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Vulnerable and rebellious: The instability of aggressive drivers

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Aggressive driving contributes to a significant number of vehicle crashes every year and remains a prevalent behavior despite traffic enforcement. Our study investigates the constituents of three known predictors of aggressive driving: self-esteem, narcissism, and rebelliousness. We administered an online survey to 194 undergraduates who were recruited through a psychology participant pool from a mid-sized Canadian university. Correlational and regression analyses revealed that aggressive driving behaviors were predicted by vulnerable narcissism, proactive rebelliousness, and reactive rebelliousness. Additionally, both grandiose and vulnerable narcissism were significantly correlated with both proactive and reactive rebelliousness. Hierarchical regression analyses showed that the two types of rebelliousness contributed to 19% of the variance in aggressive driving when controlling for vulnerable narcissism. Lastly, mediation analyses revealed that both proactive and reactive rebelliousness partially mediated the relationship between vulnerable narcissism and aggressive driving behaviors. These results suggest that both types of rebelliousness play a significant role in aggressive driving behaviors. We also encourage future research that examines negativistic dominance and self-esteem instability as predictors of aggressive behavior.

Keywords: aggressive driving, narcissism, self-esteem, rebelliousness

Introduction

Aggressive driving is defined as "an aggressive behavioral response to provocation while driving" (Edwards et al., 2013, p. 192) and can be displayed through a variety of behaviors such as speeding, tailgating, and horn-honking. Aggressive driving contributes to more than half of all vehicle crashes in North America and studies show that aggressive-driving-related crashes are on the rise (AAA Foundation for Traffic Safety, 2009). For example, one study cited in the AAA report described a 56% increase in fatal motor vehicle collisions caused by aggressive driving between 2003 and 2007. Police officers in Ontario, Canada reported an 80% increase in aggressive-driving-related deaths between 2016 and 2017 (Shum, 2017). The prevalence and deadly consequences of aggressive driving highlight the importance of understanding why individuals exhibit these behaviors and their motivation to drive aggressively. Our study examines the constituents of three constructs that have previously been associated with aggressive driving: self-esteem, narcissism, and rebelliousness (or negativistic dominance).

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Self-esteem, defined as how an individual evaluates themselves and their own worth, has been shown to predict aggressive driving (Leary & Baumeister, 2000). However, the results remain equivocal as some studies point to inflated self-esteem as a predictor of aggressive driving (e.g., Lustman et al., 2010); whereas others show low self-esteem as a predictor (e.g., Przepiorka et al., 2014). Additionally, the directionality of self-esteem may depend on the type of aggression. Amad et al. (2020) found high self-esteem to be associated with proactive aggression (aggression that is purposeful or planned) and low self-esteem to be associated with reactive aggression (aggression that is defensive or unplanned). Theorists reason that, like aggression, self-esteem can also be displayed in two forms: explicit and implicit. Explicit self-esteem is the general form and represents our conscious feelings of self-worth and acceptance. Implicit self-esteem is the opposite and represents our non-conscious and automatic feelings of self (Zeigler-Hill, 2006). The existence of these two types of self-esteem is best explained using the dual-process model, which proposes that humans have two modes of processing: a cognitive mode (conscious and rational, associated with explicit self-esteem) and an experiential mode (non-conscious and automatic, associated with implicit self-esteem; Epstein & Morling, 1995; Zeigler-Hill, 2006).

Both types of self-esteem may relate to aggressive driving through psychological security. Terror management theory suggests that humans' acute awareness of death has the potential to create anxiety because it is at odds with the evolutionary motive to survive (Juhl & Routledge, 2016). This

anxiety caused by our awareness of death is referred to as mortality salience (Greenberg et al., 1997). Previous research shows that self-esteem (both explicit and implicit) can affect how individuals respond to mortality salience. High explicit self-esteem has been associated with risky behavior in response to mortality salience. Individuals with high driving self-esteem report greater intentions to take driving risks when exposed to death-related facts and images than when exposed to neutral facts and images (Carey & Sarma, 2011). Schmeichel et al. (2009) conducted three studies examining participants' self-esteem and defensive responses to mortality salience. One study found that mortality salience increased the endorsement of positive personality profiles in participants with high explicit and low implicit self-esteem, suggesting that these individuals are more susceptible to defensive responses to mortality salience. The results of the other two studies suggest that individuals with high implicit self-esteem are more resilient to mortality salience (Schmeichel et al., 2009).

Related to self-esteem is the personality trait of narcissism. Individuals high in narcissism feel superior to others, have inflated self-views, and lack empathy (Bushman et al., 2018). Schreer (2002) investigated narcissism with driving aggression using the Narcissistic Personality Inventory (NPI). Two subscales of the NPI, Exhibitionism for women and Entitlement for men, predicted aggressive driving behavior. Additionally, Edwards et al. (2013) found that narcissism and driving anger accounted for almost 50% of the explained variance in driving aggression. Narcissism's relation to aggressive behavior is attributed to the theory of threatened egotism, which states that high but unstable self-esteem causes individuals to react more aggressively when provoked (Baumeister et al., 1996).

Driving aggression research has mainly focused on narcissism in its overt form (grandiose narcissism); however, the covert form of narcissism (vulnerable narcissism) may also play an important role. Grandiose narcissism is characterized by feelings of entitlement and exploitative behaviors, whereas vulnerable narcissism is characterized by anxiety and defensiveness (Rohmann et al., 2019). Vulnerable narcissism and its relationship with aggressive driving has been examined among drivers in Turkey. Dobrucali and Özkan (2021) investigated this relationship through the narcissism-impulsivity hypothesis, which suggests that individuals high in narcissism are impulsive, making them prone to react aggressively to provocation. They found that attentional impulsivity (poorly focusing on a task) partially mediated the relationship between vulnerable narcissism and aggressive driving, specifically the use of a vehicle to express anger. Additionally, they found that grandiose narcissism moderated the relationship between attentional impulsivity and use of a vehicle to express anger (Dobrucali & Özkan, 2021).

The main difference between the two forms of narcissism is self-esteem. Research shows that grandiose narcissism is associated with high explicit self-esteem and vulnerable narcissism is associated with low explicit self-esteem. The two types of narcissism have also been examined with implicit self-esteem; indeed, some research supporting the mask hypothesis states that individuals high in grandiose narcissism display high explicit self-esteem and low implicit self-esteem (e.g., Jordan et al., 2003; Zeigler-Hill, 2006). A 'modest mask' hypothesis has been proposed for vulnerable narcissism stating individuals high in vulnerable narcissism would display low explicit self-esteem and high implicit self-esteem; however, research does not support this hypothesis (Brown & Brunell, 2017).

Aggressive driving can also be predicted by our dominant motivational styles. Reversal theory offers a model of motivation and emotion that suggests individuals can switch between different motivational states depending on a variety of factors, such as the framing of the situation, or by something "triggering" this reversal (Apter, 1982). There are four motivational domains containing two opposing states within them. The first is the means-end domain, which is comprised of the telic state (serious, motivated by achievement and future goals) and the paratelic state (playful, motivated by enjoyment). The second is the rules domain, which is comprised of the conforming state (motivated by operating within the expectations) and rebellious or negativistic state (motivated by disobeying these expectations). The third is the transactions domain, which is comprised of the mastery state (motivated by control and power) and the sympathy state (motivated by care and compassion). The fourth is the relationships domain, which is comprised of the autic (motivated by self) and alloic (motivated by others) states. Reversal theory also proposes that individuals can have an inherent tendency to adopt one motivational style over the other, rendering them dominant in a certain state (Apter, 1982). For example, individuals may reverse into a rebellious state, but if they are conforming-state-dominant, they are prone to more quickly reverse back to, and remain in, the conforming state.

Our study will focus on the rebellious or negativistic state of the rules domain. Rebelliousness is characterised by whether an individual follows or does not follow rules or expectations. Research has shown that individuals high in rebelliousness tend to participate in various risky behaviors (e.g., risky sexual and/or health behaviors; Lafreniere et al., 2013). Rebelliousness has also been shown to significantly predict aggressive driving (Lafreniere et al., 2021); however, that study examined rebelliousness as a *singular* concept and did not distinguish between proactive rebelliousness (characterized by seeking fun or pleasure) and reactive rebelliousness (characterized by vindictive or vengeful behavior; McDermott, 1988). Both rebelliousness types have been shown to predict risky behaviors, but proactive rebelliousness is es-

pecially influential in predicting illegal and aggressive behaviors (Lafreniere et al., 2013).

The Present Study and Hypotheses

Our study examined whether the constituents of trait narcissism, self-esteem, and rebelliousness predicted aggressive driving. Additionally, we sought to examine how these three constructs may relate to each other. We offered five hypotheses. Hypothesis 1 proposed that like grandiose narcissism, vulnerable narcissism would also predict aggressive driving. Hypothesis 2, however, based on the theory of threatened egotism and terror management theory, proposed that grandiose narcissism would have a greater association with aggressive driving than vulnerable narcissism. Hypothesis 3, also based on terror management theory, proposed that high explicit self-esteem and low implicit self-esteem would predict aggressive driving.

Our final hypotheses examined rebelliousness. Hypothesis 4 proposed that both proactive and reactive rebelliousness would predict aggressive driving. Hypothesis 5 proposed that proactive rebelliousness would be more strongly associated with grandiose narcissism and that reactive rebelliousness would be more strongly associated with vulnerable narcissism. Hypothesis 5 was based on the previously-mentioned research by Amad et al. (2020), which ties proactive aggression (aggression that is purposeful or planned) to high self-esteem and reactive aggression (aggression that is defensive or unplanned) to low self-esteem. Both types of rebelliousness and aggression appear to be related in their underlying motives.

Methods

Participants

One-hundred and ninety-four undergraduate student participants were recruited from the psychology participant pool of a medium-sized university in Ontario, Canada. Ontario uses a graduated drivers' licensing system with three levels: G1, G2, and G. The G2 level allows people to drive by themselves and to drive over the speed limit of 80 km/h (Ministry of Transportation of Ontario, 2020). The current study was open to students who had a G2 or higher-level license to ensure adequate driving experience. The sample was predominantly female (90%), between the ages of 17 and 25 years (91%), had a G2 or full G license (99%), and drove a vehicle at least once a day or every few days (86%). See Table 1 for a full breakdown of participant demographic characteristics. Participants received 0.5 bonus points toward their grade in an applicable psychology course in exchange for 30 minutes of their time. This research was approved by the university's Research Ethics Board.

Table 1
Participant Demographic Characteristics

		n (N = 194)
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	17
	Once a week	17
	Few times a month	7
	Once a month	3
	Never	0
License Ever Suspended	Yes	7
	No	187

Procedure and Measures

Undergraduate students who signed up for the psychology participant pool were able to view an ad for the study online and participate if they met the eligibility criteria. Participants were told they needed to complete the study on a laptop or personal computer (i.e., no mobile devices) to be able to use a keyboard to complete the reaction time task. Eligible participants were provided a link to complete the online survey via the platform *Qualtrics*. First, participants were presented with a consent form. If they agreed to participate, demographic information was then collected followed by the Implicit Association Test and the other four measures discussed below. Lastly, at the end of the survey, participants were given the opportunity to submit or withdraw their responses.

The online survey contained the following measures:

The *Self-Esteem Implicit Association Test* (IAT; Greenwald et al., 1998, Greenwald & Farnham, 2000) was used to measure implicit self-esteem. This test consists of a computerized task where participants categorize self-relevant and non-self-relevant words with pleasant and unpleasant valence words using their keyboard. Participants' reaction time is recorded, and the data were analyzed by computing a d-score, which is the standardized difference between the compatible (self + pleasant) and incompatible (self + unpleasant) blocks. The IAT was made functional to Qualtrics using the software created by Carpenter et al. (2019), which alters the HTML and Javascript of Qualtrics allowing reaction time to be recorded. The IAT has been widely used as a measure of

Table 2
Descriptive Statistics and Intercorrelations for Primary Variables

Variable	*M*	*SD*	α	1	2	3	4	5	6
1. Aggressive Driving (DAX)	50.18	11.86	.92						
2. Grandiose Narcissism (NPI)	3.60	2.28	.60	.25***					
3. Vulnerable Narcissism (HSNS)	29.17	6.00	.74	.31***	.18*				
4. Implicit Self-Esteem (IAT)	0.71	0.33	.74	-.04	-.02	-.01			
5. Explicit Self-Esteem (RSES)	19.72	5.47	.89	-.13	.21***	-.47***	.10		
6. Proactive Rebelliousness (PRO)	2.75	2.47	.54	.41***	.33***	.17*	-.09	-.06	
7. Reactive Rebelliousness (REA)	1.99	2.03	.48	.41***	.24***	.27***	-.06	-.12	.32***

Note. α = Cronbach's reliability.
* $p < .05$, *** $p < .001$

implicit self-esteem and displayed the highest test-retest reliability when compared to seven other implicit self-esteem measures over 31 days (Bosson et al., 2000). Cronbach's α reliability for this study was 0.74.

The *Driving Anger Expression Inventory* (DAX; Deffenbacher et al., 2002) was used to measure aggressive driving. This measure consists of 34-items that assess aggressive driving behavior in three categories: 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"). Participants answer the items using a four-point Likert scale ranging from "almost never" to "almost always". Cronbach's α reliability was 0.92.

The *Narcissistic Personality Inventory-13* (NPI-13; Gentile et al., 2013) was used to assess grandiose narcissism. This measure consists of 13 paired statement items from the original 40-item NPI (Raskin & Terry, 1988) that participants answer by selecting the statement that best represents themselves (forced choice). Cronbach's α reliability for this scale was moderate (0.60) but was ultimately retained for analyses.

The *Hypersensitive Narcissism Scale* (HSNS; Hendin & Cheek, 1997) was used to assess vulnerable narcissism. This measure consists of 10 items which participants rate on a five-point Likert scale from "strongly disagree" to "strongly agree". The HSNS has shown adequate internal reliability in both clinical (α = .71) and non-clinical (α = .69) populations (Fossati et al., 2009). For the current study, Cronbach's α reliability was 0.74.

Rosenberg's Self-Esteem Scale (RSES; Rosenberg, 1965) was used to assess explicit self-esteem. This measure consists of 10 items that participants rate on a five-point Likert scale from "strongly disagree" to "strongly agree". The RSES is a well-validated measure as it has been a popular measure of self-esteem for decades. This measure demonstrates high test-retest reliability (e.g., test-retest coefficient of .82 for a one-week period; Fleming & Courtney, 1984) and high internal consistency (α = .87; Bosson et al., 2000). Cronbach's α reliability for this study was 0.89.

Lastly, the *Rebelliousness Questionnaire* (RQ; McDermott, 1988) was used to measure the two subscales of rebelliousness. The RQ is a forced choice questionnaire consisting of 18 items, seven items corresponding to each of the subscales and four filler items. Cronbach's α reliability for both subscales of rebelliousness were low for this study, 0.54 for proactive and 0.48 for reactive; however, this measure was still retained for analyses. Recommendations are later offered for scale modification.

Results

All analyses were tested using IBM Statistical Package for Science (SPSS) Version 26.0 and employed the standard .05 level of significance. See Table 2 for descriptive statistics and correlations of the instrument-derived variables. Aggressive Driving was weakly correlated with grandiose narcissism ($r = .25, p < .001$), and moderately correlated with vulnerable narcissism ($r = .31, p < .001$). Aggressive driving was also moderately correlated to both proactive rebelliousness ($r = .41, p < .001$) and reactive rebelliousness ($r = .41, p < .001$). Aggressive Driving was only marginally, but negatively, correlated with explicit self-esteem ($r = -.13, p = .07$). Implicit self-esteem was not significantly correlated with any of the variables. Explicit self-esteem was moderately, but negatively, correlated with vulnerable narcissism ($r = -.47, p < .001$) and weakly correlated with grandiose narcissism ($r = .21, p = .004$). Both types of narcissism were positively correlated with the two types of rebelliousness. Grandiose and vulnerable narcissism were weakly correlated with each other ($r = .18, p = .013$). Both types of rebelliousness were also moderately correlated with each other ($r = .32, p < .001$). Lastly, gender (not shown in the table) was positively associated with vulnerable narcissism, showing females scored higher than males.

To test Hypotheses 2 and 5, correlational analyses were further examined using the Meng et al. (1992) method. This method extends the Fisher *Z* transformation and tests

Table 3
Differences in Correlations Using the Meng et al. (1992) Method

Variables	Correlation Difference	*Z*	95% CI
Aggressive Driving → Grandiose Narcissism	-.05	-0.61	-0.24 – 0.13
Proactive Rebelliousness → Grandiose Narcissism and Vulnerable Narcissism	-.16	-1.75	-0.34 – 0.02
Reactive Rebelliousness → Grandiose Narcissism and Vulnerable Narcissism	.18	0.29	-0.16 – 0.21

Table 4
Regression Results for Predictors of Aggressive Driving Behaviors

Model	Variable	*b*	*SE*	β	*F*	Adjusted R^2
Standard	Grandiose Narcissism	0.36	0.34	0.07	19.17	0.27***
	Vulnerable Narcissism	0.35	0.13	0.18**		
	Proactive Rebelliousness	1.33	0.32	0.28**		
	Reactive Rebelliousness	1.47	0.39	0.25**		
Hierarchical (Step 1)	Vulnerable Narcissism	0.60	0.14	0.31***	19.75	0.09***
Hierarchical (Step 2)	Vulnerable Narcissism	0.37	0.13	0.19***	25.18	0.27***
	Proactive Rebelliousness	1.43	0.31	0.30***		
	Reactive Rebelliousness	1.52	0.39	0.26***		

Note. b = unstandardized regression coefficient, SE = standard error of b, β = standardized regression coefficient.
** p < .01, *** $p < .001$

whether there are significant differences between two correlations on the same dependent variable by conducting a *Z* test of the null hypothesis of equal correlations and providing 95% confidence intervals. First, the difference between the correlations of both types of narcissism with aggressive driving were compared. Additionally, the correlations between proactive and reactive rebelliousness with grandiose and vulnerable narcissism were also examined. The results showed that there were no significant differences between the correlations. The confidence intervals for all three of the tests included zero, meaning the null hypothesis that the correlations are equal must be retained, see Table 3 for statistics.

Next, a standard multiple regression analysis was conducted with both types of narcissism and rebelliousness as predictors and aggressive driving as the outcome measure. The overall regression model was significant, $F(4, 189) = 19.17, p < .001$, $MSE = 102.18$; and explained 27% of the variance. The final regression model showed that grandiose narcissism did not contribute significantly to the prediction of aggressive driving. Vulnerable narcissism, proactive rebelliousness, and reactive rebelliousness all significantly predicted aggressive driving.

As more exploratory analyses, a hierarchical regression was conducted to examine if the two types of rebelliousness could predict aggressive driving while controlling for vulnerable narcissism. The final regression model showed that introducing the two types of rebelliousness explained an additional 19% of the variance in aggressive driving. This change in R^2 was significant, $F(3, 190) = 25.18, p < .001$, $MSE = 102.23$; see Table 4 for regression results from both regression analyses.

Lastly, to further examine the relationship between vulnerable narcissism and the two types of rebelliousness on aggressive driving, two mediation analyses were conducted. First, the relationship between vulnerable narcissism and aggressive driving with reactive rebelliousness as the mediator was conducted using PROCESS macro, Version 4.0 (Hayes, 2013) within SPSS. Both the direct effect ($\beta = .42, t(194) = 3.19, p = .002$) and the total effect ($\beta = .60, t(194) = 4.44, p < .001$) were significant, consistent with a partial mediation model. The results of the indirect effect using 95% confidence intervals and 5,000 bootstrap samples showed that reactive rebelliousness accounted for approximately 30% of the total effect ($ab = .18$, Bootstrap $CI_{95} = .08$ and .30, see Table 5 and Figure 1).

Next, the relationship between vulnerable narcissism and aggressive driving with proactive rebelliousness as the mediator was conducted using the same method. Once again, both direct effect ($= .48, t(194) = 3.74, p < .001$) and total effect ($= .60, t(194) = 4.44, p < .001$) were significant, reflecting a partial mediation model. The indirect effect ($ab = .13$, Bootstrap $CI_{95} = .03$ and .25) showed that proactive rebelliousness accounted for approximately 21% of the total effect (see Table 6 and Figure 2).

Table 5
Effect of Vulnerable Narcissism on Aggressive Driving as Mediated by Reactive Rebelliousness

Variable / Effect	*b*	*SE*	*t*	95% CI
Vulnerable Narcissism → Reactive Rebelliousness	0.09***	0.02	3.81	0.04 – 0.13
Vulnerable Narcissism → Aggressive Driving	0.42***	0.13	3.19	0.16 – 0.68
Vulnerable Narcissism → Reactive Rebelliousness → Aggressive Driving	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

*** $p < .001$

Table 6
Effect of Vulnerable Narcissism on Aggressive Driving as Mediated by Proactive Rebelliousness

Variable / Effect	*b*	*SE*	*t*	95% CI
Vulnerable Narcissism → Proactive Rebelliousness	0.07***	0.03	2.41	0.01 – 0.13
Vulnerable Narcissism → Aggressive Driving	0.48***	0.13	3.74	0.23 – 0.73
Vulnerable Narcissism → Proactive Rebelliousness → Aggressive Driving	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

*** $p < .001$

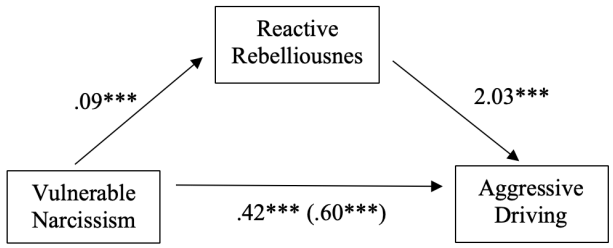

Figure 1. Mediation model for vulnerable narcissism on aggressive driving as mediated by reactive rebelliousness, ***$p < .001$.

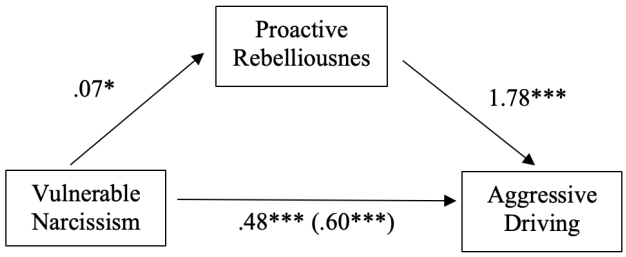

Figure 2. Mediation model of vulnerable narcissism on aggressive driving as mediated by proactive rebelliousness, *$p < .05$ *** $p < .001$.

Discussion

Our study had two main objectives: to examine three predictors of aggressive driving by testing the constituents of self-esteem, narcissism, and rebelliousness, and to examine the relationship between these predictors. The findings supported two of the proposed hypotheses (Hypotheses 1 and 4) that vulnerable narcissism and both types of rebelliousness would predict aggressive driving. Correlational analyses supported previous research on the two subtypes of narcissism showing that high explicit self-esteem was negatively correlated with vulnerable narcissism and positively correlated with grandiose narcissism. Females reported higher scores on the vulnerable narcissism scale than males, which is also consistent with recent findings on narcissism and gender (Green et al., 2020).

Although grandiose narcissism was significantly correlated with aggressive driving, regression analyses revealed that it was not a significant predictor after the model already included vulnerable narcissism and the two types of rebelliousness. These results may have occurred due to the high percentage of female participants as research suggests that vulnerable narcissism is higher amongst females (Green et al., 2020). Alternatively, these findings may have been a result of the grandiose narcissism measure used in this study (NPI-13). For example, Schreer (2002) found only two subscales of narcissism (Exhibitionism in women and Entitle-

ment for men) predicted aggressive driving using the original NPI. The specific items of the NPI used in the NPI-13 may not be significant predictors of aggressive driving behaviors. The NPI-13 also showed lower internal reliability (α = .60), which may have played a role in grandiose narcissism being an insignificant predictor in the regression analyses.

Additionally, the results showed no significant difference between the correlations of aggressive driving and the two types of narcissism (Hypothesis 2). These results suggest that vulnerable narcissism is an important predictor of aggressive driving and may be a better predictor of aggressive driving than grandiose narcissism. The results support previous findings showing that narcissism and low self-esteem predicted aggressive driving behaviors (Przepiorka et al., 2014). Additionally, they also support findings from Hart et al. (2019) who suggested that narcissistic individuals with low self-esteem (e.g., vulnerable narcissists) do not need much provocation to become aggressive, whereas narcissistic individuals with high self-esteem (e.g., grandiose narcissists) need a higher level of provocation to display this aggression. Vulnerable narcissism is characterized by unstable self-esteem, which has been said to make individuals prone to aggression (Lustman et al., 2010). Therefore, the findings of the current study suggest that self-esteem instability, and not whether an individual has predominately high or low self-esteem, may play a role in aggressive driving.

Previous research has found both high (e.g., narcissistic individuals) and low explicit self-esteem to be associated with aggressive driving. In the current study, neither explicit nor implicit self-esteem were significantly associated with aggressive driving; therefore, hypothesis 3 was not supported. Explicit and implicit self-esteem were also not significantly correlated with each other, which does not reflect previous findings of a weak, positive correlation between the IAT and explicit self-esteem measures (Bosson et al., 2000). Although some studies have found explicit self-esteem as a predictor of aggressive driving, these studies often used different aggressive driving measures (e.g., Driving Anger Scale, Driving Vengeance Questionnaire, etc.). These findings reflect those of Schreer (2002) as self-esteem alone did not predict aggressive driving using a 12-item aggressive driving measure, only certain subscales of narcissism did. Further, some studies have found implicit self-esteem plays a role in aggression (e.g., Sandstrom & Jordan, 2008), while others find no relationship. For example, the findings in this study support those by Schroeder-Abe et al. (2007) who found no relationship between implicit self-esteem (also measured using the IAT) and outward displays of aggression in young adults.

Theorists have often debated that self-esteem and narcissism relate to aggression with either an additive or interactive effect. An additive effect suggests that self-esteem decreases aggression whereas narcissism increases aggression (Hyatt et al., 2018). In this study, vulnerable narcissism (low self-esteem) had a stronger association with aggressive driving than grandiose narcissism (high self-esteem). Therefore, the findings support the notion that self-esteem relates to aggression as an interactive effect, which suggests that narcissism relates to aggression more weakly at high vs. low self-esteem (Hart et al., 2019). Studies have shown that explicit self-esteem alone does not predict aggression (e.g., Schreer, 2002); however, it appears that the interaction of narcissistic individuals with low explicit self-esteem are more prone to aggressive driving than non-narcissistic individuals.

Both proactive and reactive rebelliousness predicted aggressive driving (Hypothesis 4), which supports previous research pairing both types of rebelliousness to risky and aggressive behaviors (Lafreniere et al., 2013, 2021). When examining the two types of rebelliousness with the other variables, Hypothesis 5 proposed 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. Although the correlational analyses seemed to support Hypothesis 5, further analysis using the Meng et al. (1992) method revealed there were no significant differences between these correlations. These findings reflect similar patterns found in a recent meta-analysis analyzing narcissism with the two forms of aggression. Kjaervik and Bushman (2021) found the average correlation between narcissism and proactive aggression to be stronger than that of narcissism and reactive aggression; however, the correlations were not significantly different. Additionally, these insignificant findings may have been a result of the low internal reliability of the Rebelliousness Questionnaire. The relationship comparing the correlations may be found to be significant in the future with enhanced measurement of proactive and reactive rebelliousness.

Lastly, the present study performed exploratory analyses to further understand the relationships between vulnerable narcissism, rebelliousness, and aggressive driving. A hierarchical regression model revealed that adding the two types of rebelliousness (in a model that already included vulnerable narcissism) accounted for an additional 19% of the variance in aggressive driving behaviors. Additionally, mediation models showed that both reactive and proactive rebelliousness partially mediated the relationship between vulnerable narcissism and aggressive driving. The relationship between reactive rebelliousness and vulnerable narcissism supports previous research demonstrating that individuals high in vulnerable narcissism tend to be defensive because their low self-esteem makes them prone to ego-threats. Proactive rebelliousness does not appear to have a strong theoretical connection with vulnerable narcissism; however, findings from this study suggest that individuals high in vulnerable narcissism may perform either proactive or reactive rebellious acts to vindicate their self-esteem.

Limitations, Implications, and Future Directions

While this study provided valuable insights into the predictors of aggressive driving, it is not without its limits. This study used a convenience sample of undergraduate students and most of the sample (90%) was female. Additionally, this study was conducted on a sample of drivers within Canada who may only be familiar with North American traffic settings and norms. Future research should examine these constructs using more balanced samples and incorporating other regions around the world to understand whether these predictors are significant for different populations.

Other limitations to this study were the instruments used to measure implicit self-esteem and the two types of rebelliousness. The results did not show a significant correlation between explicit and implicit self-esteem, which may have occurred due to measurement problems that rendered the IAT ineffective. The IAT is best administered within a controlled laboratory setting; however, the current study was implemented during the COVID-19 pandemic and thus, the study needed to be conducted online. Fazio & Olsen (2003) have demonstrated that implicit associations are sensitive to priming effects and other situational cues. By administering the IAT online, this study was not able to control whether participants were primed by their environment. Lastly, although the two types of rebelliousness were important predictors in this study, the results must be interpreted with caution due to low reliability. The Rebelliousness Questionnaire is a popular measure of negativistic dominance; however, the reliability is a chronic issue with multiple studies reporting low Cronbach's alphas (e.g., Lafreniere et al., 2013). Future research should incorporate additional measures of negativistic dominance (e.g., The Motivational Style Profile) or investigate the possibility of creating a more robust measure.

Despite these limitations, the results of this study have several implications for prevention and future research. Firstly, the findings support the notion that both narcissism and rebelliousness should continue to be examined as two separate types, as opposed to singular concepts. To the best of our knowledge, the current study was the first to examine vulnerable narcissism and aggressive driving in a Canadian population and provides further evidence that vulnerable narcissism may be an important predictor of aggressive driving. More studies incorporating vulnerable narcissism with aggressive driving need to be conducted to gain more understanding of how they relate to each other. The findings of this study also further support the notion that narcissism is a strong predictor of aggressive behavior and therefore, should be considered when creating driver profiles for assessing driver behavior. Additionally, different methods of measuring aggressive driving (e.g., using a drive simulator) as opposed to relying on self-report measures should be tested with these variables.

Future research should continue to examine self-esteem instability and its potential role in aggressive driving. In relation to this, the other two constructs used in this study (narcissism and rebelliousness) may also fluctuate within an individual over time. For example, Edershile and Wright (2021) found levels of grandiose and vulnerable narcissism to fluctuate depending on an individual's dominant state and level of entitlement. Further studies examining reversal theory and how it may be useful in understanding the motivations behind aggressive driving should also be conducted. A foundational component of reversal theory is how individuals can reverse between motivational states and how our environment may trigger these reversals (e.g., the presence of a police officer may make a person reverse to the conforming state). Future research should examine motivational states after changes in the environment (e.g., the presence of a speeding sign) to understand the impact of these prevention methods on motivations to drive aggressively.

References

AAA Foundation for Traffic Safety. (2009). Aggressive driving: Research update. https://safety.fhwa.dot.gov/speedmgt/ref_mats/fhwasa1304/resources2/38%20-%20Aggressive%20Driving%202009%20Research%20Update.pdf

Amad, S., Gray, N. S., & Snowden, R. J. (2020). Self-esteem, narcissism, and aggression: Different types of self-esteem predict different types of aggression. *Journal of Interpersonal Violence*, *35*(23-24),1-18. https://doi.org/10.1177/0886260520905540

Apter, M. J. (1982). *The experience of motivation: The theory of psychological reversals*. New York: Academic Press.

Baumeister, R., Smart, L., & Boden, J. (1996). Relation of threatened egotism to violence and aggression: The dark side of high self-esteem. *Psychological Review*, *103*, 5-33. https://doi.org/10.1037/0033-295x.103.1.5

Bosson, J. K., Swann, W. B. Jr., & Pennebaker, J. W. (2000). Stalking the perfect measure of implicit self-esteem: The blind men and the elephant revisited? *Journal of Personality and Social Psychology*, *79*(4), 631-643. https://doi.org/10.1037/0022-3514.79.4.631

Bushman, B. J., Steffgen, G., Kerwin, T., Whitlock, T., & Weisenberger, J. M. (2018). "Don't you know I own the road?" The link between narcissism and aggressive driving. *Transportation Research Part F*, *52*, 14-20. https://doi.org/10.1016/j.trf.2017.10.008

Brown, A. A., & Brunell, A. B. (2017). The "modest mask"? An investigation of vulnerable narcissists' implicit self-esteem. *Personality and Individual Differences*, *119*, 160-167. http://dx.doi.org/10.1016/j.paid.2017.07.020

Carpenter, T. P., Pogacar, R., Pullig, C., Kouril, M., Aguilar, S., LaBouff, J., Isenberg, N., & Chakroff, A. (2019).

Survey-software implicit association tests: A methodological and empirical analysis. *Behavior Research Methods*, *51*, 2194-2208. https://doi.org/10.3758/s13428-019-01293-3

Carey, R. N., & Sarma, K. M. (2011). The impact of threat appeal messages on risky driving intentions: A terror management theory perspective. *Journal of the Australasian College of Road Safety*, *22*(4), 51-56.

Deffenbacher, J. L., Lynch, R. S., Oetting, E. R., & Swaim, R. C. (2002). The driving anger expression inventory: A measure of how people express their anger on the road. *Behavior Research and Therapy*, *40*(6), 717-737. https://doi.org/10.1016/S0005-7967(01)00063-8

Dobrucali, B., & Özkan, T. (2021). What is the role of narcissism in the relationship between impulsivity and driving anger expression? *Transportation Research Part F*, *77*, 246-256. https://doi.org/10.1016/j.trf.2021.01.008

Edershile, E. A., & Wright, A. G. C. (2021). Fluctuations in grandiose and vulnerable narcissism: A momentary perspective. *Journal of Personality and Social Psychology*, *120*(5), 1386-1414. https://doi.org/10.1037/pspp0000370

Edwards, B. D., Warren, C. R., Tubré, T. C., Zyphur, M. J., & Hoffner-Prillaman, R. (2013). The validity of narcissism and driving anger in predicting aggressive driving in a sample of young drivers. *Human Performance*, *26*, 191-210. https://doi.org/10.1080/08959285.2013.795961

Epstein, S., & Morling, B. (1995). Is the self motivated to do more than enhance and/or verify itself? In M. H. Kernis (Ed.), *Efficacy, agency, and self-esteem* (pp. 9-29). Plenum.

Fazio, R. H., & Olson, M. A. (2003). Implicit measures in social cognition research: Their meaning and use. *Annual Review of Psychology*, *54*, 297-327. https://doi.org/10.1146/annurev.psych.54.101601.145225

Fleming, J. S., & Courtney, B. E. (1984). The dimensionality of self-esteem: II. Hierarchical facet model for revised measurement scales. *Journal of Personality and Social Psychology*, *46*(2), 404-421. https://doi.org/10.1037/0022-3514.46.2.404

Fossati, A., Borroni, S., Grazioli, F., Dornetti, L., Marcassoli, I., Maffei, C., & Cheek, J. (2009). Tracking the hypersensitive dimension of narcissism: Reliability and validity of the Hypersensitive Narcissism Scale. *Personality and Mental Health*, *3*(4), 235-247. https://doi.org/10.1002/pmh.92

Gentile, B., Miller, J. D., Hoffman, B. J., Reidy, D. E., Zeichner, A., & Campbel, W. K. (2013). A test of two brief measures of grandiose narcissism: The Narcissistic Personality Inventory-13 and the Narcissistic Personality Inventory-16. *Psychological Assessment*, *25*(4), 1120-1136. https://doi.org/10.1037/a0033192

Green, A., MacLean, R., & Charles, K. (2020). Unmasking gender differences in narcissism within intimate partner violence. *Personality and Individual Differences*, *167*: 110247. https://doi.org/10.1016/j.paid.2020.110247

Greenberg, J., Solomon, S., & Pyszczynski, T. (1997). Terror management theory of self-esteem and cultural worldviews: Empirical assessments and conceptual refinements. *Advances in Experimental Social Psychology*, *29*, 61-139. https://doi.org/10.1016/S0065-2601(08)60016-7

Greenwald, A. G., & Farnham, S. D. (2000). Using the implicit association test to measure self-esteem and self-concept. *Journal of Personality and Social Psychology*, *79*(6), 1022-1038. https://doi.org/10.1037/0022-3514.79.6.1022

Greenwald, A. G., McGhee, D. E., & Schwartz, J. L. K. (1998). Measuring individual differences in implicit cognition: The implicit association test. *Journal of Personality and Social Psychology*, *74*(6), 1464-1480. https://doi.org/10.1037/0022-3514.74.6.1464

Hart, W., Richardson, K., & Breeden, C. J. (2019). An interactive model of narcissism, self-esteem, and provocation extent on aggression. *Personality and Individual Differences*, *145,* 112-118. https://doi.org/10.1016/j.paid.2019.03.032

Hayes, A. F. (2013). Introduction to mediation, moderation, and conditional process analysis: A regression-based approach. (K. David & T. Little, Eds.) Guilford Press.

Hendin, H. M., & Cheek, J. M. (1997). Assessing hypersensitive narcissism: A re-examination of Murray's narcissism scale. *Journal of Research in Personality*, *31*(4), 588-599. https://doi.org/10.1006/jrpe.1997.2204

Hyatt, C. S., Sleep, C. E., Lamkin, J., Maples-Keller, J. L., Sedikides, C., Campbell, W. K., & Miller, J. D. (2018). Narcissism and self-esteem: A nomological network analysis. *PLoS One*, *13*(8), e0201088. https://doi.org/10.1371/journal.pone.0201088

Jordan, C. H., Spencer, S. J., Zanna, M. P., Hoshino-Browne, E., & Correll, J. (2003). Secure and defensive high self-esteem. *Journal of Personality and Social Psychology*, *85*(5), 969-978. http://dx.doi.org/10.1037/0022-3514.85.5.969

Juhl, J., & Routledge, C. (2016). Putting the terror in terror management theory: Evidence that the awareness of death does cause anxiety and undermine psychological well-being. *Current Directions in Psychological Science*, *25*(2), 99-103. https://doi.org/10.1177/0963721415625218

Kjaervik, S. L., & Bushman, B. J. (2021). The link between narcissism and aggression: A meta-analytic review. *Psychological Bulletin*, *147*(5), 477-503. https://doi.org/10.1037/bul0000323

Lafreniere, K., Lee, C., Craig, J., Shah, D., & Cramer, K. M. (2021). Personality and metamotivational predictors of aggressive driving. *Journal of Motivation, Emo-*

tion, and Personality, *10*, 1-12. https://doi.org/10.12689/jmep.2021.1001

Lafreniere, K., Menna, R., & Cramer, K. M. (2013). Rebelliousness, effortful control, and risky behavior: Meta-motivational and temperamental predictors of risk-taking in older adolescents. *Journal of Motivation, Emotion, and Personality*, *1*, 17-26. https://doi.org/10.12689/jmep.2013.103

Leary, M. R., & Baumeister, R. F. (2000). The nature and function of self-esteem: Sociometer theory. *Advances in Experimental Social Psychology*, *32*, 1-62. https://doi.org/10.1016/S0065-2601(00)80003-9

Lustman, M., Wiesenthal, D. L., & Flett, G. L. (2010). Narcissism and aggressive driving: Is an inflated view of the self a road hazard? *Journal of Applied Social Psychology*, *40*(6), 1423-1449. https://doi.org/10.1111/j.1559-1816.2010.00624.x

McDermott, M. R. (1988). Measuring rebelliousness: The development of the Negativism Dominance Scale. In M. J. Apter, J. H. Kerr, & M. P. Cowles (Eds.), *Progress in reversal theory* (pp. 297-312). Amsterdam: Elsevier.

Meng, X. L., Rosenthal, R. & Rubin, D. B. (1992). Comparing correlated correlation coefficients. *Psychological Bulletin*, *111*(1), 172-175. https://doi.org/10.1037/0033-2909.111.1.172

Ministry of Transportation of Ontario. (2020). *The official Ministry of Transportation (MTO) driver's handbook*. Publications Ontario.

Przepiorka, A. M., Blachnio, A., & Wiesenthal, D. L. (2014). The determinants of driving aggression among Polish drivers. *Transportation Research Part F*, *27*, 69-80. http://dx.doi.org/10.1016/j.trf.2014.09.007

Raskin, R., & Terry, H. (1988). A principal-components analysis of the Narcissistic Personality Inventory and further evidence of its construct validity. *Journal of Personality and Social Psychology*, *54*(5), 890-902. https://doi.org/10.1037/0022-3514.54.5.890

Rohmann, E., Hanke, S., & Bierhoff, H. (2019). Grandiose and vulnerable narcissism in relation to life satisfaction, self-esteem, and self-construal. *Journal of Individual Differences*, *40*(4), 194-203. https://doi.org/10.1027/1614-0001/a000292

Rosenberg, M. (1965). *Society and the adolescent self-image*. Princeton, NJ: Princeton University Press.

Sandstrom, M. J., & Jordan, R. (2008). Defensive self-esteem and aggression in childhood. *Journal of Research in Personality*, *42*, 506-514. https://doi.org/10.1016/j.jrp.2007.07.008

Schmeichel, B. J., Filardo, E., McGregor, I., Gailliot, M. T., Gitter, S., & Baumeister, R. F. (2009). Terror management theory and self-esteem revisited: The roles of implicit and explicit self-esteem in mortality salience effects. *Journal of Personality and Social Psychology*, *96*(5), 1077-1087. https://doi.org/10.1037/a0015091

Schreer, G. E. (2002). Narcissism and aggression: Is inflated self-esteem related to aggressive driving? *North American Journal of Psychology*, *4*(3), 333-342.

Shröeder-Abé, M., Rudolph, A., & Schütz, A. (2007). High implicit self-esteem is not necessarily advantageous: Discrepancies between explicit and implicit self-esteem and their relationship with anger expression and psychological health. *European Journal of Personality*, *21*, 319-339. https://doi.org/10.1002/per.626

Shum, D. (2017, June 8). *Aggressive driving-related deaths up 80 per cent on provincial roads: OPP*. Global News, https://globalnews.ca/news/3511806/aggressive-driving-deaths-opp/

Zeigler-Hill, V. (2006). Discrepancies between implicit and explicit self-esteem: Implications for narcissism and self-esteem instability. *Journal of Personality*, *74*, 119-144. https://doi.org/10.1111/j.1467-6494.2005.00371.x