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John M. Houston

Rollins College, jhouston@rollins.edu

Paul Harris

Rollins College, pharris@rollins.edu

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The Aggressive Driving Behavior Scale:
Developing a Self-Report Measure of Unsafe Driving Practices¹

John M. Houston, Paul B. Harris, and Marcia Norman

Rollins College

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Abstract

The purpose of this study was to investigate the reliability and validity of a new 11-item measure of aggressive driving, the Aggressive Driving Behavior Scale, which focuses on behaviors, rather than cognitions, emotions, or motivational states. Based on a sample of 200 undergraduates (111 women and 89 men), the study examined the convergent validity of the new scale with measures of hostility, hypercompetitiveness, and aggressive thoughts and emotions experienced while driving. A principal component analysis of the Aggressive Driving Behavior Scale ($\alpha = .80$) yielded two factors that form reliable subscales labeled Speeding and Conflict Behavior. As expected, the total scale and its two subscales correlated with hostility, hypercompetitiveness, as well as aggressive driving-related thoughts and emotions. The results suggest that the scale can be used as a research tool and a self-assessment instrument.

Key words: aggressive driving measure, aggressive driving behavior, personality

The Aggressive Driving Behavior Scale:

Developing a Self-Report Measure of Unsafe Driving Practices

Aggressive driving is a dysfunctional pattern of social behaviors that constitutes a serious threat to public safety. Aggressive driving can involve a variety of behaviors including tailgating, honking, rude gesturing, flashing high beams at slower traffic, and speeding. The National Highway Traffic Safety Administration (2001) reports that aggressive driving is a major cause of traffic accidents and injury. In 2000, aggressive driving in the form of speeding alone contributed to 703,000 crash-related injuries and an additional 12,350 traffic fatalities. The NHTSA estimates that the economic cost of these crashes is over \$27 billion per year.

Given the cost of aggressive driving in dollars and human lives, it is not surprising that this topic has developed a growing interest among the psychology community. Over the past decade researchers have developed a number of assessment instruments designed to measure different aspects of aggressive driving including driver stress (Glendon, Dorn, Matthews, Gulian, Davies, & Debney, 1993), situation specific anger (Deffenbacher, Oetting, & Lynch, 1994), deviant drivers' attitudes (Wiesenthal, Hennessy, & Gibson, 2000) and driving-related impatience, anger, and punishing and competing behavior (Larson, 1996). In general, these measures focus on clusters of variables associated with aggressive driving such as mood states, cognitions, and coping responses. However, little research has systematically investigated the pattern of unsafe driving practices that characterize aggressive driving. Since researchers operationally define aggressive driving in a variety of ways, comparing results across studies can be problematic.

The purpose of this study was to develop a reliable and valid self-report measure of aggressive driving behavior. By defining aggressive driving as a pattern of unsafe driving

behavior that puts the driver and/or others at risk, the scale was designed to measure those behaviors that others perceive as potentially aggressive and harmful.

For conceptual clarity, it should be noted that “aggression” is generally defined as physical or verbal behavior intended to hurt someone (Myers, 2002). However, as Feldman (1995) points out, “intention” represents an unobservable hypothetical state that can only be inferred from a person’s overt behavior. Consequently, both an observer’s inference about intent and an individual’s self-report of past intent are subject to bias and inaccuracy. In an attempt to avoid some of the problems inherent in inferring intent in driving behavior, this study focused on developing a scale that describes driving behavior without reference to possible emotional states (i.e., irritation, frustration, anger, and rage) or motivational states (i.e., boredom, competition, punishment, and revenge). Given the broad range of cognitive, emotional, and motivational states identified in theories of human aggression (e.g., Anderson, Deuser, & DeNeve, 1995), it appears more parsimonious to assess specific behaviors than to attempt to pair behaviors with cognitions, emotions, or motivations.

There are a number of constructs that should converge on any valid measure of aggressive driving, including hostility, hypercompetitiveness, and aggressive thoughts while driving (Blanchard, Barton, & Malta, 2000; Houston, McIntire, Hunter, Johnson, & Francis, 2001). Hostility is characterized by a tendency to distrust and dislike others (Cook & Medley, 1954). These propensities towards distrustfulness run counter to the prescriptive rules of driving that emphasize courteous social behavior and respect for the rights of others. When other drivers become the target of this distrust and disliking, the resulting pattern of driving behavior may appear hostile and aggressive. Accordingly, those high in hostility would be expected to engage in more behaviors associated with aggressive driving.

Hypercompetitiveness is defined as “an indiscriminant need to compete and win (and avoid losing) at any cost as a means of maintaining or enhancing feelings of self worth” (Ryckman, Hammer, Kaczor, & Gold, 1990, p. 632). Since driving is based on cooperative principles of social interaction, engaging in competitive behavior while driving can lead to a pattern of driving that is perceived as aggressive. Thus, drivers high in hypercompetitiveness should display a higher frequency of aggressive driving behavior.

Finally, aggressive driving should be associated with aggressive thoughts and emotions experienced while driving. Several researchers (Stokols, Novaco, Stokols, & Campbell, 1978; Glendon, Dorn, Matthews, Gulian, Davies, & Debney, 1993) argue that aggressive driving represents a stress-related response to driving environments. This definition of aggressive driving proposes that as drivers experience various types of stress-provoking situations, they utilize coping strategies that may include confrontational responses such as aggressive thoughts, anger, and risk-taking behavior. Although the nature of the driving stressors vary across drivers, aggressive driving is often a byproduct of coping strategies that involve characteristic patterns of cognitive, emotional, and behavioral responses to the driving environment. Therefore, drivers with stress-related aggressive thoughts and emotions should engage in a higher frequency of aggressive driving behaviors.

To summarize, the purpose of this study was to develop a scale of aggressive driving behavior and examine the scale’s convergent validity with measures of hostility, hypercompetitiveness, and aggressive driving-related thoughts and emotions. Consequently, if the Aggressive Driving Behavior Scale is a valid measure of aggressive driving, it should be positively correlated with measures of hostility, hypercompetitiveness, and aggressive driving-related thoughts and emotion.

Method

Participants

Two hundred undergraduate students (111 women and 89 men) at a small liberal arts college located in the greater Orlando area agreed to participate. Participants ranged in age from 18 to 24 years, with a mean age of 20.02 ($SD = 1.41$). Mean length of driving experience was 4.24 years ($SD = 1.76$), with 36% of participants reporting that most of their experience was with highway driving and the remaining 64% reporting the most experience with city driving.

Measures

The Aggressive Driving Behavior Scale lists 11 unsafe driving practices that could be interpreted as aggressive (see Table 1). Initial items were generated following a series of peer focus groups in which undergraduate students discussed their own driving behaviors and those of others. During the focus groups, student facilitators recorded a total of 11 behaviors that group members most strongly believed represented aggressive driving. Using the resulting measure, participants rate the frequency with which they have engaged in each of the 11 behaviors over the past six months using a 6-point response scale (1 never, 2 almost never, 3 sometimes, 4 fairly often, 5 very often, 6 always).

In order to validate the scale, a number of measures conceptually linked to aggressive driving were administered.

The Driving Aggression Scale of the Driving Behaviour Inventory. All participants completed the Driving Aggression Scale of the Driving Behavior Inventory (Glendon et al., 1993). The Driving Aggression Scale (DAS) is a 9-item measure designed to assess aggressive thoughts, emotions, and motivational states experienced while driving. Each item on the DAS uses a 100-mm visual analogue scale and is scored 0-100. Participants respond to scale items by

placing a mark along a 100-mm line with scale anchors of “Not at all” at one end and “Very much” at the other. The distance of the mark in mm from the “Not at all” anchor determines the score on the item. The scale score is computed by averaging the scores from the individual items. Examples of scale items include “Driving usually makes me feel aggressive” and “I think it is worthwhile to take risks on the road.” The DAS has a test-retest reliability of .72 and a Cronbach’s alpha of .79. Mathews (1993) reports that the DAS is positively correlated with driving behaviors such as tailgating and frequent overtaking.

The Hypercompetitiveness Attitude Scale. Participants also completed the Hypercompetitiveness Attitude Scale (HCA) developed by Ryckman, Hammer, Kaczor, and Gold (1990) to measure a high need to compete and win at all costs. The 26-item HCA uses a 5-point response scale ranging from 1 (never true of me) to 5 (always true of me). Sample items include “If you don’t get the better of others, they will surely get the better of you,” and “Failure or loss in competition makes me feel less worthy as a person.” The scale has high internal consistency ($\alpha = .91$) and is positively correlated with several other measures of competitiveness (Houston, McIntire, Kinnie, and Terry, 2002).

The Cook Medley Hostility Scale. A subsample of 116 participants also completed the Cook Medley Hostility (Ho) Scale (Cook & Medley, 1954), 50 items extracted from the MMPI that measure a relatively stable and enduring hostile attitude towards the world. The Ho scale uses a true-false response format and includes items such as “I think most people would lie to get ahead” and “It is safer to trust nobody.” The scale has high test-retest reliability ($r = .84$ over 4 years; Shekelle, Gale, Ostfeld, & Paul, 1983) and high internal consistency ($\alpha = .82$; Smith & Frohm, 1985). The scale is also positively correlated with behavioral and self-report measures of hostility (Smith, Sanders, & Alexander, 1990).

Results

Scale Development

A principal component analysis with varimax rotation of the 11 aggressive driving behavior items yielded two factors with eigenvalues greater than 1. This two-factor solution accounted for 44.82% of the explained variance.

Table 1 illustrates the rotate factor matrix as well as the reliabilities (Cronbach's alpha) for the items composing each factor. Items from the first factor were combined to form the Conflict Behavior Scale ($\alpha = .73$). These questions clearly represent aggressive behaviors directed towards other drivers. Items from the second factor were combined to form the Speeding Scale ($\alpha = .68$). These questions describe behaviors of drivers who typically drive at higher speeds. These behaviors could still be considered as aggressive since the drivers are putting others at risk as the result of their own reckless behavior. The two subscales were significantly correlated, $r = .54, p < .01$. Combining all 11 items from the two subscales of the Aggressive Driving Behavior Scale results in a reliable ($\alpha = .80$) overall measure of aggressive driving practices.

On average, participants reported using Speeding Scale behaviors ($M = 3.45, SD = .95$) more frequently than Conflict Behavior Scales behaviors ($M = 2.80, SD = .84$), $t(199) = 10.62, p < .01$. As Table 2 illustrates, males reported using more behaviors than females on the Aggressive Driving Behavior Scale as a whole, $t(198) = 2.57, p < .05$. Using Cohen's effect size index (Cohen, 1988), the effect size was small to moderate ($d = .37$). Gender differences were also found on the Conflict Behavior subscale, $t(198) = 3.14, p < .01, d = .45$. Gender differences for the overall scale are primarily due to Conflict Behavior responses, as no significant difference was found for scores on the Speeding Scale, $t(198) = .93, p = .36, d = .13$.

Scale Validation

Pearson correlation coefficients presented in Table 3 support the validity of the Aggressive Driving Behavior Scale and its two subscales. Reported frequency of aggressive driving behaviors was positively related to aggressive thoughts and emotions experienced while driving (Driving Aggression Scale: Glendon et al., 1993), high levels of competitiveness (Hypercompetitiveness Attitude Scale: Ryckman et al., 1990) and a hostile orientation to life (Cook Medley Hostility Scale: Cook & Medley, 1954).

Discussion

Overall, the findings from this study indicate that the Aggressive Driving Behavior Scale (ADBS) has good psychometric properties. In addition to moderately high internal consistency for the entire 11-item scale, the measure contains two factors (Conflict Behavior and Speeding) that form internally consistent subscales. As expected, the Aggressive Driving Behavior Scale was also positively correlated with measures of hostility, hypercompetitiveness, and aggressive thoughts while driving. While providing evidence of convergent validity, this pattern of results also indicates that the ADBS is related to, but distinct from, the stress and anger-based conceptualization of aggressive driving provided by the Driving Aggression Scale which emphasizes emotional reactions to driving and negative appraisal of other drivers.

By focusing on the behavioral aspects of aggressive driving, the ADBS provides a useful distinction between two dimensions of risky driving behavior, conflict behavior and speeding. Conflict behavior involves direct social interaction with other drivers and is characterized by incompatible actions that elicit conflict responses, such as honking, rude gesturing, and flashing high beams. The cluster of behaviors in the Conflict Behavior Scale is consistent with other forms of interpersonal conflict behavior in that goals appear to be impeded or blocked by others.

Several researchers have suggested that attributional processes serve as precursors of conflict behavior. For example, Myers (2002) reports that the perceived incompatibility of actions are often magnified by misperceptions. Within the context of driving, this suggests that attributions can influence aggressive driving behavior. This conceptualization of aggressive driving suggests that attributional processes as well as stress and anger should be considered in future research exploring the dynamics of aggressive driving.

The behaviors forming the Speeding Scale appear to differ from Conflict Behavior Scale items by their focus on unsafe driving practices that do not necessarily involve other drivers. Although the Speeding Scale includes risk-taking behavior, such as speeding, tailgating, and failing to slow for yellow lights, it is unclear if these behaviors represent calculated risks, impulsive decision-making or simply carelessness. Future research using convergent and differential validity strategies should provide greater conceptual clarity of the dimension of aggressive driving assessed by this scale.

Gender differences on the ADBS, particularly the Conflict Behavior Scale, warrant further research. Although the effect sizes are small to moderate, these findings indicate that men overtly express their aggression differently than women while driving. These results are consistent with findings from Bettencourt and Miller's (1996) meta-analysis on gender differences in aggression which found that in experimental studies unprovoked men are more aggressive than women. Although aggression researchers continue to debate the extent to which biological factors, cultural norms, and gender roles contribute to gender differences in aggression (e.g. Benton, 1992), meta analyses by Eagly and Steffen (1986) and Bettencourt and Miller (1996) suggest that: (1) men tend to be more aggressive than women, unless situational factors make gender role consideration less salient, and (2) women differ from men in their

assessment of the degree to which a situation might evoke a dangerous retaliation. Applied to the driving context, these findings may help account for the gender differences on the Conflict Behavior Scale of the ADBS and the lack of gender differences on the Driving Aggression Scale (DAS).

Consistent with previous research (Mathews, Dorm, Hoyes, Davies, Glendon, & Taylor, 1998) supplemental analyses indicated no differences for the DAS, $t(198) = 1.21, p = .23, d = .17$. Since the DAS primarily assesses aggressive thoughts and emotions while driving, these findings indicate that there may be no real differences in the affective and cognitive responses of male and female drivers. However, the Conflict Behavior Scale of the ADBS involves direct interaction with other drivers and contains several items which could evoke a dangerous retaliation, such as “make rude gestures”, “flash my high beams at slower traffic”, and “tap my brakes when a car follows too closely.” Thus, in keeping with Berkowitz’s (1988) findings that those who have reason to fear that their aggressive acts will bring about retaliation are more likely to control their aggression, women may experience similar aggressive thoughts and emotions as men while driving but may refrain from certain types of aggressive driving behaviors to avoid danger from retaliation. However, more research is needed to determine the factors contributing to gender differences in aggressive driving.

The Aggressive Driving Behavior Scale is designed to have practical utility as both a research tool and a self-assessment instrument. By measuring specific and observable driving behaviors, the ADBS can be compared directly with objective driving data as well as observer ratings. This should reduce potential bias associated with attempting to infer drivers’ cognitive, emotional, and motivational states. As a self-assessment instrument, the ADBS can be used by drivers to identify their own unsafe driving practices and target specific behaviors that need to

change to reduce aggressive driving. Since the measure is easy to administer, score, and interpret, the ADBS may be appropriate as a diagnostic tool in educational settings such as driver education classes or traffic school. Although the ADBS does not attempt to provide a comprehensive list of unsafe driving practices, it focuses on behaviors that are most commonly associated with aggressive driving.

Finally, given that aggressive behavior is influenced by individual, social, cultural, and environmental factors (Anderson, Deuser, & DeNeve, 1995), further research is needed to investigate how these variables relate to the ADBS. For example, under what circumstances are people more likely to engage in specific types of aggressive driving? To what extent do cultural norms influence aggressive driving? Examining a broader range of correlates of the ADBS should provide a more complete theoretical framework for studying aggressive driving behavior.

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Table 1

Rotated Factor Loadings and Scale Statistics for the Aggressive Driving Behavior Scale

Items by Factor	Factor Loadings	
	One	Two
Conflict Behavior ($\alpha = .73$)		
1. Intentionally tap my brakes when another car follows too closely	.74	-.25
2. Make rude gestures at other drivers when they do something I don't like	.62	.31
3. Honk when another driver does something inappropriate	.58	.19
4. Merge into traffic even when another driver tries to close the gap between cars	.58	.19
5. Speed up when another car tries to overtake me	.56	.25
6. Follow another car in front of me closely to prevent another car from merging in front of me	.53	.37
7. Flash my high beams at slower traffic so that it will get out of my way	.46	.24
Speeding ($\alpha = .68$)		
8. Follow a slower car at less than a car length	.02	.72
9. Drive 20 miles per hour faster than the posted speed limit	.21	.72
10. Pass in front of a car at less than a car length	.30	.68
11. Accelerate into an intersection when the traffic light is changing from yellow to red	.42	.48

Note. For all 11 items: $\alpha = .80$

Table 2

Means for Scales and Items, and Comparisons of Means for Females and Males

Items by Scale	Overall Sample		Means by Gender	
	<i>M</i>	<i>SD</i>	Female	Male
Aggressive Driving Behavior Scale	33.40	8.58	32.02	35.11*
Conflict Behavior Subscale	19.61	5.91	18.46	21.04**
1. Tap brakes when car follows too closely	2.99	1.47	2.74	3.31**
2. Make rude gestures	2.41	1.37	2.23	2.64*
3. Honk	3.23	1.45	3.23	3.24
4. Force merge into traffic	2.81	1.21	2.68	2.98
5. Speed up when car tries to overtake me	2.89	1.36	2.75	3.08
6. Follow car closely to prevent another merging	3.18	1.34	3.11	3.28
7. Flash my high beams at slower traffic	2.09	1.34	1.74	2.52**
Speeding Subscale	13.79	3.79	13.57	14.07
8. Follow slower car at less than car length	3.44	1.33	3.56	3.28
9. Drive 20 mph faster than speed limit	3.30	1.35	3.14	3.51
10. Pass in front of a car at less than a car length	3.14	1.30	2.94	3.39*
11. Accelerate through yellow light	3.91	1.33	3.94	3.89

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

Table 3

Pearson Correlation Coefficients for Aggression Scales

	1	2	3	4	5
1. Aggressive Driving Behavior Scale (ADBS)	--				
2. Conflict Behavior Subscale of ADBS	.93	--			
3. Speeding Subscale of ADBS	.82	.54	--		
4. Driving Aggression Scale	.54	.47	.50	--	
5. Hypercompetitiveness Attitude Scale	.41	.38	.33	.35	--
6. Cook Medley Hostility Scale	.36	.30	.35	.35	.45

Note. All correlations are significant, $p < .01$.