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Further Investigating the Predictors of Aggressive Driving: Vulnerable Narcissism, Implicit Self-Esteem, and Rebelliousness

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Further Investigating the Predictors of Aggressive Driving:

Vulnerable Narcissism, Implicit Self-Esteem, and Rebelliousness

By

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Further investigating the predictors of aggressive driving:

Vulnerable narcissism, implicit self-esteem, and rebelliousness

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October 20th, 2021

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ABSTRACT

Aggressive driving is a dangerous and common occurrence that is steadily on the rise. The aim of the current study was to further investigate three constructs: narcissism, self-esteem, and rebelliousness; and their role in aggressive driving. All three constructs predict aggressive driving as singular concepts; however, their subtypes have not been separately examined using a North American sample. In particular, this study explored whether vulnerable narcissism, implicit self-esteem, and both proactive and reactive rebelliousness could predict aggressive driving behaviour. This study also aimed to investigate how the constructs of narcissism, self-esteem, and rebelliousness relate to each other. One hundred and ninety-four participants completed an online survey consisting of an implicit association test and questionnaires assessing driving behaviour, personality, and self-esteem. Multiple regression analyses revealed that vulnerable narcissism and both subtypes of rebelliousness significantly predicted aggressive driving. Further, mediation analyses showed that both reactive and proactive rebelliousness mediated the relationship between vulnerable narcissism and aggressive driving. These findings suggest that vulnerable narcissism may be an important predictor of aggressive driving. The results also suggest that future research should measure both subtypes of narcissism and rebelliousness when examining these constructs as possible motivators of aggressive behaviour.

DEDICATION

To Dave, I wish I could tell you all about this research.

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LIST OF ABBREVIATIONS/SYMBOLS

ADBS   Aggressive Driving Behaviour Scale

DAX   Driving Anger Expression Inventory

DT   Dark Triad

FFNI   Five-Factor Narcissism Inventory

HSNS   Hypersensitive Narcissism Scale

IAT   Implicit Association Test

NPI   Narcissistic Personality Inventory

PADS   Propensity for Angry Driving Scale

PNI   Pathological Narcissism Inventory

RSES   Rosenberg Self-Esteem Scale

RQ   Rebelliousness Questionnaire

CHAPTER I

Introduction

Most people can recall a time when they felt anger in response to a driving situation. Previous research has demonstrated that experiencing anger while driving results in more frequent aggressive driving behaviours (Precht et al., 2017). This anger often results from provocation of other drivers (e.g., when another driver is blocking your path). This has prompted many researchers to ask the question: if aggressive driving results from provocation, then can we predict who is more likely to react aggressively? Multiple studies have been conducted assessing different driving scenarios and motivations behind driving behaviour. Whereas the personality trait of narcissism is a strong predictor of aggressive driving (Edwards et al., 2013; Schreer, 2002), no study has assessed narcissism based on its two subtypes: grandiose and vulnerable using a North American sample. Additionally, self-esteem is also a predictor of aggressive driving; however, the findings are contradictory as to its precise relation. The presence of mixed findings could be the result of the measurement of self-esteem, as no study has examined implicit self-esteem and its relation to aggressive driving. Lastly, the personality dimension of rebelliousness has also been associated with risky and aggressive behaviour, including aggressive driving (Lafreniere et al., 2021); however, the two subtypes of rebelliousness have not been investigated. The current study aimed to determine whether the two subtypes of narcissism, the constituents of self-esteem, and the two subtypes of rebelliousness differ in their association with aggressive driving. By understanding the predictors of aggressive driving, we can enhance driver training and create interventions to help prevent this dangerous behaviour.

Defining Aggressive Driving

In a recent census, 12.6 million Canadians reported that they drove a car to work every day (Statistics Canada, 2019). Commuting by car has become a fact of life for many people and can almost seem like an automatic task; however, the high prevalence of aggressive driving suggests that this volume of commuters may pose a significant danger to society (Statistics Canada, 2019). Previous research shows a high prevalence rate for experiencing anger while driving. In one study, participants journaled how often they became angry while driving; results showed that incidents of driving anger occurred more than daily (Neighbors et al., 2002). These incidents of driving anger were often accompanied by an aggressive behavioural response, which varied from mild (e.g., honking their horn) to extreme (e.g., chasing another driver). Furthermore, in a national survey from 2014, 86% of participants reported engaging in at least one aggressive driving behaviour at least once during a two-year period (Stephens & Fitzharris, 2017).

Aggressive driving is estimated to be partially responsible for more than half of all vehicle crashes in North America and is the leading cause of traffic crashes and injuries – even above other common factors such as texting and alcohol consumption (AAA Foundation for Traffic Safety, 2009). Previous research has demonstrated that negative emotional reactions (like anger) divert our attention from the primary task at hand (Frijda, 1986). However, another study found that anger resulted in more frequent aggressive driving behaviours, but not more frequent driving errors. Therefore, driving anger is said to create danger due to willful behaviours, not simply cognitive overload (Precht et al., 2017). These statistics become more alarming given recent studies showing that aggressive driving is steadily on the rise, with fatal motor vehicle collisions caused

by aggressive driving increasing 56% between 2003 and 2007 (AAA Foundation for Traffic Safety, 2009). More recently, aggressive driving-related deaths increased by 80% in Ontario between 2016 to 2017 (Shum, 2017). These statistics show that in reality, commuting to work every day can be inconspicuously dangerous.

Although there is ample research on driving aggression, there is no consistent definition of the behaviour, as many researchers from around the world define it differently. For example, Lajunen et al. (1998, p. 108) defined driving aggression as "any form of driving behaviour that is intended to injure or harm other road users physically or psychologically." For comparison, Edwards et al. (2013, p. 192) defined aggressive driving as "an aggressive behavioural response to provocation while driving." Many other researchers define aggressive driving through a range of behaviours such as tailgating, horn-honking, making obscene gestures, and deliberately obstructing the path of other vehicles (Schreer, 2002). Studies using driving simulators can measure aggressive driving by observing behaviours such as speeding, following lead vehicles too closely, and making unsafe lane changes. These behaviours are more likely to be made by aggressive drivers, and can directly or indirectly endanger others on the road (Tasca, 2000). The present study will use the more recent definition of aggressive driving (Edwards et al., 2013), as this better encompasses the goal of this study.

Aggressive driving is also related to the concept of road rage, defined as "the constellation of thoughts, feelings, and behaviours that result when an individual perceives an unjustified provocation while driving" (Britt & Garrity, 2003, p. 55). In Ontario, aggressive driving behaviours such as speeding and tailgating can result in fines and license suspensions; however, these behaviours often go unnoticed or untracked

(Surmanski, 2018). Many cities throughout Ontario have hotlines and online webpages where aggressive and dangerous driving can be reported. Road rage is not mentioned in the Criminal Code or Highway Traffic Act, although it can lead to other criminal charges such as dangerous driving or careless driving (Surmanski, 2018). Furthermore, behaviours associated with road rage are usually considered criminal offenses (e.g., dangerous driving), whereas those associated with aggressive driving are often considered traffic offenses (O'Brien, 2011; Tasca, 2000). Many researchers agree that aggressive driving behaviour occurs on a continuum with acts ranging from the benign (e.g., making an obscene gesture) to the violent (e.g., deliberately blocking another driver's path). Road rage would often better describe those behaviours at the extreme end of the continuum; however, the terms 'road rage' and 'aggressive driving' are often used interchangeably by researchers and in the media (O'Brien, 2011). Britt and Garrity (2003) argued that the term 'road rage' helps to capture the breadth of an individual's responses to an anger-provoking situation when driving, whereas other researchers argued that this term does little to aid in the understanding of aggressive driving behaviour (Elliott, 1999).

The lack of a constant definition of aggressive driving has created many ambiguities throughout the research (O'Brien, 2011). In previous attempts to establish a suitable working definition, researchers have identified three recurring themes within the domain of aggressive driving. The first theme is *emotion* as aggressive driving behaviour often appears to be driven by negative emotions like anger and rage. The second theme is *intentionality* as many researchers suggest that aggressive driving is more closely related to risk-taking behaviours regardless of whether these behaviours are intentional

(Deffenbacher et al., 2007). Lastly, the third theme is *behaviour*, although this theme is more disputed amongst researchers. Tasca (2000) states that common behaviours associated with aggressive driving (e.g., speeding and tailgating) should only be considered as such when they are combined with the other themes, emotion and intent, as this creates the potential for others' endangerment. However, other researchers argue that these behaviours do not need emotion and intent to cause harm (Dula & Geller, 2003). These three themes need to be considered when conducting research on aggressive driving since they permit the investigation of the phenomenon through multiple perspectives (O'Brien, 2011).

As a consequence of the inconsistent definition, there are many approaches to measuring aggressive driving that examine different aspects. Some instruments examine the emotional, cognitive, or motivational aspects of aggressive driving and measure constructs such as driver stress (Glendon et al., 1993) or driver anger (Deffenbacher et al., 1994). For example, a commonly used measure is the Propensity for Angry Driving Scale (PADS) which was designed to identify individuals with the greatest propensity to become angry while driving, and therefore engage in aggressive driving behaviours (DePasquale et al., 2001). As previously mentioned, intentionality is an important theme within aggressive driving behaviour. However, intent can either be measured by an individual's self-report of past intent (such as with the PADS) or inferred by an observer of a person's overt behaviour -- both of which are subject to bias and inaccuracy (Houston et al., 2003).

As a result of this, many aggressive driving measures focus on describing observable driving behaviour without incorporating emotional or motivational states.

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Examples of instruments which focus on behaviour are the Aggressive Driving

Behaviour Scale (ADBS; Houston et al., 2003) and the Driving Anger Expression

Inventory (DAX; Deffenbacher et al., 2002). The ADBS focuses on behaviours that are

most commonly associated with aggressive driving and has two subscales: speeding and

conflict behaviour. The DAX investigates a wider range of behaviours, and has three

subscales: verbal aggression expression, personal physical aggression expression, and use

of a vehicle to express anger. It also includes an adaptive/constructive expression

subscale that measures cognitive and behavioural strategies for safe driving, problem-

solving, and cognitively reframing the situation. Both instruments assess aggressive

driving by determining the frequency of aggressive driving behaviour displayed by the

individual in the past. Although self-report measures are still subject to bias, these

instruments may offer a more valid representation of an individual's aggressive driving

behaviour (Houston et al., 2003).

Theories of Aggressive Driving

One of the first explanations of aggressive driving was the frustration-aggression

hypothesis. Originally proposed by Dollard et al. (1939), the frustration-aggression

hypothesis makes two claims about the origin of aggression. First, it suggests that

frustration, defined as the blocking or thwarting of an ongoing goal, leads to some form

of aggression. In a driving scenario, this can consist of driving behind a slow driver or

having another vehicle obstruct your path. Second, the hypothesis claims that aggression

always stems from frustration (Dollard et al., 1939). However, research does not fully

support either axiom of this hypothesis as frustrating driving situations do not always

lead to aggression, and aggressive behaviours on the road are often mediated by many

situational factors. For example, a common frustrating driving situation is traffic congestion, which led researchers to hypothesize that drivers who are more frequently exposed to traffic congestion would resort to aggressive driving behaviours more frequently than drivers who are not (Shinar, 1998). Research does not support this hypothesis as results show traffic congestion does not increase driver aggression (Lajunen et al., 1999). In contrast, a situational factor that influences aggressive expressions is the ambient temperature as a study found a positive correlation between horn-honking and increasing temperatures (Kenrick & MacFarlane, 1986).

Based on these shortcomings of the original formulation, the frustration-aggression hypothesis was reformulated to include the influence of situational factors. Berkowitz (1989) proposed that personal attributions and negative affect play an important role in whether frustration prompts aggressive behaviour. The reformulation suggested that aggression would result from frustration only in situations where the frustrator was unpleasant enough to produce an intense emotion (e.g., anger). Further, the amount of anger experienced in different situations also depends on the individual interpretation of the particular situation and the characteristics of the situation (Berkowitz, 1989). Multiple studies support this reformulation such as the study conducted by Precht et al. (2017) which demonstrated that the impact of anger on driving violations depended on the intensity of said anger. Only severe anger triggered by threats or provocations from another driver increased driving aggression, whereas anger caused by conflict with a passenger or while conversing on the phone did not increase aggression. More recent studies suggest further convolutions in aggression expression with how social and cultural norms may play a role in determining the behavioural

response to frustration. For example, Leander et al. (2020) demonstrated a frustration-*affirmation* model where frustration created by thwarted goals produced both violent and non-violent responses depending on the perceived norms for the behaviour.

Another commonly cited theory of driving aggression is Weiner's attributional theory. Attribution theories generally focus on how individuals interpret events, and how these interpretations influence their thinking and behaviour (Weiner, 1993). In driving situations, how an individual interprets another driver's behaviour may play a crucial role in whether their response is aggressive or neutral (Lustman et al., 2010). Previous research found that individuals tend to assign situational attributions (e.g., distracting stimuli in the environment) to their own behaviour when committing a traffic violation but assign dispositional attributions (e.g., personality) when explaining another driver's behaviour (Baxter et al., 1990). This pattern of thought may lead individuals to underestimate the amount of frustration their driving behaviour may create in other drivers. Furthermore, Lennon and Watson (2015) found that drivers who attributed a stable or internal cause to other driver's behaviour (e.g., believing the other driver is a dangerous person) were more likely to display aggressive behaviour than drivers who attributed a situational cause (e.g., believing the other driver made a mistake).

These findings reflect the actor-observer bias wherein individuals tend to overestimate dispositional and underestimate situational causes of the behaviours of others, but attribute situational as opposed to dispositional causes to their own behaviours (Jones & Nisbett, 1971). This bias occurs due to differences in visual perspective of an event (e.g., when we evaluate our own actions, we mainly focus on the situation) and due to differences in knowledge and experience of the self versus others (Jones & Nisbett,

1971). The actor-observer bias is also similar to the fundamental attribution error, which states that people have a tendency to underestimate the degree to which behaviour is externally caused (Sabini et al., 2001). For example, Harre et al. (2004) found that participants attributed "showing off, acting cool" significantly more for friends' risky driving behaviours than for self, and attributed "in a hurry, late" significantly more for themselves than for friends. Similarly, a study conducted in Denmark revealed that drivers used more non-hostile attributions (e.g., being frightened) when explaining their own anger expression but used more hostile attributions (e.g., not being able to control their own anger) for other drivers (Møller & Haustein, 2018). These phenomena can cause aggressive drivers to view their behaviour as justified given the circumstances (e.g., congested traffic; Lennon & Watson, 2011). Many studies on the attributions of driving behaviour reflect this hypothesis as aggressive retaliation is often milder when driver intent is less clear and not the result of deliberate hostility (Lennon & Watson, 2011).

Predictors of Aggressive Driving

Researchers have identified multiple predictors of aggressive driving such as demographics, situational antecedents, and individual factors. Many studies examining aggressive driving assessed the demographic characteristics of the individuals who displayed higher levels of driver aggression. Most notably, being young and being male are seemingly the best demographic predictors of aggressive driving (Hennessy & Wiesenthal, 2001; Tasca, 2000). Previous research on gender differences in traffic behaviour found that men are more frequently involved in accidents and traffic violations and often have more serious accidents (Matović et al., 2020; McGarva et al., 2006). A

study by González-Iglesias et al. (2012) revealed men displayed higher levels of physical aggression while driving (e.g., making hostile gestures towards the other driver). These findings are ascribed to males' higher extent of anger, lower perception of fear, and inability to control emotional arousal (González-Iglesias et al., 2012). However, gender disparities tend to be contingent upon many individual factors such as level of education attained, hometown location (rural or urban), or driving situation (Fountas et al., 2019). For example, research using the driving anger scale has shown that men are more angered by police presence and slow driving, whereas women are more angered by illegal driving behaviour and traffic obstructions (Deffenbacher et al., 1994). A more recent study found that gender differences may be the result of men and women adopting different driving styles. In a sample of Spanish drivers, men scored higher in aggressive and risky driving styles while women scored higher in careful and anxious styles (Padilla et al., 2020).

The concept of driving anger was originally proposed by Deffenbacher et al. (1994) and is commonly examined in research as a predictor of driving aggression. Deffenbacher et al. (1994, p. 84) defined driving anger as "the extent to which anger is experienced in driving-related contexts" and thus, those with higher trait driving anger become angry more frequently and experience more intense anger while operating a vehicle. Multiple studies have linked higher driving anger with driving aggression (Dahlen et al., 2012; Lajunen & Parker, 2001; Zhang & Chan, 2016). A meta-analysis by Bogdan et al. (2016) found a positive relationship between driving anger and aggressive driving behaviour. However, previous research states that the relationship between driving anger and aggression partially depends on multiple factors such as demographic characteristics and traffic enforcement. For example, higher driving anger is reported in

younger people (Lajunen & Parker, 2001). A meta-analysis conducted on the association between driving anger and driving outcomes showed that driving anger was a stronger predictor of risky driving among younger drivers than among older drivers (Zhang & Chan, 2016). Additionally, a study conducted in the United Kingdom found that driving anger provoked by impeding the driver's progress was higher in areas without police presence (Stanojević et al., 2018).

Previous research also suggests that driving aggression can be explained by situational factors and time demands. One example of situational factors would be the level of interaction between drivers in a given situation, including the window of time available for retaliation. Observing a driver disobey traffic laws (e.g., speeding) may make another driver angry; however, this anger cannot be directly expressed to the speeding driver. Situations involving closer interactions between drivers (e.g., taking someone's parking spot) can lead to extreme aggression (Lajunen & Parker, 2001). Furthermore, research has shown that aggressive reactions in driving situations vary according to the characteristics of the situation. For example, situations involving direct hostility and reckless driving display stronger aggressive reactions (Lajunen & Parker, 2001). Situational factors can also be dependent on time pressure. In a recent driving simulator study, drivers were randomly assigned to one of three time categories: hurried, very hurried, and a control group. In both hurried groups, the drivers selected higher speeds and displayed riskier driving behaviours (e.g., accepted smaller gaps on left turns; Fitzpatrick et al., 2017).

Research has investigated drivers' self-esteem and its relationship with aggressive driving. Self-esteem is defined as the way in which individuals evaluate themselves and

their own worth (Leary & Baumeister, 2000). Research suggests that inflated self-esteem is a strong predictor of aggressive driving (Britt & Garrity, 2006; Schreer, 2002). Researchers argue that driving aggression is often caused by individuals perceiving other drivers' actions as personal threats, which motivates them to retaliate in order to vindicate their self-esteem (Neighbors et al., 2002). These findings go against the common wisdom that low self-esteem is associated with aggression. According to this theory, people with low self-esteem are motivated to act aggressively towards others who challenge their self-worth because their feelings of inferiority may make them want to harm those they see as better than themselves (Horney, 1950; Toch, 1993); however, many studies show mixed results. For example, one study found the combination of high self-esteem and high narcissism produced the highest levels of aggression (Bushman et al., 2009). In contrast, another study found that low self-esteem was associated with reactive aggression (e.g., unplanned, defensive), whereas narcissism (synonymous with high self-esteem) was associated with proactive aggression (e.g., planned, calculated; Amad et al., 2020). Additional research supports these findings, including one study of a Polish population wherein high levels of narcissism and low self-esteem predicted aggressive driving (Przepiorka et al., 2014).

It has been recently argued that the relationship between self-esteem and driving aggression may stem from psychological security. Humans are biologically predisposed to continue living and to fear death (Greenberg, 2020), referred to as terror management theory. This suggests that "humans' acute awareness of death has the potential to cause terrifying anxiety and adversely affect psychological well-being because it is at odds with the evolutionarily rooted motive to survive" (Juhl & Routledge, 2016, p. 99). The anxiety

that is created when people are reminded of their mortality is known as mortality salience

(Schmeichel et al., 2009). Psychological buffers such as self-esteem and meaning in life

created by our culture act as protection from this anxiety (Greenberg et al., 1997).

Research has demonstrated that heightening the awareness of death increases anxiety, and

decreases well-being in individuals who lack these psychological buffers (Juhl &

Routledge, 2016). In driving aggression research, one study found that participants with

high driving-related self-esteem reported greater intentions to take driving risks when

exposed to death-related (rather than neutral) facts and images (Carey & Sarma, 2011).

When an individual is cut off by another driver in traffic, that individual may be

momentarily reminded of their mortality and thus, may feel the need to respond

aggressively.

Personality and Aggressive Driving

Although multiple factors including demographics, situational factors, and self-

esteem can help predict driving aggression, perhaps the most significant predictor is

personality. Researchers have investigated the link between driving aggression with

many personality traits, including the Big Five: Agreeableness, Conscientiousness,

Extraversion, Neuroticism, and Openness to Experience (Goldberg, 1993). Dahlen et al.

(2012) found a negative relation between aggressive driving and each of agreeableness,

conscientiousness, and emotional stability (neuroticism). This study measured driving

behaviour using the DAX, and collected driver outcomes (e.g., how many accidents the

participant has been involved in). Personality variables accounted for 36% of the variance

in aggressive driving behaviours. Sumer et al. (2019) similarly found that neuroticism

was a significant predictor of motor vehicle collisions. Additionally, both agreeableness

and conscientiousness were negatively associated with vengeful and aggressive behaviours on the road. However, a recent meta-analysis found no relationship between driving aggression and neuroticism, and only a weak association between aggression and each of agreeableness and extraversion (Iancu et al., 2016). In fact, the only significant predictor of driving aggression was the Aggression – Hostility complex of the Alternative Five Model of personality. Driving aggression can often be described as hostile aggression towards another driver (e.g., impulsive and motivated by anger); therefore, it is no surprise the aggression-hostility complex is strongly related (Iancu et al., 2016).

More recently, research has begun to examine the Dark Triad (DT) personality traits as predictors of aggressive driving behaviors. The DT consists of three interrelated traits: narcissism (motivated by ego-reinforcement and sense of entitlement), Machiavellianism (characterized by manipulation and pursuit of power), and psychopathy (defined by callous affect and impulsive behaviour in pursuit of short term goals; see Ball et al., 2018; Paulus & Williams, 2002). Previous research demonstrates that all three DT traits correlate positively with participants scores on the PADS. Moreover, structural equation modelling showed that general aggression fully mediated the relationship between the DT and driving aggression (Ball et al., 2018). A similar study showed that the DT offered incremental validity over the Big Five personality traits (Burtaverde et al., 2016). In other words, the DT predicted driving aggression after controlling for the Big Five. The results demonstrated that Machiavellianism showed incremental validity in predicting physical driving aggression, and narcissism showed incremental validity in predicting verbal driving aggression (Burtaverde et al., 2016). Finally, previous research suggests that the DT can predict riskier driving attitudes (e.g., speeding and joyriding)

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even in young drivers (Endriulaitiene et al., 2018). In all of these studies, the personality trait of narcissism plays an important role in predicting driving aggression.

Narcissism and Aggressive Driving

The present study will focus on narcissism and its prediction of driving aggression. People who display high trait narcissism are described as selfish individuals who lack empathy for others, have inflated self-views, feel superior to others, and often only value others when it is in their favor (Bushman et al., 2018). Narcissism can take one of two forms, the extreme form being a personality disorder defined by a constant need for admiration and intense grandiosity. The present study will focus on narcissism in its less extreme form, as a personality trait. Previous research has shown a positive relationship between narcissism and provoked aggression in a variety of studies, with a stronger relationship between the trait and provoked aggression seen in children and adolescents (Rasmussen, 2016). These results are partially attributed to the fact that narcissistic behaviours are more prevalent in young adults (Foster et al., 2003). Furthermore, these findings are often attributed to how narcissists believe they are special and thus, deserve special treatment. When they do not receive this special treatment or believe they are not getting the respect they deserve, they display aggressive behaviour (Bushman et al., 2018). Researchers often characterize narcissists as having inflated but unstable self-esteem, making them more prone to vengeful behaviour (Rasmussen, 2016).

The trait of narcissism alone, without the other dark traits, is strongly associated with driving aggression (Bushman et al., 2018; Edwards et al., 2013; Lustman et al., 2010; Schreer, 2002). The first study to investigate narcissism and driving aggression revealed that two of the subscales of the Narcissistic Personality Inventory (NPI;

specifically, *Exhibitionism* for women and *Entitlement* for men) predicted aggressive

driving behaviour (Schreer, 2002). Aggressive driving was measured using a

questionnaire which asked participants to indicate how often they engage in various

aggressive driving behaviours (similar to the DAX or ADBS). This study suggested that

inflated self-esteem appears to play an important role in aggressive driving, contrary to

the popular belief that displaying aggressive behaviours is a result of low self-esteem and

inner self-doubts (Schreer, 2002). Another study presented individuals with varying

levels of trait narcissism with 10 driving scenarios, and asked them to indicate their level

of anger. Results showed that those higher in narcissism tended to act more aggressively

towards frustrating driver behaviour; however, this varied by gender and anger

experience, wherein men were more likely to react aggressively when experiencing high

levels of anger, and women when experiencing low levels of anger (Lustman et al.,

2010). Furthermore, women were more concerned about the risk of retaliation, and often

felt more comfortable displaying milder forms of aggressive driving behaviour (e.g.,

horn-honking). A study by Edwards et al. (2013) found that narcissism and trait driving

anger accounted for almost 50% of the explained variance in driving aggression

(measured using the DAX); however, narcissism explained unique variance above and

beyond driving anger.

Theory of Threatened Egotism

These findings have been attributed to the theory of threatened egotism in which

high by unstable self-esteem (also known as ego fragility) causes individuals to react

more aggressively when aggravated while driving (Baumeister et al., 1996). Narcissists

may perceive another driver's actions (e.g., cutting them off in traffic) as a personal

threat to their self-esteem; therefore, they retaliate by reciprocating an aggressive act (e.g., flashing their headlights; see Schreer, 2002). The theory of threatened egotism was first proposed by Baumeister et al. (1996), and has been used to predict other aggressive behaviours such as bullying, rape, and gang activity (Edwards et al., 2013). Schreer (2002) describes narcissists as people who approach every situation with their self-esteem at risk; therefore, this creates an anticipatory sensitivity to ego threats which warrants a hostile reaction from the individual (Edwards et al., 2013). The model of threatened egotism suggests that the presence of both an ego threat and narcissistic personality traits (e.g., high but unstable self-esteem) significantly interact to predict aggression.

As previously mentioned, research found that drivers who committed the actor-observer bias were more likely to display higher propensity for angry driving than drivers who did not (Lennon & Watson, 2015). Narcissists may be prone to committing the actor-observer bias when evaluating the behaviour of others, but also when evaluating their own behaviour (Lustman et al., 2010). This would create fluctuations in their self-worth, which may be the cause of their unstable self-esteem. Additionally, this may explain why narcissists tend to react aggressively to personal insults and negative feedback (Bushman & Baumeister, 1998). According to Lustman et al. (2010), individuals with stable self-esteem may be indifferent to ego threats because they are more likely to emphasize situational factors rather than dispositional traits. Narcissists may hold themselves to high standards and severely judge their self-worth causing them to take more personal responsibilities for their successes and failures. These high standards may lead to chronic feelings of inadequacy; yet while evaluating others,

narcissists can judge harshly without dampening their own self-esteem (Lustman et al., 2010).

Precisely how self-esteem factors into the narcissism-aggression association remains to be studied. Many researchers describe the relationship between narcissism and self-esteem as an additive construction that then influences aggression; however, recent findings have shown this may not be the case. In a study by Hart et al. (2019), multiple regression analyses revealed that the interaction between narcissism and self-esteem was linked to aggression, wherein the effects of narcissism on aggression were stronger among participants with low self-esteem than high self-esteem. In other words, narcissism accompanied with low self-esteem was related more strongly to antagonistic and aggressive behaviours (Hart et al., 2019). These results support previous findings in aggressive driving research which showed that narcissism and low self-esteem predicted aggressive driving (Przepiorka et al., 2014). However, additional findings from this study suggested that narcissists are not more aggressive due to their vulnerability to ego-threat because self-esteem did not modify effects of narcissism on psychological responses related to ego-threat (e.g., self-views that feature one's worthlessness). Rather, the authors proposed that narcissists with high self-esteem have a higher threshold for becoming aggressive; and when they do become aggressive, it is to assert their status rather than to vent their anger (Hart et al., 2019).

Grandiose and Vulnerable Narcissism

Researchers typically distinguish narcissism into one of two categories: grandiose and vulnerable. Grandiose narcissism is associated with feelings of entitlement, exhibitionism, and exploitative behaviours; whereas vulnerable narcissism is associated

with anxiety, defensiveness, and dependence on others (Rohmann et al., 2019). Grandiose narcissists are described as self-assured and socially competent, whereas vulnerable narcissists appear introverted and neurotic (Hart et al., 2017). The main difference between the two narcissism types is self-esteem, wherein grandiose narcissism is characterized by high self-esteem and vulnerable narcissism by low self-esteem (Rasmussen, 2016; Rohmann et al., 2019). However, vulnerable narcissism is further characterized by a particular sensitivity to ego threats, and is often described in the literature as thin-skinned and hypersensitive (Pincus & Lukowitsky, 2010). Due to this hypersensitivity, vulnerable narcissists have oscillating feelings of superiority and inferiority which causes their self-esteem to suffer (Rohmann et al., 2019). Both grandiose and vulnerable narcissism have been associated with aggression (Kjærvik & Bushman, 2021). Research comparing vulnerable narcissism and provoked aggression also finds a strong association between the two variables (Rasmussen, 2016). These findings may seem contradictory as previous research shows that those with grandiose narcissism (high self-esteem) are more likely to respond aggressively to provocations; however, these results suggest that the association between narcissism and provoked aggression would be observed regardless of high or low self-esteem (Rasmussen, 2016).

The two subtypes of narcissism also differ in how they are measured. The most frequently used measure of narcissism as a singular concept is the Narcissistic Personality Inventory (NPI; Raskin & Terry, 1988), which is a forced choice questionnaire where participants choose between two statements that best represents their personality. Raskin and Terry originally proposed that the NPI consisted of seven dimensions (authority, self-sufficiency, superiority, exhibitionism, exploitativeness, vanity, and entitlement);

however, subsequent analyses of the measure identify only two robust factors –

Leadership/Authority and Exhibitionism/Entitlement (Corry et al., 2008). Measures of

grandiose narcissism utilize these dimensions and focus on the sense of entitlement and

superiority aspect of the NPI to create scales that specifically measure narcissistic

grandiosity (e.g., NPI-16 and Narcissistic Grandiosity Scale). The original NPI often

displayed poor internal consistency and weak convergent validity; however, newer

subscales of grandiose narcissism corrected this with now satisfactory levels of

convergent, discriminant, and concurrent validity (Rosenthal et al., 2020).

Measures of vulnerable narcissism take a different approach and focus on

hypersensitivity and introversion. The most commonly used measure of vulnerable

narcissism is the Hypersensitive Narcissism Scale (HSNS; Hendin & Cheek, 1997),

which consists of ten items that participants rate on a five-point scale. The HSNS has

been reported as uncorrelated with the NPI; however, the clear distinction between

vulnerable and grandiose narcissism is not always apparent (Hendin & Cheek, 1997). For

example, Jauk & Kaufman (2018) found a non-linear relationship between grandiose and

vulnerable narcissism where grandiose and vulnerable narcissism were uncorrelated in

the lower range of grandiosity, but highly correlated in higher ranges of grandiosity.

Studies examining non-clinical populations show that grandiose and vulnerable

narcissism are essentially opposite (Hendin & Cheek, 1997; Miller & Campbell, 2008),

whereas studies examining clinical populations suggest grandiose narcissism is almost

always accompanied by vulnerable aspects (Pincus & Lukowitsky, 2010; Pincus et al.,

2014). Although the true relationship between the two types of narcissism is still debated

amongst researchers, these findings suggest that both types should be included when investigating behaviour and motivations.

Both types of narcissism can also be measured using a singular scale as opposed to two separate scales. Many narcissism measures examine multiple facets of the trait and allow researchers to measure both grandiose and vulnerable narcissism. The most widely used scale that measures both types of narcissism is the Pathological Narcissism Inventory (PNI), originally created by Pincus et al. (2009). The PNI measures seven facets: exploitation, grandiose fantasy, self-sacrificing self-enhancement (considered facets of grandiose narcissism), entitlement rage, contingent self-esteem, hiding the self, and devaluation (considered facets of vulnerable narcissism; Wright et al., 2010). Another commonly used scale that measures both types of narcissism is the Five-Factor Narcissism Inventory (FFNI; Glover et al., 2012). The FFNI consists of 15 facets and has been shown to measure other aspects of narcissism beyond grandiose and vulnerable (e.g., antagonism and neuroticism; Miller et al., 2016). However, these scales are most typically used when examining narcissism as a personality disorder, rather than a personality trait. The current study aimed to measure both types of narcissism as continuous personality variables and not as a personality disorder; therefore, two separate scales for grandiose and vulnerable narcissism were used in this study.

It is important to note the role that gender plays in the different types of narcissism. A widely held belief in psychology is that men tend to be higher in trait narcissism. A meta-analysis conducted by Grijalva et al. (2015) supported this claim showing stable gender differences across both age group and time (from 1990 to 2013). Further, this study also examined the facets of the NPI and vulnerable narcissism and

found that the gender differences in narcissism appears to be driven by both the Exploitative/Entitlement and Leadership/Authority facets of the NPI. However, they found no difference in gender on vulnerable narcissism. In contrast, other research shows that females tend to score higher on vulnerable narcissism measures (Pincus et al., 2009; Wright et al., 2010). A more recent study which examined narcissism gender differences within the context of intimate partner violence also supported this finding. They found that women scored higher on vulnerable narcissism, and showed no gender difference for grandiose narcissism (Valashjardi et al., 2020). In summary, research shows mixed results on the gender differences in narcissism, although most research seems to suggest the gender differences can be categorized based on these two subtypes (Valashjardi et al., 2020).

Returning to theories of narcissism and aggression, research suggests the link between vulnerable narcissism and aggression is due to narcissistic rage. The theory of narcissistic rage suggests that people high in narcissism feel attacked and exposed when they receive negative feedback, which thus causes them to experience rage (Kernberg, 1975). Findings from previous research demonstrated narcissistic vulnerability (but not grandiosity) were consistent with the ideas of narcissistic rage (Krizan & Johar, 2015). Furthermore, a study by Hart et al. (2017) tested both the rage and threatened egotism theories of narcissistic aggression using ego-threatening provocation. Their findings showed that both types of narcissism were associated with perceiving ego-threatening feedback as more truthful. However, grandiose narcissism was related to muted negative emotions and appraising the feedback as less devaluing of the self, whereas vulnerable narcissism was related to enhanced negative emotions (e.g., sadness), self-loathing, and

appraising negative feedback as both devaluing of the self and socially significant. Additionally, these results also showed the theory of narcissistic rage better predicted the anticipatory effects of vulnerable narcissism; however, neither the rage nor threatened egotism theories predicted the effects of grandiose narcissism (Hart et al., 2017). These findings are not entirely surprising as many researchers suggest that grandiose narcissism is only weakly related to egotism.

To our knowledge, only one study has examined vulnerable narcissism with aggressive driving behaviours. Dobrucali & Özkan (2021), tested the narcissism-impulsivity hypothesis by examining whether the relationship between vulnerable narcissism and aggressive driving is mediated by impulsivity. Impulsivity is characterized by poor self-control and fast decision making without consideration of negative consequences (Moeller et al., 2001). Both grandiose and vulnerable narcissism have been associated with impulsivity (Crysel et al., 2013; Malesza & Kaczmarek, 2018) The narcissism-impulsivity hypothesis suggests that individuals high in narcissism are impulsive and this causes them to react aggressively to insults or provocation (Vazire & Funder, 2006). Dobrucali & Özkan examined both types of narcissism using the FFNI-Short Form along with the DAX and the Barratt Impulsiveness Scale. They found that attentional impulsivity, defined as poorly focusing on the task, partially mediated the relationship between vulnerable narcissism and the use of a vehicle to express anger. Results also showed that grandiose narcissism moderated the relationship between attentional impulsivity and the use of a vehicle to express anger. These findings suggest that an individual's level of narcissism (both grandiose and vulnerable) and their level of impulsivity play a role in their expression of aggressive driving behaviours. However, it

should be noted that this study was conducted in Turkey and thus the findings cannot be generalized to all populations due to cultural differences (Dobrucali & Özkan, 2021).

Explicit and Implicit Self-Esteem

As previously mentioned, inflated self-esteem has been associated with both aggressive driving and narcissism. High self-esteem can be split into two forms: secure high self-esteem, associated with realistic, positive attitudes towards the self, and fragile high self-esteem, associated with feelings of self-worth that are susceptible to challenge and need constant validation (Zeigler-Hill, 2006). There are multiple ways in which these two forms of high self-esteem are distinguished, with discrepant explicit and implicit self-esteem being one of them (see Table 1 for a summary). Explicit self-esteem is defined as our conscious feelings of self-worth and acceptance, whereas, implicit self-esteem is our nonconscious and automatic feelings of self (Zeigler-Hill, 2006). Explicit self-esteem is often measured using self-reported questionnaires (e.g., Rosenberg Self-Esteem Scale (RSES); however, these measures are criticized for having a limited sensitivity for identifying individual differences and are likely to yield evaluation bias (Lannoy et al., 2020). Implicit self-esteem is measured using indirect measures (e.g., Implicit Association Test; IAT) that allow participants to make associations between positive and negative attributes with concepts of the self and others (Lannoy et al., 2020). These two types of self-esteem are best explained by the dual-process model which proposes that humans have two modes of processing: cognitive (conscious and rational) and experiential (nonconscious and automatic) (Zeigler-Hill, 2006). The cognitive system may be responsible for explicit self-esteem as this type is based on

logical analyses of self-relevant feedback, whereas the experiential system is more likely

to be responsible for implicit self-esteem (Bosson et al., 2003).

Table 1

Summary of the Main Differences Between Explicit and Implicit Self-Esteem

	Explicit Self-Esteem	Implicit Self-Esteem
Definition	Conscious feelings of self-worth	Non-conscious and automatic feelings of self
Dual Process Model	Cognitive Processing	Experiential Processing
Grandiose Narcissism	High	Low
Vulnerable Narcissism	Low	High (not supported by literature)

High self-esteem is often associated with markers of psychological adjustment as

some researchers have argued it promotes happiness and positive mental health (Taylor &

Brown, 1988; Zeigler-Hill, 2006). Other researchers claim that a moderate to high level

of self-esteem appears to be a prerequisite for healthy human functioning (Dijksterhuis,

2004). Previously, social psychology's core concepts were largely viewed as being

conscious processes; however, it is now recognized that automatic or unconscious

processes play an important role (Dijksterhuis, 2004). This shift created a focus on

implicit self-esteem and how it can also function as a psychological buffer, similar to

explicit self-esteem. Previous research found that individuals with low implicit self-

esteem show more anxiety during a confrontational interview and show lower levels of

aspiration after failure than individuals with high implicit self-esteem (Greenwald &

Farnham, 2000; Spalding & Hardin, 1999). Additionally, individuals with high implicit

self-esteem are less defensive in response to negative feedback (Dijksterhuis, 2004). It is

hypothesized that implicit self-esteem is activated as the automatic attitude toward the self when processing feedback. Therefore, individuals with high implicit self-esteem regulate negative self-related feedback better due to the release of positive, as opposed to negative, affect when the self is activated (Dijksterhuis, 2004). Previous research has even suggested that implicit self-esteem may be a stronger psychological buffer than explicit self-esteem.

Returning to the theory of terror management, its relation to both explicit and implicit self-esteem has also been examined. Schmeichel et al. (2009) conducted three experiments testing the hypothesis of mortality salience. The first experiment examined whether mortality salience increases defensiveness in individuals with low implicit self-esteem. The second examined whether boosting the implicit self-esteem of participants attenuates the effect of mortality salience. Finally, the third examined both explicit and implicit self-esteem and how they combine to influence reactions to mortality salience (Schmeichel et al., 2009). The findings of these experiments demonstrated overall that individuals with high implicit self-esteem had attenuated reactions to mortality salience. Furthermore, high explicit self-esteem was associated with responding to mortality salience but only when combined with low implicit self-esteem. Therefore, high implicit self-esteem appears to confer resilience in the face of psychological threats and may play an even bigger role than explicit self-esteem (Schmeichel et al., 2009).

Explicit and implicit self-esteem have also been examined in the two facets of narcissism with mixed results. Some research supports the Mask Model which suggests that those higher in grandiose narcissism show discrepant high self-esteem and have an inflated outward presentation of self-esteem to mask their true, dampened inward self-

esteem (Brown & Brunell, 2017). In other words, individuals with grandiose narcissism have high explicit self-esteem and low implicit self-esteem. For vulnerable narcissists, the opposite is proposed as they are hypothesized to display discrepant low self-esteem defined as low explicit self-esteem and high implicit self-esteem. Those with vulnerable narcissism do not immediately appear to be self-absorbed; however, with repeated interactions, one can begin to see entitlement (Brown & Brunell, 2017). Previous research has supported the mask hypothesis for grandiose narcissism, showing high scores on explicit self-esteem measures but low scores on implicit self-esteem measures (Jordan et al., 2003; Zeigler-Hill, 2006). However, in a meta-analysis conducted by Bosson et al. (2008), the hypothesis was not supported as they found no relation between narcissism and implicit self-esteem measures.

One explanation for these mixed results is that previous studies only used self-report measures and did not experimentally test the mask hypothesis. A few studies have examined this hypothesis experimentally using reaction times (Hardaker et al., 2019; Horvath & Morf, 2009). The rationale for these experiments is due to the narcissists' deep insecurity, which causes them to be on alert for self-threatening stimuli. These stimuli promote defensiveness and cause the narcissist to produce faster reaction times to self-threatening stimuli when the narcissists' fragility is subliminally exposed. However, although they will initially be hypervigilant, they will subsequently self-regulate to mask this vigilance to preserve their façade (Hardaker et al., 2019). This hypothesis has been supported by using lexical decision tasks which first expose participants subliminally to either a negative and self-relevant prime (e.g., failure) or neutral prime (e.g., note). Then the participants are presented with a string of letters that is either a word related to the

concept of worthlessness (e.g., incompetent), a neutral word (e.g., glass), a negative filler word (e.g., nasty), or a non-word (e.g., fiee). Results demonstrated that reaction times were faster to self-threatening stimuli when their fragility was subliminally exposed. When given more time (prime was left for 235 vs. 149 ms), narcissists took on a self-regulation response and showed reaction times equivalent to non-narcissists (Hardaker et al., 2019; Horvath & Morf, 2009).

Global Marker Model

Another theory of the relation between narcissism and implicit self-esteem is known as the global marker model. As previously mentioned, a commonly cited trait of narcissism is ego fragility. The global marker model proposes that implicit self-esteem is inversely related to ego fragility (Gregg & Sedikides, 2010). Therefore, if higher narcissism implies higher ego fragility, then higher narcissism should imply lower implicit self-esteem. Previous research supports this theory as implicit self-esteem has been found to covary negatively with signs of ego fragility such as verbal defensiveness (Kernis et al., 2008) and reactivity to threat (McGregor & Jordan, 2007). In a study by Gregg and Sedikides (2010), the global marker model was partially supported as implicit self-esteem covaried negatively with narcissism in two (out of three) studies. The results showed that individuals with the highest levels of narcissism had high explicit self-esteem and low implicit self-esteem. A more recent study investigated the relationship between explicit and implicit self-esteem and four facets of grandiose narcissism (self-sufficiency, leadership, vanity, and demand for admiration; see Pilch & Hyla, 2017). The results showed support for both the global marker model (for the self-sufficiency facet) and mask model (for the vanity facet).

The previous studies were testing the mask hypothesis with grandiose narcissism; however, vulnerable narcissism has also been examined. For vulnerable narcissists, the mask hypothesis is referred to as a Modest Mask because their low explicit self-esteem is said to function as a modesty façade to protect their inflated positive self-views as vulnerable narcissists are highly sensitive to social evaluation and base their self-worth off of other's feedback and approval (Brown & Brunell, 2017; Hendin & Cheek, 1997). In a study by Brown and Brunell (2017), both the mask and modest mask hypotheses were not supported by the results of two studies. However, interesting findings regarding grandiose and vulnerable narcissism were found using a bogus pipeline methodology, where participants were led to believe their responses were being monitored by a lie detector device, which typically facilitated more honest responses (Jones & Sigall, 1971). The participants were asked if they believe their self-esteem is at the level they typically report (e.g., high explicit self-esteem for grandiose narcissists and lower explicit self-esteem for vulnerable narcissists). Results showed that grandiose narcissists believe they have higher self-esteem whereas vulnerable narcissists believe they have lower self-esteem. The authors concluded that these findings suggest that narcissists' own sense of agency plays a role in their self-beliefs. Grandiose narcissists' self-esteem is boosted by their higher sense of agency, whereas the low self-esteem of vulnerable narcissists' is fueled by their lower sense of agency (Brown & Brunell, 2017).

Although narcissism has been frequently tied to high self-esteem (which has led to confusion and overlap between the two constructs; see Brummelman et al., 2016), previous research suggests that grandiose narcissism may not actually have significant associations with feelings of self-worth (Pincus et al., 2009). A study examining the

facets of pathological narcissism with self-esteem found that the grandiosity facet of the PNI was not associated with self-esteem, whereas the vulnerability facet was negatively associated with self-esteem (Zeigler-Hill & Besser, 2013). This negative association is attributed to the hypothesis that the vulnerable facet of narcissism is the only facet of narcissism that is associated with daily fluctuations of feelings of self-worth. Furthermore, the results revealed that vulnerable narcissism was the strongest predictor of self-esteem instability which might explain the complex and inconsistent associations between narcissism as a singular concept, rather than multiple facets, and self-esteem instability (Zeigler-Hill & Besser, 2013).

In summary, the literature suggests that both narcissism and self-esteem play an important but convoluted role in aggressive driving. Many of the studies reviewed appear to contradict one another; however, these findings may be a result of overlooking the intricate facets of the concepts being examined. For example, whereas trait narcissism has been investigated with driving aggression, most studies have only looked at narcissism as a whole and have neglected to decompose the trait. Additionally, self-esteem has also been investigated with driving aggression with mixed results. These findings might be explained by the lack of distinguishing between explicit and implicit self-esteem as research suggests this distinction yields important differences. For example, a recent study from France found that high implicit self-esteem is a significant predictor of dangerous mobile phone use (e.g., texting while driving), whereas explicit self-esteem was not related to mobile phone dependence or dangerous mobile phone use (Lannoy et al., 2020). Alternatively, previous research had found low self-esteem to be predictive of phone dependence and problematic phone use (Elhai et al., 2017). These findings support

the importance of examining self-esteem as two distinct psychological constructs rather than a singular construct (Lannoy et al., 2020).

Reversal Theory and Rebelliousness

The current study also further investigated the relationship of reversal theory and rebelliousness with aggressive driving. Reversal theory is a theory of motivation, personality, and emotion which proposes that our motives and emotions change depending on the meaning we attribute to a certain situation at a given time (Apter, 1982). The theory states that we can reverse between different motivational states which then allows us to change the meaning attributed to a situation. There are four meta-motivational domains containing two opposing states within them. The first domain is means-end which is comprised of the telic (or serious, motivated by achievement and future goals) and paratelic (or playful, motivated by enjoyment) states. The second domain revolves around rules where an individual is motivated by either operating within the expectations (conforming state) or their want to go against these rules (rebellious or negativistic state). The third domain is transactions which is represented by the mastery state (approaching a situation with control and power) and sympathy state (approaching a situation with care and compassion). The last domain is centered around relationships and is comprised of the autic (or self) state and alloic (or other) state. This domain refers to whether someone is motivated by their self-interests or by the interests of others (Apter, 1982).

Reversal theory proposes that we can reverse between the different states depending on various factors such as our framing of the situation, frustration, or by something "triggering" this reversal. For example, the presence of a traffic sign may

invoke the conforming state of the rules domain for an individual who is driving (Apter, 2007). This suggests that one's personality is not a permanent asset but rather a reversing tendency changing in accordance with different situations and environments. Reversal theory goes against many basic assumptions within psychology such as consistency in personality and homeostasis in theories of motivation (Apter, 1989). However, the theory provides an explanation for an inherent inconsistency and self-contradictory behaviour that individuals can display and shows the complexity of human behaviour in suggesting that individuals not only differ from each other but also from themselves at different times (Apter, 1989). The theory also proposes that individuals have an inherent tendency to adopt one motivational style over the other. In other words, an individual may reverse into a conforming state but if they are negativistic dominant, they will more frequently reverse back into a rebellious state. This is referred to as dominance and can help explain why there is some level of consistency of behaviour within individuals (Apter, 1989).

The meta-motivational states of reversal theory can be measured in multiple ways. Some scales measure an individual's motivational state at a particular point in time (e.g., the Reversal Theory State Measure; Desselles et al., 2014). This allows researchers to investigate how motivational states may change after specific events (e.g., stressful events) and can help us understand intra-individual changes. However, most reversal theory research focuses on state or meta-motivational dominance (e.g., the Social Reactivity Scale which measures whether a person is dominant in the rebellious state; McDermott, 1988). These measures often ask questions about different scenarios and asks how the individual would most likely react or how frequently an individual behaves in a particular way. The Motivational Style Profile (Apter et al., 1998) is most commonly

used as it allows for the measurement of all eight meta-motivational states and computes a dominance score for each state.

Rebelliousness and Aggressive Driving

The current study will focus on the rebellious (or negativistic) state of the rules domain within reversal theory. Rebelliousness as a construct refers to whether an individual follows or does not follow rules or expectations. Previous research has shown that individuals who tend to be rebellious (or are negativistic dominant) also tend to participate in various risky behaviors such as risky sexual behaviours and risky health behaviours (Lafreniere et al., 2013). Rebelliousness has also been shown to predict aggressive driving. Lafreniere et al. (2021) examined an individual's propensity for aggressive driving with motivational tendencies and showed that individuals higher in impulsivity and rebelliousness also showed a greater propensity for aggressive driving. However, this study examined rebelliousness as a singular concept and did not distinguish between the two types of rebelliousness: proactive and reactive.

Proactive rebelliousness is defined as seeking rebellious activity for fun or pleasure whereas reactive rebelliousness is characterized by vindictive or vengeful behaviour (McDermott, 1988). Both types of rebelliousness have been shown to predict different types of risky behaviour at varying levels. For example, proactive rebelliousness was shown to be especially influential in predicting illicit drug use and other illegal and aggressive behaviours (Lafreniere et al., 2013). Proactive and reactive rebelliousness were included within this study because they directly relate to the other constructs. Proactive rebelliousness is similar to proactive aggression which is aggression that is purposeful or planned. Both proactive rebelliousness and aggression involve the

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individual actively pursuing the rebellious or aggressive behaviour (Amad et al., 2020; McDermott, 1988). Alternatively, reactive rebelliousness is similar to reactive aggression as both involve behaviour that is defensive in nature and often done in the heat of the moment in reaction to a perceived threat (Amad et al., 2020). As previously mentioned, a recent study found that high self-esteem (narcissism) was associated with proactive aggression and low self-esteem was associated with reactive aggression. The authors concluded that people with low self-esteem are prone to greater reactive aggression from their anger and hostility while those with high self-esteem often act in planned aggression to achieve a goal (Amad et al., 2020). Further, a recent meta-analysis conducted by Kjærvik & Bushman (2021) found narcissism to be related to both proactive and reactive aggression. The average correlation between narcissism and proactive aggression was stronger than that of narcissism and reactive aggression; however, these results were not significantly different (Kjærvik & Bushman, 2021).

The Current Study

The aim of the current study was to further investigate the predictors of aggressive driving by determining whether vulnerable narcissism, implicit self-esteem, and both proactive and reactive rebelliousness could predict aggressive driving. To date, no study has examined the role of vulnerable narcissism or implicit self-esteem with aggressive driving using a North American sample, only the more common forms of the constructs (i.e., grandiose narcissism and explicit self-esteem) have been investigated. Additionally, no study has examined how proactive and reactive rebelliousness relate to aggressive driving as two separate constructs. The current study also aims to investigate how these three constructs (narcissism, self-esteem, and rebelliousness) and their

constituents relate to each other and may combine to predict aggressive driving behaviour.

Hypotheses

There were five hypotheses in total proposed for this study. It was first hypothesized that like grandiose narcissism, (H1) vulnerable narcissism would predict aggressive driving. This was advanced based on the terror management theory which suggests that self-esteem acts as a psychological buffer to mortality salience and previous research that has demonstrated that vulnerable narcissist' have low self-esteem which may make them prone to aggressive behaviours (Baumeister et al., 1996; Greenberg et al., 1997; Rasmussen, 2016; Rohmann et al., 2019). Secondly, when comparing grandiose and vulnerable narcissism to aggressive driving, it was hypothesized that (H2) grandiose narcissism would have a greater association with aggressive driving than vulnerable narcissism. This was advanced based on previous research that supports the mask hypothesis where grandiose narcissists' show high explicit self-esteem and low implicit self-esteem, making them more prone to respond to ego threats (Rasmussen, 2016; Rohmann et al., 2019; Zeigler-Hill & Besser, 2013). Additionally, since lower implicit self-esteem has been associated with ego fragility and defensiveness, individuals with lower implicit self-esteem may be more prone to exhibit aggressive driving behaviour (Gregg & Sedikides, 2010).

Regarding self-esteem, it was hypothesized that (H3) high explicit self-esteem and low implicit self-esteem would be associated with aggressive driving. This was advanced based on the terror management theory which states that high explicit self-esteem and low implicit self-esteem is associated with responding to mortality salience

and high implicit self-esteem confers resilience to psychological threats (Dijksterhuis, 2004; Greenberg et al., 1997; Schmeichel et al., 2009). For the rebelliousness subscales, it was hypothesized that (H4) both proactive and reactive rebelliousness would predict aggressive driving based on previous research tying rebelliousness to risky behaviours (Lafreniere et al., 2013, 2021). Lastly, it was hypothesized that (H5) proactive rebelliousness would correspond with grandiose narcissism (or high explicit self-esteem) and reactive rebelliousness would correspond with vulnerable narcissism (or low explicit self-esteem). This final prediction was based on previous research tying high self-esteem (or narcissism) to proactive aggression and low self-esteem to reactive regression (Amad et al., 2020).

CHAPTER II

Method

Participants

The final sample consisted of 194 undergraduate students from the University of Windsor. Participants were recruited through the Psychology Participant Pool where students can sign up to receive partial course credit in exchange for research participation. Participants received 0.5 bonus points in exchange for 30 minutes of their time completing the survey. Ontario uses a graduated licensing system with three levels: G1, G2, and G. The G2 level allows people to drive by themselves and drive over the speed limit of 80 km/h (Ministry of Transportation of Ontario, 2020). To ensure that all participants had adequate driving experience, participants were required to have at least a G2 driver's license. Additionally, participants needed to complete the survey using a laptop or personal computer (i.e., no mobile devices) to be able to use a keyboard to complete the reaction time task. The majority of the sample was female (174 females, 19 males, and one who specified other as their gender), and 91% were between the ages of 17 and 25 years. The majority of participants had either a G2 driver's license or a full G license (99%) and stated that they drove a vehicle at least once a day or every few days (86%). Seven participants stated they previously had their license suspended. See Table 2 for a complete breakdown of the participant demographics.

Table 2

Summary of Participant Responses to the Demographic Questions (N = 194)

Variable		*n*
Gender	Male	19
	Female	174
	Other	1
Age	17 – 20 years	95
	21 – 25 years	83
	26 – 30 years	11
	31 years or older	5
License Status	Learner's Permit (G1)	1
	Ontario Novice (G2)	97
	Ontario Full (G)	96
Driving Frequency	At least once a day	86
	Few times a week	81
	Once a week	17
	Few times a month	7
	Once a month	3
	Never	0
Previous License Suspension	Yes	7
	No	187

Procedure

The study was advertised as a personality and driving behaviour questionnaire and took approximately 30 minutes to complete (see Appendix A for participant pool advertisement). Participants gained access to the experiment once they agreed to participate and reviewed the consent form through the University of Windsor's Participant Pool (see Appendix B for consent form). Participants were provided with a link to complete the online survey via the platform *Qualtrics*. First, demographic

information was collected about the participant's gender, age, driver's license status, how frequently they drove a vehicle, and whether they previously had their driver's license suspended (see Appendix C). Next, participants completed the Implicit Association Test and the other four measures. At the end of the survey, participants were able to consent again to have their responses included in the analyses or could choose to remove their responses.

Measures

Self-Esteem Implicit Association Test (IAT; Greenwald et al., 1998; Greenwald & Farnham, 2000; see Appendix-D) is a computerized categorization task that measures implicit self-esteem through automatic associations of self-relevant and non-self-relevant words with pleasant and unpleasant valence words (Zeigler-Hill, 2006). Participants are asked to categorize words as either being related to or not related to self and as pleasant or unpleasant using two computer keys as their reaction time is recorded. This measure consists of five blocks of trials, three blocks are practice trials containing single categorizations (e.g., self vs. other or pleasant vs. unpleasant), the remaining two blocks are combined categorizations (both self vs. not-self and pleasant vs. unpleasant). The two combined blocks are referred to as compatible (e.g., self + pleasant vs. non-self + unpleasant) and incompatible (self + unpleasant vs. non-self + pleasant). Examples of the four different stimuli include: self-stimuli (e.g., self, mine, and my), other stimuli (e.g., other, them, and their), pleasant stimuli (e.g., happy, pleasure, and joy) and unpleasant stimuli (e.g., gloom, pain, and death).

The reaction time of the participants' responses were recorded for the two combined blocks and the data were analyzed by computing a d-score -- the standardized

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difference between the two combined blocks (Greenwald et al., 2003). A d-score of zero indicates no difference in reaction time, a positive score indicates faster reaction times in the compatible block, and a negative score indicates faster reaction times in the incompatible block (Carpenter et al., 2019). Therefore, the more positive a participant's d-score, the higher their implicit self-esteem. The d-score method was validated by Greenwald et al. (2003) and is the standard data analysis procedure for the IAT. The IAT has been widely used as a measure of implicit self-esteem (e.g., Lannoy et al., 2020; Schmeichel et al., 2009; Zeigler-Hill, 2006), and had the highest test-retest reliability after approximately 31 days ($r = .69$) when compared to seven other implicit self-esteem measures (Bosson et al., 2000). Cronbach's alpha has been reported as .88 and research consistently shows the IAT to be weakly correlated with explicit self-esteem measures (mean $r = .21$; Bosson et al., 2000).

Driving Anger Expression Inventory (DAX; Deffenbacher et al., 2002; see Appendix-E) was used to measure aggressive driving. This measure consists of 34-items and assesses three categories of aggressive driving behaviour where participants are asked to rate the items using a four-point Likert scale (e.g., 1 = "almost never", 4 = "almost always") to indicate how often they generally behave in that manner, with higher scores indicating higher driving aggression. The categories include: verbal aggression expression (e.g., "I call the other driver names aloud"), personal physical aggressive expression (e.g., "I try to get out of the car and have a physical fight with the other driver"), and use of vehicle to express anger (e.g., "I flash my lights at the other driver"). The adaptive/constructive subscale was not utilized in this study as we wanted to assess aggressive behaviours only. This subscale is commonly dropped in studies specifically

examining aggressive driving behaviours (e.g., Edwards et al., 2013). This measure was

chosen as it has already been compared with narcissism in multiple studies showing

narcissism to be a predictor of driving aggression (e.g., Schreer, 2002). We chose the

DAX over instruments such as the PADS as we wanted to measure behaviour as opposed

to intent or emotion. Additionally, this measure has shown good reliability (ranging from

.84 to .89) and validity as the three categories of aggressive driving behaviour were

highly positively correlated with reports of aggression (Deffenbacher et al., 2001).

   Narcissistic Personality Inventory (NPI-13; Gentile et al., 2013; see Appendix-F)

is based on 13 items derived from the original 40-item Narcissistic Personality Inventory

(NPI-40) and was used to assess grandiose narcissism (Raskin & Terry, 1988). This

measure consists of a true-false scale and examines three factors associated with

grandiose narcissism: Leadership/Authority, Grandiose Exhibitionism, and

Entitlement/Exploitativeness. This measure consists of paired statements in which one

statement represents narcissistic traits and the other represents non-narcissistic traits.

Participants were asked to choose one of these statements that best represents themselves

(forced choice questionnaire). Examples of narcissistic statements include: "I find it easy

to manipulate people" and "people always seem to recognize my authority". Examples of

non-narcissistic statements include: "I don't like it when I find myself manipulating

people" and "being an authority doesn't mean that much to me". This version of the NPI

has shown both good convergent and discriminant validity and good internal reliability

($\alpha > .70$), with the exception of the Entitlement/Exploitativeness scale ($\alpha = .59$) (Gentile

et al., 2013).

Hypersensitive Narcissism Scale (HSNS; Hendin & Cheek, 1997; see Appendix-G) consists of 10-items and was used to assess vulnerable narcissism. This measure has been used to assess vulnerable narcissism in multiple studies and has shown to be reliable (Brown & Brunell, 2017). Sample items include "I can become entirely absorbed in thinking about my personal affairs, my health, my cares, or my relations in others" and "I dislike being in a group unless I know that I am appreciated by at least one of those present". Participants rate the items on a five-point Likert scale (e.g., 1 = "strongly disagree" to 5 = "strongly agree"). The HSNS has shown adequate internal reliability consistency in both clinical (α = .71) and non-clinical (α = .69) populations (Fossati et al., 2009). Furthermore, two separate scales were used as opposed to using one scale with different subscales to measure both grandiose and vulnerable narcissism (e.g., PNI) as studies suggest that these subscales often overlap in their measurement (Yung, 2016).

Rosenberg's Self-Esteem Scale (RSES; Rosenberg, 1965; see Appendix-H) is a 10-item measure assessing explicit self-esteem. Participants are asked to rate the items on how they typically feel about themselves on a five-point Likert scale (e.g., 1 = "strongly disagree" and 5 = "strongly agree"). Sample items include "on the whole, I am satisfied with myself" and "I feel that I have a number of good qualities." Furthermore, this measure is employed because it has previously been used to examine self-esteem with narcissism (e.g., Brown & Brunell, 2017; Zeigler-Hill, 2006) and has also been used in multiple aggressive driving studies (e.g., Schreer, 2002). The RSES has been used as a measure of explicit self-esteem for decades as it is a well-validated measure (Blaskovich & Tomaka, 1991) and demonstrates a high test-retest reliability of .85 for a two-week

interval (Rosenberg, 1965; Silber & Tippett, 1965). Cronbach's alpha has been reported as .87 (Bosson et al., 2000).

Rebelliousness Questionnaire (RQ; McDermott, 1988; see Appendix-I) was used to measure the two subscales of rebelliousness. This measure is administered under the title 'Social Reactivity Scale' to not influence any responses. It consists of 18 items with forced-choice responses, seven items corresponding to proactive and reactive rebelliousness each and four filler items. The proactive rebelliousness subscale measures an individual's tendency to engage in rebellious or negativistic behaviours for fun and excitement. The reactive rebelliousness subscale measures an individual's tendency to commit unpremeditated acts in response to frustration and perceived affronts (McDermott, 1988). Previous research has shown some evidence of construct validity and internal consistency for both subscales (Klabbers et al., 2009). Lafreniere et al. (2013) reported moderate Cronbach's alphas at .63 for the proactive rebelliousness subscale and .52 for the reactive rebelliousness subscale.

CHAPTER III

Results

Data Preparation

In total, 200 participants completed the study; however, six participants were excluded from the analyses. Two participants were removed as they did not consent to have their responses included in the analyses, and two participants were removed due to missing a significant portion of the measures. Additionally, two participants were removed based on their scores on the IAT, which were below the cut-off of 0.30 s. This cut-off is used to remove participants who responded too fast when categorizing the words (i.e., these participants likely did not follow the task and may have been randomly pressing the keys; Carpenter et al., 2019). All analyses for the current study were conducted using the IBM Statistical Package for Social Science (SPSS) Version 26.0 (2019). The significance level used for the analyses was $p < .05$. There were seventeen individual missing data points throughout the measures. The missing data points were assessed using Little's MCAR test, which tests whether the data is Missing Completely at Random (MCAR). This test was not significant ($p = .08$); therefore, it was concluded that these data were missing completely at random. Removing these participants would have removed almost 9% of the data; therefore, the missing values were addressed by calculating and inputting scale totals. Additionally, these data were assessed for any outliers using boxplots through SPSS. None of the variables had outliers outside of three inter-quartile ranges. Outliers were also examined using the z-scores where values greater than 3.29 were considered outliers. All variables had the majority of cases (around 95%) within the acceptable range (Field, 2013).

Variables

The IAT scores were evaluated using the *iatgen* software created by Carpenter et al. (2019). The mean d-score was positive, which means that overall, participants responded more rapidly when associating self-related pronouns with positive valence words as opposed to negative valence words ($M = .71$, $SD = .33$). IAT effects (mean latency for self + negative block minus mean latency for self + positive block) were significant, Cohen's d $= 2.17$, $t (193) = 30.22$, $p < .001$. These findings are similar to other studies which used the IAT to measure implicit self-esteem (Greenwald & Farnham, 2000; Karpinski, 2004). When examining the Cronbach's alphas, all scales and subscales showed alphas within the appropriate range (greater than .70), with the exceptions of the NPI-13 (grandiose narcissism) and both types of rebelliousness. These three scales were further examined to identify any items that significantly influenced the alphas. Removing items did not significantly improve the alphas for all three scales and the measures were retained for the analyses. Additionally, other studies have found similar internal consistencies with the rebelliousness subscales (e.g., Lafreniere et al., 2013). The means, standard deviations, ranges, and Cronbach's alphas for all other variables can be found in Table 3.

Table 3

Means, Standard Deviations, Ranges, and Cronbach's alphas of Study Variables (N = 194)

Variable	*M*	*SD*	Range	Alpha
DAX Total	50.18	11.86	34 - 98	.92
DAX – Physical Aggression	12.02	2.43	11 - 31	.86
DAX – Verbal Aggression	24.13	8.06	12 - 47	.91
DAX – Use of Vehicle	14.03	3.65	11 - 31	.85
Grandiose Narcissism	3.60	2.28	0 - 12	.60
Vulnerable Narcissism	29.17	6.00	14 - 44	.74
Implicit Self-Esteem	0.71	0.33	-0.6 – 1.6	.74
Explicit Self-Esteem	19.72	5.47	4 - 30	.89
Proactive Rebelliousness	2.75	2.47	0 - 13	.54
Reactive Rebelliousness	1.99	2.03	0 - 9	.48

Note. DAX = Driving Anger Expression Inventory

Correlational Analyses

Correlational analyses were conducted for all variables, including the five demographic variables. Gender was only significantly correlated with vulnerable narcissism, with a weak positive correlation of r (194) = .20, p = .005, showing females scored higher than males. The other demographic variables were not significantly correlated with any of the variables. Driving aggression (DAX total) was positively correlated with both grandiose, r (194) = .25, p < .001, and vulnerable narcissism, r (194) = .31, p < .001, and both reactive, r (194) = .41, p < .001, and proactive rebelliousness, r (194) = .41, p < .001. The three subscales of the driving expression inventory were also examined. The physical aggression subscale was also positively correlated with grandiose narcissism, r (194) = .21, p = .004, and both proactive rebelliousness, r (194) = .33, p < .001, and reactive rebelliousness, r (194) = .30, p < .001. The verbal aggression subscale was positively correlated with both types of narcissism: grandiose, r (194) = .23, p =

.002, and vulnerable, r (194) = .32, p < .001, and both types of rebelliousness: proactive, r (194) = .36, p < .001, and reactive, r (194) = .35, p < .001. Lastly, the use of a vehicle as aggression expression subscale was also positively correlated to both types of narcissism: grandiose, r (194) = .18, p = .012, and vulnerable, r (194) = .22, p = .008, and both types of rebelliousness: proactive, r (194) = .33, p < .001, and reactive, r (194) = .33, p < .001.

Explicit self-esteem was only marginally correlated with driving aggression, r (194) = -.13, p = .07. Explicit self-esteem was significantly negatively correlated with vulnerable narcissism, r (194) = -.47, p < .001; and positively correlated with grandiose narcissism, r (194) = .21, p = .004. Grandiose and vulnerable narcissism were also very weakly correlated with each other, r (194) = .18, p = .013. Both grandiose and vulnerable narcissism were significantly correlated with the two types of rebelliousness. Grandiose narcissism had a weak positive correlation with reactive rebelliousness, r (194) = .24, p = .001; and a moderate positive correlation with proactive rebelliousness, r (194) = .33, p < .001. Vulnerable narcissism had a weak positive correlation with reactive rebelliousness, r (194) = .27, p < .001; and a weak positive correlation with proactive rebelliousness, r (194) = .17, p = .02. When examining the correlations between the two rebelliousness scales and the other variables, it is important to note the low internal consistency found in both rebelliousness subscales. The data points for both subscales are not consistent; therefore, we cannot be confident about where they fall and must interpret these correlations with caution. Lastly, proactive and reactive rebelliousness were also positively correlated with each other, r (194) = .32, p < .001; see Table 4 for all correlational statistics).

Table 4

Correlations Among Study Variables (N = 194)

	2	3	4	5	6	7	8	9	10
1. DAX Total	.64***	.92***	.78***	-.04	-.13	.25***	.31***	.41***	.41***
2. DAX – Physical Aggression		.40***	.55***	-.04	-.11	.21**	.10	.33***	.30***
3. DAX – Verbal Aggression			.53***	-.01	-.13	.23**	.32***	.36***	.35***
4. DAX – Use of Vehicle				-.01	-.07	.18*	.22**	.33***	.33***
5. Implicit Self-Esteem					.10	-.02	-.01	-.09	-.06
6. Explicit Self-Esteem						.21**	-.47***	-.06	-.12
7. Grandiose Narcissism							.18*	.33***	.24**
8. Vulnerable Narcissism								.17*	.27***
9. Proactive Rebelliousness									.32***
10. Reactive Rebelliousness									

Note. DAX = Driving Anger Expression Inventory.

p < .05. **p* < .01. ***p* < .001.

Accordingly, *t*-tests were conducted to further explore the significant relationship between gender and vulnerable narcissism. Findings revealed that females (*M* = 29.57, *SD* = 5.97) reported significantly higher levels of vulnerable narcissism, *t* (191) = 2.95, *p* = .004, Cohen's d = 0.75, than males (*M* = 25.37, *SD* = 5.19). Next, the correlation coefficients were further analyzed using a method created by Meng et al. (1992) to determine if there were significant differences between certain correlations. This method provides a difference between the correlations, 95% confidence intervals, and a *Z* test of the null hypothesis of equal correlations. First, the difference between the correlations of

both types of narcissism with aggressive driving was examined. The *Z* test was not significant meaning there is not a significant difference between the correlations of grandiose and vulnerable narcissism with aggressive driving. This method was also used to examine the differences between the correlations of proactive and reactive rebelliousness with grandiose and vulnerable narcissism. Both tests revealed there were no significant differences between these correlations (see Table 5).

Table 5

Differences in Correlations Using the Method by Meng et al. (1992)

Variables	Correlation Difference	*Z*	95% CI
DAX → NPI and HSN	-0.05	-0.61	-0.24 – 0.13
PRO → NPI and HSN	-0.16	-1.75	-0.34 – 0.02
REA → NPI and HSN	0.18	0.29	-0.16 – 0.21

Note. DAX = Aggressive Driving, PRO = Proactive Rebelliousness, REA = Reactive Rebelliousness, NPI = Grandiose Narcissism, and HSN = Vulnerable Narcissism.

Regression Analyses

Before conducting the regression analyses, the relevant assumptions were examined. Firstly, a sample size of 194 was deemed adequate given the six independent variables included in the analysis, wherein 10 responses per independent variable is deemed sufficient (Tabachnick & Fidell, 2013). The assumption of normality, which should be satisfied by both the dependent variable and the values of the residuals, was examined using the descriptive statistics of skewness and kurtosis and the Kolmogorov-Smirnov statistic. When examining the skewness and kurtosis values, the dependent variable of aggressive driving was positively skewed and had a significant Kolmogorov-Smirnov test ($p < .001$). Additionally, the residuals also violated the assumption of normality as the maximum standardized residual was above the absolute value of three.

To determine if non-normality was an issue for this sample, the dependent variable was converted into a rank variable and the regression analyses were re-examined. Since the results did not significantly differ from the original regression analysis, along with the knowledge that regression analyses tend to be robust to mild violations of non-normality, this violation was deemed inconsequential (Field, 2013).

The second assumption is the assumption of linearity, which consists of determining if there is a linear relationship between the independent variables and the dependent variable (Field, 2013). Scatterplots created between each of the independent variable and the dependent variable suggest that this assumption has been met. The third assumption is that the values of the residuals are independent (uncorrelated). The Durbin-Watson statistics for both regression analyses showed that this assumption had been met as the values were close to two (1.99 and 2.00, respectively). The fourth assumption is that there is no multicollinearity within these data. Multicollinearity occurs when there is a strong correlation between two or more of the predictors (Field, 2013). When examining the correlations, none of the variables used in the regression were highly correlated with each other (all correlations were under .50). Additionally, the collinearity statistics show this assumption has been met as both Variance Inflation Factor (VIF) scores and Tolerance scores were within the appropriate ranges (VIF range = 1.10 to 1.20; Tolerance range = .83 to .92). Lastly, Cook's distances were examined and showed no values greater than one; therefore, it was assumed that there were no influential data points within the sample (Field, 2013).

A multiple linear regression was conducted with driving aggression as the dependent variable and both types of narcissism and rebelliousness as predictor variables.

The four predictor variables were all included in the first stage of the model (entry method, with intercept). The regression analysis indicated that the model explained 27% of the variance (Adjusted R^2 = .27) and that the model was a significant predictor of aggressive driving, $F(4, 189) = 19.17$, $p < .001$). Vulnerable narcissism ($\beta = .18$, $t(189) = 2.78$, $p = .006$), proactive rebelliousness ($\beta = .28$, $t(189) = 4.13$, $p < .001$), and reactive rebelliousness ($\beta = .25$, $t(189) = 3.75$, $p < .001$) were all significant predictors within the model. Grandiose narcissism was not a significant predictor of aggressive driving ($\beta = .07$, $t(189) = 1.04$, $p = .2997$; see Table 6).

Table 6

Summary of Multiple Regression Analysis for Aggressive Driving Behaviours

Variable	B	SE B	β	F	Adjusted R^2
				19.17	0.27
Grandiose Narcissism	0.36	0.34	0.07		
Vulnerable Narcissism	0.35	0.13	0.18**		
Proactive Rebelliousness	1.33	0.32	0.28**		
Reactive Rebelliousness	1.47	0.39	0.25**		

Note. B = unstandardized regression coefficient, SE B = standard error of regression coefficient, β = standardized regression coefficient.

** $p < .01$

A two-stage hierarchical regression was also conducted with aggressive driving as the dependent variable, vulnerable narcissism inputted in the first stage, and proactive and reactive rebelliousness inputted in the second stage. This order was specifically implemented as we wanted to determine whether rebelliousness could predict aggressive

driving behaviours when controlling for vulnerable narcissism. The results of the

hierarchical regression (with intercept) showed that vulnerable narcissism contributed

significantly to the regression model, F (1, 192) = 19.75, p < .001; but only accounted for

approximately 9% of the variance in aggression driving before adding the two types of

rebelliousness. Introducing the two types of rebelliousness explained an additional 19%

of the variance in aggressive driving, and this change in R^2 was significant, F (3, 190) =

25.18, p < .001. In the first stage, vulnerable narcissism was a significant predictor of

aggressive driving (β = .31, t (192) = 4.44, p < .001). When all three independent

variables were included in stage two of this regression, proactive rebelliousness was the

most important predictor (β = .30, t (189) = 4.56, p < .001), followed by reactive

rebelliousness (β = .26, t (189) = 3.91, p < .001), and vulnerable narcissism (β = .19, t

(189) = 2.90, p = .004; see Table 7).

Table 7

Summary of Hierarchical Multiple Regression Analysis for Aggressive Driving
Behaviours

Model	Variable	B	$SE\ B$	β	F	Adjusted R^2
1					19.75	0.09
	Vulnerable Narcissism	0.60	0.14	0.31***		
2					25.18	0.27
	Vulnerable Narcissism	0.37	0.13	0.19***		
	Proactive Rebelliousness	1.43	0.31	0.30***		
	Reactive Rebelliousness	1.52	0.39	0.26***		

Note. B = unstandardized regression coefficient, *SE B* = standard error of regression
coefficient, β = standardized regression coefficient.

*** p < .001

Mediation Analyses

To further examine the relationship between vulnerable narcissism and aggressive driving, a mediation analysis was conducted to investigate whether reactive rebelliousness mediated the relationship between vulnerable narcissism and aggressive driving. The mediation analysis was conducted using the PROCESS macro Version 4.0 (Hayes, 2013). First, the results of the regression analysis show that vulnerable narcissism (independent variable) is a significant predictor of reactive rebelliousness (mediator), ($b = .09$, $t (194) = 3.81$, $p = .0002$). Next, the direct effect (c' path), or regression analysis between vulnerable narcissism and aggressive driving was also significant, $b = .42$, $t (194) = 3.19$, $p = .002$, consistent with a partial mediation model. The total effect of the model (c path) was also significant, $b = .60$, $t (194) = 4.44$, $p < .0001$. The results of the indirect effect based on 5000 bootstrap samples show a significant indirect effect between vulnerable narcissism and aggressive driving mediated by reactive rebelliousness ($ab = .18$, Bootstrap $CI_{95} = .08$ and $.30$). The mediator, reactive rebelliousness, accounted for approximately 30% of the total effect on aggressive driving ($P_M = .18 / .60$; see Table 8 and Figure 1).

Table 8

Effect of Vulnerable Narcissism on Aggressive Driving as Mediated by Reactive Rebelliousness

Variable / Effect	b	SE	t	95% CI
HSN → REA	0.09***	0.02	3.81	0.04 - 0.13
HSN → DAX	0.42***	0.13	3.19	0.16 - 0.68
HSN → REA → DAX	2.03***	0.39	5.21	1.26 – 2.80
Effects				
Direct	0.42***	0.13	3.19	0.16 - 0.68
Indirect	0.18			0.08 - 0.30
Total	0.60***	0.14	4.44	0.34 - 0.87

Note. HSN = Vulnerable Narcissism, REA = Reactive Rebelliousness, DAX = Aggressive Driving.

*** $p < .001$

Figure 1

Mediation Model for Vulnerable Narcissism on Aggressive Driving as Mediated by Reactive Rebelliousness
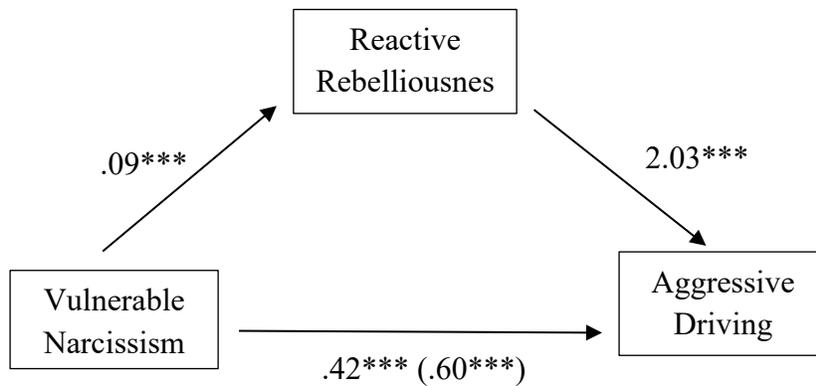
***$p < .001$

Proactive rebelliousness was also examined as a mediator between vulnerable narcissism and aggressive driving. First, the regression analysis showed vulnerable

narcissism (independent variable) was a significant predictor of proactive rebelliousness

(mediator), $b = .07$, t (194) = 2.41, $p = .017$. Similar to the previous analysis, the direct

effect (c' path), or regression analysis between vulnerable narcissism and aggressive

driving was also significant; $b = .48$, t (194) = 3.74, $p = .0002$. The total effect of the

model was also significant, $b = .60$, t (194) = 4.44, $p < .0001$, consistent with a partial

mediation model. Lastly, the indirect effect was once again examined using the

PROCESS macro Version 4.0 (Hayes, 2013), applying a bootstrap estimation approach

with 5000 samples. The results showed the indirect effect was significant ($ab = .13$,

Bootstrap $CI_{95} = .03$ and .25). Proactive rebelliousness (mediator) accounted for

approximately 21% of the total effect on aggressive driving ($P_M = .13 / .60$; see Table 9

and Figure 2).

Table 9

Effect of Vulnerable Narcissism on Aggressive Driving as Mediated by Proactive Rebelliousness

Variable / Effect	b	SE	t	95% CI
HSN → PRO	0.07*	0.03	2.41	0.01 - 0.13
HSN → DAX	0.48***	0.13	3.74	0.23 - 0.73
HSN → PRO → DAX	1.78***	0.31	5.75	1.17 - 2.39
Effects				
Direct	0.48***	0.13	3.74	0.23 - 0.73
Indirect	0.13			0.08 - 0.30
Total	0.60***	0.14	4.44	0.34 - 0.87

Note. HSN = Vulnerable Narcissism, PRO = Proactive Rebelliousness, DAX = Aggressive Driving.

* $p < .05$ *** $p < .001$

Figure 2

Mediation model of Vulnerable Narcissism on Aggressive Driving as Mediated by Proactive Rebelliousness
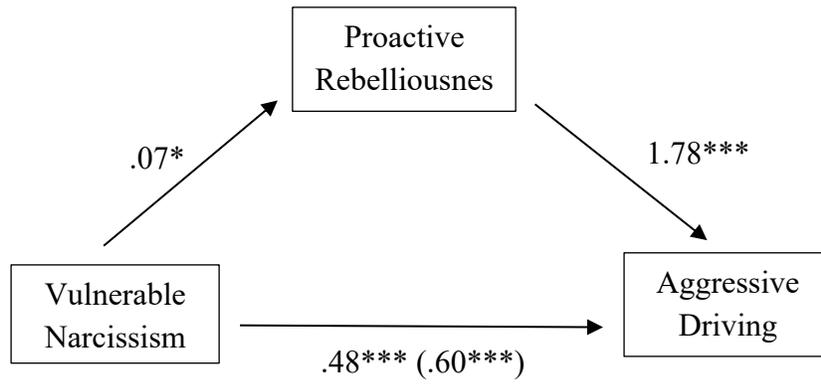
$*p < .05, ***p < .001$

CHAPTER IV

Discussion

Summary of Major Findings

There were two primary objectives of the current study. The first was to compare the predictors of aggressive driving by examining the constituents of narcissism, self-esteem, and rebelliousness. Secondly, this study aimed to examine how these six constructs were related to each other and thus combine to better predict aggressive driving behaviour. Correlation analyses showed that four constructs (grandiose narcissism, vulnerable narcissism, proactive rebelliousness, and reactive rebelliousness) were positively correlated with aggressive driving. When examining the three subscales of the DAX separately, the correlations reflected those of the total scale with the exception of the physical aggression subscale, which was not correlated with vulnerable narcissism. High explicit self-esteem was negatively correlated with vulnerable narcissism and positively correlated with grandiose narcissism. Implicit self-esteem was not correlated with any of the study variables. Regression analyses revealed that vulnerable narcissism, proactive rebelliousness, and reactive rebelliousness were all significant predictors of aggressive driving. Hierarchical regression analyses showed that the two types of rebelliousness accounted for 19% of the variance in aggressive driving. Lastly, mediation models showed that both reactive and proactive rebelliousness mediated the relationship between vulnerable narcissism and aggressive driving.

Gender was only positively correlated to vulnerable narcissism, wherein females reported higher vulnerable narcissism than males, and is consistent with previous research on gender differences in narcissism (e.g., Valashjardi et al., 2020). Although

there were significantly more female participants in this study, the 19 male participants were likely enough to achieve a reliable estimate of the mean. This is according to the Central Limit Theorem, which states that a sample size of 20-25 participants is sufficient (Field, 2013). Additionally, the Cohen's d for the *t*-test revealed a moderate effect size (Lakens, 2013). These findings are also consistent with previous research examining self-esteem instability which found girls to have significantly higher self-esteem instability than boys (Chabrol et al., 2006). Since vulnerable narcissism is often characterized by self-esteem instability, these findings may be related; however, other studies find no gender differences with vulnerable narcissism (Grijalva et al., 2015).

The regression analyses supported the first hypothesis (H1) and revealed that vulnerable narcissism was a significant predictor of aggressive driving. Although grandiose narcissism was significantly correlated with aggressive driving, it was not a significant predictor of aggressive driving after the model already included vulnerable narcissism, reactive rebelliousness, and proactive rebelliousness. It was further hypothesized (H2) that grandiose narcissism would have a greater association with aggressive driving than vulnerable narcissism. Although the correlation analyses appeared to support this hypothesis, further examination using the Meng et al. (1992) method revealed there was no significant difference between the correlations of grandiose and vulnerable narcissism on aggressive driving. These findings suggest that vulnerable narcissism may be a better predictor of aggressive driving than grandiose narcissism. Further, these results partially support previous research showing that narcissism and low self-esteem related more strongly to aggressive behaviours and predicted aggressive driving behaviours (Hart et al., 2019; Przepiorka et al., 2014). Vulnerable narcissism is

characterized by low self-esteem; although both implicit and explicit self-esteem were not significantly correlated with aggressive driving in this study, these findings suggest self-esteem levels (i.e., whether it is high or low) may not play a significant role in whether a person will exhibit aggressive driving behaviours. Perhaps what matters more is self-esteem instability, which is a trademark of vulnerable narcissism. Unstable self-esteem (or ego fragility) has been reported to make individuals prone to aggression (Lustman et al., 2010). This also supports the theory of threatened egotism which states that individuals with unstable self-esteem react aggressively to ego-threatening situations (Baumeister et al., 1996).

Next, it was hypothesized (H3) that low implicit self-esteem would be associated with aggressive driving as it would make an individual less resilient to psychological threats and thus make them more prone to aggressive behaviour. Individuals with high levels of grandiose narcissism also tend to show low implicit self-esteem (Brown & Brunell, 2017). Therefore, it was also hypothesized that participants who scored higher in grandiose narcissism would also report more aggressive driving behaviours. The results of this study did not support this hypothesis as both explicit and implicit self-esteem were not significantly correlated with aggressive driving. Further, it was originally proposed that vulnerable narcissists would display high implicit self-esteem; however, research has yet to demonstrate a relationship between vulnerable narcissism and implicit self-esteem (Brown & Brunell, 2017). The results of this study are consistent with these findings as implicit self-esteem did not appear to play a role in predicting aggressive driving behaviours. The instability of self-esteem may have also contributed to this result. It was originally thought that implicit self-esteem was more stable than explicit self-esteem;

however, research has shown that implicit self-esteem can be influenced by our environment (Fazio & Olsen, 2013). Perhaps this instability being more dominant in vulnerable narcissists explains why implicit self-esteem has not been associated with the construct.

The regression analyses also supported the fourth hypothesis (H4) and revealed that both proactive and reactive rebelliousness significantly predicted aggressive driving. These findings support previous research which has shown that both types of rebelliousness predicted risky and aggressive behaviours (Lafreniere et al., 2013, 2021). Proactive rebelliousness has also been negatively associated with inhibitory control, which suggests that those with negativism dominance might have difficulty in suppressing inappropriate behaviours (Lafreniere et al., 2013). Additionally, the current study was the first to examine how both grandiose and vulnerable narcissism and the two types of rebelliousness relate to each other. It was hypothesized (H5) that grandiose narcissism (or high self-esteem) would relate more to proactive rebelliousness, and vulnerable narcissism (or low self-esteem) would relate more to reactive rebelliousness. The correlational analyses appeared to support this hypothesis as all four variables were significantly correlated. However, further analyses using the Meng et al. (1992) method revealed that there were no significant differences between the correlations for the types of narcissism on proactive and reactive rebelliousness.

Exploratory analyses were conducted to further understand the relationships between these variables. A hierarchical regression model revealed that the two subtypes of rebelliousness significantly explained the variance in aggressive driving when controlling for vulnerable narcissism. Although vulnerable narcissism significantly

contributed to the variance in aggressive driving, it only accounted for approximately 9%.

Adding the two types of rebelliousness accounted for an additional 19% of the variance.

Mediation models also showed that both reactive and proactive rebelliousness partially

mediated the relationship between vulnerable narcissism and aggressive driving, with

reactive rebelliousness accounting for 30% and proactive rebelliousness accounting for

21% of the total effect. These findings suggest that although an individual's level of

vulnerable narcissism may play a role in displaying aggressive driving behaviours, this

relationship is indirect and is partially determined by the individual's level of

rebelliousness (both reactive and proactive). Rebellious tendencies in narcissistic

individuals are often tied with instances of ego threat (Stucke & Sporer, 2002). The

relationship between reactive rebelliousness and vulnerable narcissism is consistent with

previous research which shows that those high in vulnerable narcissism tend to be

defensive, based in part on their low self-esteem leaving them more vulnerable to ego-

threats. Proactive rebelliousness, rebellious acts based on fun or excitement, do not

appear to have a direct connection with vulnerable narcissism. However, the results of

this study suggest that rebellious acts in order to vindicate self-esteem can be either

reactive or proactive, likely depending on the distinct situation.

Limitations

The aim of the current study was to provide valuable insights into the predictors

of aggressive driving and how these predictors relate to each other. Whereas this task was

accomplished by investigating four predictors that have not been previously examined

using a North American sample (vulnerable narcissism, implicit self-esteem, proactive

rebelliousness, and reactive rebelliousness), limitations to this study should be

highlighted. First, this study utilized a convenience sample of undergraduate students who were recruited through the psychology participant pool at the University of Windsor. Although this sample represented a diverse population of students with various driving experience and frequency, the vast majority of the sample was female (90%); therefore, the results of this study cannot be generalized to all populations. Future research should investigate these predictors with a more balanced sample to understand whether these predictors are interchangeable in both men and women. Further, this study was conducted on a sample of drivers within Canada; therefore, the results of this study cannot be generalized to all populations due to the cultural differences of traffic settings around the world (Dobrucali & Özkan, 2021).

Another limitation to this study was the use of the IAT to measure implicit self-esteem. Due to the global pandemic of COVID-19, which began shortly before the conception of this research project, all research needed to be conducted online. Therefore, the IAT could not be administered within a controlled laboratory setting and had to be adapted for an online survey. As previously mentioned, it was originally thought that implicit beliefs tended to be more stable than explicit beliefs. However, research has shown that implicit associations are sensitive to priming effects and other situational cues (Fazio & Olson, 2003). For example, Davies et al. (2005) found that implicit female stereotypes were greater when priming participants with stereotypic television advertisements (e.g., depicting women as emotional and weak). Participants of this study completed the IAT on their own devices likely in the comfort of their own homes; therefore, it is unknown whether participants would have been primed by their

environment (e.g., they could have been watching television or engaging with other people while completing the survey).

One final limitation to this study was the use of the Rebelliousness Questionnaire (or Social Reactivity Scale) to measure both proactive and reactive rebelliousness. The two subtypes of rebelliousness were important predictors throughout this study; however, a major limitation to this is that the results must be interpreted with caution because of the inconsistency of these variables. Although the Rebelliousness Questionnaire is a popular measure of negativistic dominance and has been utilized in many studies examining rebelliousness, the reliability of this measure is a chronic issue with multiple studies reporting moderate to low Cronbach's alphas (e.g., Lafreniere et al., 2013). One of the possible issues of this measure is based on its design as a forced choice questionnaire and thus, it does not allow for much variability in responses. An easy solution to this would be incorporating Likert scale responses to the Rebelliousness Questionnaire. Other possible issues that may be contributing to the measure's low reliability include the age of the scale (published in 1988) and its European origins which may not generalize to all populations. These issues highlight a potential avenue for future research to establish a more reliable measure of negativistic dominance.

Implications

Despite these limitations, the current study successfully replicated multiple findings from previous research and offered the field some novel insights and results. For example, correlational analyses revealed that explicit self-esteem was positively correlated with grandiose narcissism and negatively correlated with vulnerable narcissism, which is consistent with previous research examining the two types of

narcissism (Rasmussen, 2016; Rohmann et al., 2019). This study was the first to examine proactive and reactive rebelliousness separately as predictors of aggressive driving and supports the notion that these two subtypes should be conceptualized and studied independently, and not as one singular construct of rebelliousness. Lastly, the current study was the first to show a relationship between vulnerable narcissism and aggressive driving using a North American population, which opens the field for future research to not only replicate these findings but examine vulnerable narcissism with other aggressive behaviours that have only been compared to grandiose narcissism.

Future Directions

The findings of the current investigation point to a few fruitful avenues which are pertinent for future study. The regression analyses revealed that both proactive and reactive rebelliousness accounted for approximately 20% of the variance in aggressive driving. This poses the question as to what variables account for the remaining variance. Future research should continue to investigate the predictors of aggressive driving (e.g., driving anger) to understand what combination of variables account for the most variance. Additionally, the potential relationship between proactive and reactive rebelliousness with grandiose and vulnerable narcissism conjure more questions about the two types of rebelliousness and how they relate to the two types of aggression. More specifically, it poses the question about what is the difference between the two constructs (e.g., what is the difference between proactive rebelliousness and proactive aggression?) and how these constructs are measured. Although not all rebellious behaviour is aggressive, the similarities between the two types of rebelliousness and aggression warrant future research to examine these constructs in more depth.

Future research on the predictors of driving behaviour should focus on implementing different techniques for measuring constructs, such as using driving simulators to examine aggressive driving behaviour as opposed to relying on self-report measures only. As previously mentioned, many aggressive driving measures focus on intent or emotional aspects of driving behaviour which may be subject to bias and inaccuracy (Houston et al., 2003). Self-report measures in general also tend to not be the best instruments, as people may not be completely truthful when reporting their past behaviours (e.g., they may lie to seem less aggressive). Driving simulators allow researchers to examine an individual's aggressive driving tendencies in different scenarios (e.g., under time pressure; Fitzpatrick et al., 2017) and using a multitude of behaviours (e.g., speed selection; Gauld et al., 2015). Although driving simulators still may not be a perfect representation of a person's driving behaviour, future research should aim to gather data from driving simulations in conjunction with other aggressive driving measures for the best possible depiction.

Lastly, self-esteem instability and how this may influence driving behaviour should be further investigated using different methods, such as measuring self-esteem at multiple points over a period of time. The instability of self-esteem has been shown to be an important component of the construct and has been established as a risk factor for depression (Kernis et al., 1998). The findings of the current study further suggest its importance in relation to aggressive behaviours. Future research should continue to examine self-esteem instability and how it may motivate aggressive behaviour. In that same regard, future studies should also investigate rebelliousness by measuring meta-motivational states at multiple points (e.g., before and after a driver acts aggressively

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towards the participant in a simulation). A foundational component of reversal theory is how individuals can reverse between meta-motivational states (Apter, 1982). These changes in motivational states and how they are triggered (e.g., by objects in our environment, such as the presence of a police officer) may also play an important role in what motivates a person to exhibit aggressive driving behaviours. Further, recent studies suggest that levels of narcissistic states (both grandiose and vulnerable) tend to fluctuate over time depending on an individuals dominate state and level of entitlement (Edershile & Wright, 2021). Therefore, future research should examine all three of the constructs used in this study through multiple timestamps as opposed to momentary states.

Conclusion

In conclusion, the results of the current study shed light on how three established predictors of aggressive driving can be further examined to reveal new findings. Firstly, this study provides evidence that vulnerable narcissism may be an important predictor of aggressive driving. Secondly, the findings of this study suggest that self-esteem instability plays an important role in aggressive driving behaviour and should be further examined in regard to how it predicts aggression. Lastly, this study demonstrated a relationship between vulnerable narcissism and the two types of rebelliousness and how they both contribute to aggressive driving behaviours. The results of this study support the notion that both narcissism and rebelliousness should continue to be examined as two subtypes, as opposed to singular concepts. In summary, the current study provided support for previous research and enriched the literature with novel findings on the predictors of aggressive driving.

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APPENDICES

Appendix A: Participant Pool Advertisement

Title: Personality and Motivations behind Driving Behaviour

Researchers: Cassidy Kost, under the supervision of Dr. Ken Cramer

Duration: 30 minutes

Credits: 0.5 bonus point

Description: This study examines personality and motivations that may influence our driving behaviour. Specifically, we are interested in whether certain personality traits and other motivational factors can predict driving behaviour. This study will consist of a word categorization task followed by questions asking about your personality and driving behaviour.

Please note: This study must be completed on a laptop or computer, it cannot be taken with a mobile device (e.g., cellphone or iPad).

Eligibility Requirements: To participate in this study, you must

    1.) Have a G2 or higher-level driver's license

This study will take no more than 30 minutes to complete and will be completed in one online survey session. If you complete the study, you will be awarded 0.5 bonus point toward a designated psychology class.

Appendix B: Consent Form

University of Windsor

CONSENT TO PARTICIPATE IN RESEARCH

Title of Study: Personality and Motivations behind Driving Behaviour.

You are asked to participate in a research study conducted by Cassidy Kost and Dr. Kenneth Cramer, from the Psychology department at the University of Windsor. The results of this study will contribute to the Master's Thesis requirements of the primary investigator.

If you have any questions or concerns about the research, please contact Cassidy Kost at kostc@uwindsor.ca or Dr. Kenneth Cramer at KCramer@uwindsor.ca or at 519-253-3000 ext. 2239.

PURPOSE OF THE STUDY
The purpose of this study is to understand how our personality may play a role in our driving behaviour. We are interested in how certain personality traits may predict aggressive driving behaviour over others. Additionally, we are interested in uncovering motivations behind aggressive driving behaviour which will help to create intervention programs and prevent the behaviour to make our roads safer.

PROCEDURES
If you volunteer to participate in this study, you will be asked to:
First, answer demographic questions about your gender, age, driver's license level, and driving frequency. Next, you will be asked to complete a word categorization task which requires you to categorize words using keys on your keyboard. This task will record your reaction time (e.g., how long it takes for you to respond or press the key) and will take approximately five minutes. Lastly, you will be asked to answer a number of questions regarding your behaviour (including your driving behaviour) and personal beliefs. Completion of the entire survey is estimated to take under half an hour (30 minutes).

POTENTIAL RISKS AND DISCOMFORTS
This study involves making simple responses regarding questions and statements about personality and behaviour. Risks associated with participation in this study are considered minimal. It is possible that participants may experience mild distress when answering questions regarding their personality and behavioural patterns.

POTENTIAL BENEFITS TO PARTICIPANTS AND/OR TO SOCIETY
By participating in this study, participants will have a chance to contribute to psychological research.

COMPENSATION FOR PARTICIPATION
This study will take no more than 30 minutes of your time and is worth 0.5 bonus points if you are registered in the Psychology Participant Pool and are registered in one or more eligible psychology courses. At the end of the survey, you will be redirected to a

separate survey to fill out your name and email address to be compensated through the Participant Pool. A separate survey is implemented to make certain your responses to this survey remain anonymous and are not connected to any personal information. Please ensure you fill out this separate survey in order to receive bonus points. If you choose to withdraw from this study before completing it (e.g., exiting the survey before starting or halfway through), you will not be compensated. If you choose to withdraw your responses after completing the survey, you will still receive compensation provided you fill out the compensation survey.

CONFIDENTIALITY
Any information that is obtained in connection with this study and that can be identified with you will remain confidential and will be disclosed only with your permission. A separate survey will be used to collect your name and email address for compensation purposes only. Your name and other personal information will not be linked to the data at any time. Only researchers involved in the study will have access to the data. If the data is not used it will be destroyed and if published, no personal information will be discussed.

PARTICIPATION AND WITHDRAWAL
You can choose whether to be in this study or not. If you volunteer to be in this study and choose to withdraw before completing the survey you will not receive any bonus points; however, there will be no additional consequences. You may also refuse to answer any questions you don't want to answer and still remain in the study. The investigator may withdraw you from this research if circumstances arise which warrant doing so. Participants cannot withdraw data after they complete the survey because data will be anonymously stored.

FEEDBACK OF THE RESULTS OF THIS STUDY TO THE PARTICIPANTS
Upon completion of this study the final research findings will be available on the following website:
Web address: https://scholar.uwindsor.ca/research-result-summaries/
Date when results are available: September 2021

SUBSEQUENT USE OF DATA
These data may be used in subsequent studies, in publications and in presentations.

RIGHTS OF RESEARCH PARTICIPANTS
You may withdraw your consent at any time and discontinue participation without penalty by simply exiting the survey or web browser. Incomplete surveys will not be included in the data analysis and will be deleted. However, once you complete the entire survey and submit your responses, your data cannot be deleted because no identifying information will be linked to the data.

If you have questions regarding your rights as a research participant, contact: The Office of Research Ethics, University of Windsor, Windsor, Ontario, N9B 3P4; Telephone: 519-253-3000, ext. 3948; e-mail: ethics@uwindsor.ca

I understand the information provided for the study *Personality and Motivations behind Driving Behaviour* as described herein. My questions have been answered to my satisfaction, and I agree to participate in this study.

Appendix C: Demographic Questions

1. What is your gender?

- Male
- Female
- Non-binary
- Other

2. What is your age (in years)?

- 17 – 20
- 21 – 25
- 26 – 30
- 31 or older

3. What level of driver's license do you currently have?

- I do not have a driver's license
- Learner's permit – G1
- Probational license – G2
- Full license – G

4. In the past year, how often have you driven a vehicle?

- Once a day
- Every few days
- Once a week
- Once a month
- Less than once a month

5. Have you ever had your driver's license suspended?

- Yes
- No

Appendix D: Implicit Association Test (IAT)

(Greenwald & Farnham, 2000)

Items:

Self	Other	Positive	Negative
Myself	Other	Joy	Grief
Mine	Them	Warmth	Agony
Me	Their	Paradise	Pain
My	They	Happy	Poison
Self	Them	Smile	Sickness
Myself	Other	Pleasure	Death
		Sunshine	Tragedy
		Rainbow	Vomit

Note: Self and Other categories show some items listed twice because these items appeared more frequently.

Appendix E: Driving Anger Expression Inventory (DAX)

(Deffenbacher et al., 2002)

Verbal Aggressive Expression (12 items)

I call the other driver names aloud.

I make negative comments about the other driver aloud.

I yell questions like "Where did you get your license?"

I swear at the other driver aloud.

I yell at the other driver.

I call the other driver names under my breath.

I swear at the other driver under my breath.

I make negative comments about the other driver under my breath.

I glare at the other driver.

I shake my head at the other driver.

I give the other driver dirty looks.

I think things like "Where did you get your license?"

Personal physical aggressive expression (11 items)

I try to get out of the car and tell the other driver off.

I try to force the other driver to the side of the road.

I try to get out of the car and have a physical fight with the other driver.

I give the other driver the finger.

I roll down the window to help communicate my anger.

I shake my fist at the other driver.

I try to scare the other driver.

I bump the other driver's bumper with mine.

I make hostile gestures other than giving the finger.

I go crazy behind the wheel.

I stick my tongue out at the other driver.

Use of the vehicle to express anger (11 items)

I drive right up on the other driver's bumper.

I drive a little faster than I was.

I try to cut in front of the other driver.

I follow right behind the other driver for a long time.

I speed up to frustrate the other driver.

I flash my lights at the other driver.

I purposely block the other driver from going what he/she wants to go.

I do to other drivers what they did to me.

I drive a lot faster than I was.

I slow down to frustrate the other driver.

I leave my lights on in the other driver's rear-view mirror.

Appendix F: Narcissistic Personality Inventory-13 (NPI-13)

(Gentile et al., 2013)

Item	Responses (Narcissistic response over non-narcissistic response)
12	I like having authority over other people.
	I don't mind following orders.
27	I have strong will to power.
	Power for its own sake doesn't interest me.
32	People always seem to recognize my authority.
	Being an authority doesn't mean much to me.
36	I am a born leader.
	Leadership is a quality that takes a long time to develop.
4	I know that I am a good person because everybody keeps telling me so.
	When people compliment me I sometimes get embarrassed.
15	I like to show off my body.
	I don't particularly like to show off my body.
19	I like to look at my body.
	My body is nothing special.
20	I will usually show off if I get the chance.
	I try not to be a show off.
29	I like to look at myself in the mirror.
	I am not particularly interested in looking at myself in the mirror.
13	I find it easy to manipulate people.
	I don't like it when I find myself manipulating people.

14   I insist upon getting the respect that is due me.

            I usually get the respect I deserve.

24   I expect a great deal from other people.

            I like to do things for other people.

25   I will never be satisfied until I get all that I deserve.

            I take my satisfactions as they come.

Appendix G: Hypersensitive Narcissism Scale (HSNS)

(Hendin & Cheek, 1997)

Items:

1. I can become entirely absorbed in thinking about my personal affairs, my health, my cares or my relations with others.

2. My feelings are easily hurt by ridicule or by the slighting remarks of others.

3. When I enter a room I often become self-conscious and feel that the eyes of others are upon me.

4. I dislike sharing the credit of an achievement with others.

5. I dislike being with a group unless I know that I am appreciated by at least one of those present.

6. I feel that I am temperamentally different from most people.

7. I often interpret the remarks of others in a personal way.

8. I easily become wrapped up in my own interests and forget the existence of others.

9. I feel that I have enough on my hands without worrying about other people's troubles.

10. I am secretly "put out" when other people come to me with their troubles, asking me for my time and sympathy.

Appendix H: Rosenberg Self-Esteem Scale (RSES)

(Rosenberg, 1965)

Items (* reverse-scored):

1. I feel that I am a person of worth, at least on an equal basis with others.

2. I feel that I have a number of good qualities.

3. All in all, I am inclined to feel that I am a failure.

4. I am able to do things as well as most other people.

5. I feel I do not have much to be proud of at all.*

6. I take a positive attitude toward myself.

7. On the whole, I am satisfied with myself.

8. I wish I could have more respect for myself.*

9. I certainly feel useless at times.*

10. At times I think I am no good at all.*

Appendix I: Rebelliousness Questionnaire (Social Reactivity Scale; RQ)

(McDermott, 1988)

1. When you are told you are breaking a rule (for example, 'No smoking') is your first reaction to

      a. Stop breaking the rule any further

      b. Go ahead and still break the rule

      c. Not sure

2. You have been treated badly by someone. Do you

      a. Try to get back at the person

      b. Hope that things will improve

      c. Not sure

3. In trying to complete an exercise routine, you go through some pain. Do you

      a. Continue

      b. Give up

      c. Not sure

4. "I enjoy the thrill I get from being difficult and awkward" Do you

      a. Agree

      b. Disagree

      c. Not sure

5. If people are unkind to you, do you feel you should be

      a. Unkind back

      b. Understanding

      c. Not sure

6. Do you find it exciting to do something 'shocking'?

      a. Yes, often

      b. No, hardly ever

      c. Not sure

7. If you are asked particularly NOT to do something, do you feel an urge to do it?

    a. No, hardly ever

    b. Yes, often

    c. Not sure

8. You are in a group of people who are drinking, but you do not like alcohol and are offered a drink. Would you

    a. Refuse the drink

    b. Accept the drink

    c. Not sure

9. Do you tease people unnecessarily just so as to have some fun at their expense?

    a. Yes, often

    b. No, hardly ever

    c. Not sure

10. A parking attendant tells you that you cannot park where you have just put the car. Would you

    a. Apologize and move it

    b. Argue with the attendant

    c. Not sure

11. How often do you do something you shouldn't just to get some excitement?

    a. Not often at all

    b. Often

    c. Not sure

12. You are asked to take part in an activity which secretly you dislike. Would you

    a. Say you have something else planned

    b. Say 'no' without explaining

    c. Not sure

13. If you get yelled at by someone in authority, would you

    a. Get angry and argue back

b. Try hard to avoid an argument

c. Not sure

14. If a person your age was mean to you, would you

    a. Try to forget it

    b. Try to get revenge

    c. Not sure

15. Can you think of anything you oppose strongly?

    a. No

    b. Yes

    c. Not sure

16. A charity will not accept you as a volunteer. Is your first reaction to

    a. Thank them for considering you

    b. Tell them to "go to hell"

    c. Not sure

17. How often do others say that you are a difficult person?

    a. Rarely

    b. Often

    c. Not sure

18. If you ask a person at a party to dance with you who says 'no' without offering any explanation, do you

    a. Get annoyed

    b. Accept it

    c. Not sure

Items 1, 4, 6, 7, 9, 11, and 17 make up the proactive rebelliousness subscale. Items 2, 5, 10, 13, 14, 16, and 18 make up the reactive rebelliousness subscale. Items 3, 8, 12, and 15 are filler items.

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