningful impact of multiple dimensions of forgiveness on driving-related variables. Given that adverse driving outcomes such as MVCs, and traffic tickets/warnings can have significant personal and social impacts (e.g., injury, cost to society, death), it is imperative that researchers continue to examine variables that can potentially hinder or improve driving behaviors and outcomes. Although significant advances in external driving features such as anti-lock brakes, automated braking systems, and airbags have decreased the number of serious injuries related to MVCs (Heaps, 2010), less work has been done on internal driver-specific factors (Recarte & Nunes, 2000; 2003), for example dimensions of forgiveness. The current findings, in concert with previous findings, suggest that forgiveness of

self and forgiveness of uncontrollable situations, in addition to forgiveness of others, are significantly related to fewer adverse driving outcomes over the past 5 years. These findings, although not without limitation, suggest that interventions to recognize, manage, and potentially decrease unforgiveness, both while engaged in driving and non-driving activities, may decrease the frequency or intensity of adverse driving outcomes for young drivers. For example, assessing an individual's trait level of forgiveness (i.e., of self, of others, and of uncontrollable situations), anger rumination, stress, and dangerous driving behaviors may provide useful data to predict future adverse driving outcomes and allow for early interventions targeting these variables. In sum, the current study provides 1) the next logical step toward demonstrating the impact of forgiveness on driving behaviors and adverse driving outcomes 2) that more research is needed to explore the relationship between forgiveness and driving, and 3) that research should move toward developing intervention programs to target multiple dimensions of forgiveness in young drivers.

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APPENDICES

Appendix A

Driving Demographic Questionnaire

1. Sex (M, F, Other)
2. How old are you? ____ ____ age
3. What is highest grade or year of regular school you have completed?
4. Are you currently married, divorced, separated, widowed, or single?
5. How often do you drive a motor vehicle, regardless of whether it is for work or for personal use?
   Never Few Days a Year Few Days a Week Almost every day (or more)
6. How many years/months have you been driving?_____Years _____Months
7. What kind of vehicle do you drive most often?
   Car, Van, SUV, Pickup Truck, Other Truck, Motorcycle, Other
   a. Make_____; Model_____; Year_____
8. Now, thinking about the roads you normally drive on, would you say that the roads where you drive most often are in areas that are:
   More urban than rural 1, More rural than urban 2, About the same 3
9. On average how many miles per week do you typically drive?_____
10. As the driver, how many times have you been in a vehicle crash in the past 12 months?
    a. Of those crashes how many were you found to be "at fault" for _____
11. As the driver, how many times have you been in a vehicle crash in the past 5 years?
    a. Of those crashes how many were you found to be "at fault" for _____
12. Was anyone injured in that crash (only count injuries that required medical attention)?
    Respondent, Someone Else, Both Respondent and Other Person Injured, No one Injured
13. Within the past 12 months, how many times have you:
    a. Gotten a ticket/warning for speeding _____ (number)
    b. Gotten a ticket/warning for reckless driving _____(number)
    c. Gotten a ticket/warning for stop light infraction _____ (number)
    d. Gotten a ticket/warning for stop sign infraction _____ (number
    e. Been convicted of a DWI or DUI _____ (number)
    f. Other ticket/warning not listed _____(number): specify _____
    g. Had your license suspended as a result of claims or points _____ (number)
    h. Had your car insurance canceled as a result of claims or points ___(number)
14. Within the past 5 years, how many times have you:
    a. Gotten a ticket/warning for speeding _____ (number)
    b. Gotten a ticket/warning for reckless driving _____(number)
    c. Gotten a ticket/warning for stop light infraction _____ (number)
    d. Gotten a ticket/warning for stop sign infraction _____ (number
    e. Been convicted of a DWI or DUI _____ (number)
    f. Other ticket/warning not listed _____(number): specify _____
    g. Had your license suspended as a result of claims or points _____ (number)
    h. Had your car insurance canceled as a result of claims or points ___(number)

Appendix B

Trait Forgiveness Scale

Directions: Indicate the degree to which you agree or disagree with each statement below by using the following scale: 1=strongly disagree, 2=mildly disagree, 3=agree and disagree equally, 4=mildly agree, and 5=strongly agree

——— 1. People close to me probably think I hold a grudge too long.

——— 2. I can forgive a friend for almost anything.

——— 3. If someone treats me badly, I treat him or her the same.

——— 4. I try to forgive others even when they don't feel guilty for what they did.

——— 5. I can usually forgive and forget an insult.

——— 6. I feel bitter about many of my relationships.

——— 7. Even after I forgive someone, things often come back to me that I resent.

——— 8. There are some things for which I could never forgive even a loved one.

——— 9. I have always forgiven those who have hurt me.

——— 10. I am a forgiving person.

Appendix C

Deffenbacher Driving Anger Scale

Instructions: Imagine that each situation described below was actually happening to you and rate the amount of anger that would be provoked.

none at all	a little	some	much	very much
1	2	3	4	5

1. Someone is weaving in and out of traffic.
2. A slow vehicle on a mountain road will not pull over and let people by.
3. Someone backs right out in front of you without looking.
4. Someone runs a red light or stop sign.
5. You pass a radar speed trap.
6. Someone speeds up when your try to pass him/her.
7. Someone is slow in parking and is holding up traffic.
8. You are stuck in a traffic jam.
9. Someone makes an obscene gesture toward you about your driving.
10. Someone honks at you about your driving.
11. A bicyclist is riding in the middle of the lane and is slowing traffic.
12. A police officer pulls you over.
13. A truck kicks up sand or gravel on the car you are driving.
14. You are driving behind a large truck and you cannot see around it.

Appendix D

Driving Anger Expression Inventory

Directions: 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 fill in the bubble to the right of the 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	Sometimes	Often	Almost Always
0	1	2	3

1. I give the other driver the finger.
2. I drive right up on the other driver's bumper.
3. I drive a little faster than I was.
4. I try to cut in front of the other driver.
5. I call the other driver names aloud.
6. I make negative comments about the other driver
7. I follow right behind the other driver for a long time.
8. I try to get out of the car and tell the other driver off.
9. I yell questions like "Where did you get your license?"
10. I roll down the window to help communicate my anger.
11. I glare at the other driver.
12. I shake my fist at the other driver.
13. I stick my tongue out at the other driver.
14. I call the other driver names under my breath.
15. I speed up to frustrate the other driver.
16. I purposely block the other driver from doing what he/she wants to do.
17. I bump the other driver's bumper with mine.
18. I go crazy behind the wheel.
19. I leave my brights on in the other driver's rear view mirror.
20. I try to force the other driver to the side of the road.
21. I try to scare the other driver.
22. I do to other drivers what they did to me.
23. I pay even closer attention to being a safe driver.
24. I think about things that distract me from thinking about the other driver.
25. I think things through before I respond.
26. I try to think of positive solutions to deal with the situation.
27. I drive a lot faster than I was.
28. I swear at the other driver aloud.
29. I tell myself it's not worth getting all mad about.
30. I decide not to stoop to their level.
31. I swear at the other driver under my breath.
32. I turn on the radio or music to calm down.
33. I flash my lights at the other driver.

34. I make hostile gestures other than giving the finger.
35. I try to think of positive things to do.
36. I tell myself it's not worth getting involved in.
37. I shake my head at the other driver.
38. I yell at the other driver.
39. I make negative comments about the other driver under my breath.
40. I give the other driver a dirty look.
41. I try to get out of the car and have a physical fight with the other driver.
42. I just try to accept that there are bad drivers on the road.
43. I think things like "Where did you get your license?"
44. I do things like take deep breaths to calm down.
45. I just try and accept that there are frustrating situations while driving.
46. I slow down to frustrate the other driver.
47. I think about things that distract me from the frustration on the road.
48. I tell myself to ignore it.
49. I pay even closer attention to other's driving to avoid accidents.

Appendix E

Dula Dangerous Driving Index

Participants received the following written directions: “Please answer each of honestly as possible. Please read each item carefully and the following items as then fill in the bubble/circle of the answer you choose on the form. If none of the choices seem to be your ideal answer, then select the answer that comes closest. THERE ARE NO RIGHT OR WRONG ANSWERS. Select your answers quickly and do not spend too much time analyzing your answers. You may change any answer(s) at any time before completing this form. If you do change an answer, please erase the previous mark(s) entirely.”

1. I drive when I am angry or upset. (NE)
2. I lose my temper when driving. (NE)
3. I consider the actions of other drivers to be inappropriate or “stupid.” (NE)
4. I flash my headlights when I am annoyed by another driver. (AD)
5. I make rude gestures (e.g., giving “the finger,” yelling curse words) toward drivers who annoy me. (AD)
6. I verbally insult drivers who annoy me. (AD)
7. I deliberately use my car/truck to block drivers who tailgate me. (AD)
8. If another driver seriously threatens my safety, I would defend myself. (0)
9. I would tailgate a driver who annoys me. (AD)
10. I “drag race” other drivers at stop lights to get out front. (RD)
11. I will illegally pass a car/truck that is going too slowly. (RD)
12. I feel it is my right to strike back in some way, if I feel another driver has been aggressive toward me. (AD)
13. When I get stuck in a traffic jam, I get very irritated. (NE)
14. I will race a slow moving train to a railroad crossing. (RD)
15. I will weave in and out of slower traffic. (RD)
16. I will drive if I am only mildly intoxicated or buzzed. (RD)
17. When someone cuts me off, I feel I should punish his/her. (AD)
18. I get impatient and/or upset when I fall behind schedule when I am driving. (NE)
19. Passengers in my car/truck tell me to calm down. (NE)
20. I get irritated when a car/truck in front of me slows down for no reason. (NE)
21. I will cross double yellow lines to see if I can pass a slow moving car/ truck. (RD)
22. I feel it is my right to get where I need to go as quickly as possible. (RD)
23. I am an aggressive driver. (0)
24. I feel that passive drivers should learn how to drive or stay home. (NE)
25. I keep some type of weapon in my car/truck. (0)
26. I will drive in the shoulder lane or median to get around a traffic jam. (RD)
27. When passing a car/truck on a 2-lane road, I will barely miss on-coming cars. (RD)
28. I will drive when I am drunk. (RD)
29. I feel that I may lose my temper if I have to confront another driver. (NE)
30. I consider myself to be a risk-taker. (RD)
31. I feel that most traffic “laws” could be considered as suggestions. (RD)

**Note. Subscale items are denoted as follows: AD = aggressive driving; NE = negative emotions while driving; RD = risky driving; 0 = item omitted from sub- scales. Participants responded to the items with the following Likert scale: A = never, B = rarely, C = sometimes, D = often, E = always.

Appendix F

Heartland Forgiveness Scale

Directions: In the course of our lives negative things may occur because of our own actions, the actions of others, or circumstances beyond our control. For some time after these events, we may have negative thoughts or feelings about ourselves, others, or the situation. Think about how you typically respond to such negative events. Next to each of the following items write the number (from the 7-point scale below) that best describes how you typically respond to the type of negative situation described. There are no right or wrong answers. Please be as open as possible in your answers.

1	2	3	4	5	6	7
Almost Always False of Me		More Often False of Me		More Often True of Me		Almost Always True of Me

____ 1. Although I feel bad at first when I mess up, over time I can give myself some slack.

____ 2. I hold grudges against myself for negative things I've done.

____ 3. Learning from bad things that I've done helps me get over them.

____ 4. It is really hard for me to accept myself once I've messed up.

____ 5. With time I am understanding of myself for mistakes I've made.

____ 6. I don't stop criticizing myself for negative things I've felt, thought, said, or done.

____ 7. I continue to punish a person who has done something that I think is wrong.

____ 8. With time I am understanding of others for the mistakes they've made.

____ 9. I continue to be hard on others who have hurt me.

____ 10. Although others have hurt me in the past, I have eventually been able to see them as good people.

____ 11. If others mistreat me, I continue to think badly of them.

____ 12. When someone disappoints me, I can eventually move past it.

____ 13. When things go wrong for reasons that can't be controlled, I get stuck in negative thoughts about it.

____ 14. With time I can be understanding of bad circumstances in my life.

____ 15. If I am disappointed by uncontrollable circumstances in my life, I continue to think negatively about them.

____ 16. I eventually make peace with bad situations in my life.

____ 17. It's really hard for me to accept negative situations that aren't anybody's fault.

____ 18. Eventually I let go of negative thoughts about bad circumstances that are beyond anyone's control.

Appendix G

Depression, Anxiety and Stress Scale 21: Stress subscale

Please read each statement and circle number 0, 1, 2, or 3 that indicates how much the statement applied to you *over the past week.* There are no right or wrong answers. No not spend too much time on any statement.

The rating scale is as follows:
0 Did not apply to me at all
1 Applied to me to some degree, or some of the time
2 Applied to me to a considerable degree, or a good part of time
3 Applied to me very much, or most of the time

1. I found myself getting upset by quite trivial things
2. I tended to over-react to situations
3. I found it difficult to relax
4. I found myself getting upset rather easily
5. I felt that I was using a lot of nervous energy
6. I found myself getting impatient when I was delayed in any way (eg, elevators, traffic lights, being kept waiting)
7. I felt that I was rather touchy

Appendix H

Anger Rumination Scale

Please read each statement and rate each item on a scale from 1= “almost never” to 4 = “almost always” in terms of how well the items correspond to your belief about yourself. There are no right or wrong answers. No not spend too much time on any statement.

1. I re-enact the anger episode in my mind after it has happened
2. When something makes me angry, I turn this matter over and over again in my mind
3. Memories of even minor annoyances bother me for a while
4. Whenever I experience anger, I keep thinking about it for a while
5. After an argument is over, I keep fighting with this person in my imagination
6. Memories of being aggravated pop up into my mind before I fall asleep
7. I have long living fantasies of revenge after the conflict is over
8. When someone makes me angry I can’t stop thinking about how to get back at this person
9. I have day dreams and fantasies of violent nature
10. I have difficulty forgiving people who have hurt me
11. I ponder about the injustices that have been done to me
12. I keep thinking about events that angered me for a long time
13. I feel angry about certain things in my life
14. I ruminate about my past anger experiences
15. I think about certain events from a long time ago and they still make me angry
16. I think about the reasons people treat me badly
17. When someone provokes me, I keep wondering why this should have happened to me
18. I analyze events that make me angry
19. I have had times when I could not stop being preoccupied with a particular conflict

Appendix I

Marlowe-Crowne Social Desirability Scale

Reynolds Short Form C

1. It is sometimes hard for me to go on with my work if I am not encouraged.

2. I sometimes feel resentful when I don't get my way.

3. On a few occasions, I have given up doing something because I thought too little of my ability.

4. There have been times when I felt like rebelling against people in authority even though I knew they were right.

5. No matter who I'm talking to, I'm always a good listener.

6. There have been occasions when I took advantage of someone.

7. I'm always willing to admit it when I make a mistake.

8. I sometimes try to get even rather than forgive and forget.

9. I am always courteous, even to people who are disagreeable.

10. I have never been irked when people expressed ideas very different from my own.

11. There have times when I was quite jealous of the good fortune of others.

12. I am sometimes irritated by people who ask favors of me.

13. I have never deliberately said something that hurt someone's feelings.

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