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Examining the Interrelationships among Driving Anger, Low Self-Control, and Unsafe Driving Behaviors in a Sample of Saudi Arabian Males

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Abstract

Road traffic accidents represent a significant health concern throughout the world. In the Kingdom of Saudi Arabia (KSA), road traffic accidents, and the injuries, fatalities, and costs associated with them, are a significant social problem. At the same time, there has not been a great deal of research examining the reasons why road traffic accidents are so high in the KSA and, moreover, if anything can be done to help reduce such accidents. The current study sought to address this gap in the literature by examining whether two factors—driving anger and low self-control—are associated with moving violations and traffic accidents in the KSA. To do so, a sample of male students attending a university in the KSA were analyzed. The results of the analyses revealed that driving anger was associated with moving violations, minor traffic accidents, and major traffic accidents. Low self-control was associated with moving violations and minor traffic accidents, but not major traffic accidents. We conclude by discussing potential reasons for these findings, limitations that need to be addressed in future research, and the policy implications of these results.

Keywords: accidents; driving anger; low self-control; Saudi Arabia; traffic

دراسة العلاقة بين الغضب أثناء قيادة السيارات، وضعف التحكم الذاتي وسلوكيات القيادة لعينة من الشباب

لاذكور في المملكة العربية السعودية

ملخص الدراسة

تمثل حوادث السيارات خطراً صحياً كبيراً في جميع أنحاء العالم، وفي المملكة العربية السعودية تمثل حوادث السيارات والإصابات والوفيات المصاحبة لها مشكلة اجتماعية كبيرة. في الوقت الراهن، لا توجد دراسات كافية تركز على دراسة أسباب ارتفاع الحوادث في المملكة العربية السعودية، فضلاً عن الاهتمام بدراسة سبل الوقاية من هذه الحوادث والحد من وقوعها أو تقليل نسبة حدوثها. هذه الدراسة تحاول سد هذه الفجوة البحثية من خلال التركيز على عاملين هما: الغضب أثناء القيادة وضعف التحكم في الذات وذلك للتعرف على ما إذا كان لهذين العاملين علاقة بمخالفات القيادة والحوادث المتعلقة بقيادة السيارات في المملكة العربية السعودية. ولتحقيق هدف الدراسة، تم توزيع الاستبانة على عينة من الطلبة الذكور في إحدى جامعات المملكة العربية السعودية، وتم تحليل النتائج حيث أظهرت النتائج أن الغضب أثناء القيادة له علاقة بالمخالفات المرورية أثناء الحركة وكذلك بالحوادث في المملكة العربية السعودية الصغرى والكبرى. أما ضعف التحكم بالذات فقد وجد أنه يرتبط بالحوادث المرورية الصغرى فقط ولا يرتبط بالحوادث الطبرى. وفي الخاتمة، قدم الباحثون الأسباب المحتملة لتلك النتائج، والمحددات التي واجهتها الدراسة من أجل تفاديها في الدراسات المستقبلية، والتأثير المتوقع لنتائج الدراسة على النظم واللوائح من أجل الحد من السلوكيات السلبية أثناء القيادة.

كلمات مفتاحية: حوادث، غضب القيادة، ضعف التحكم بالذات، المملكة العربية السعودية، مرور



المجلة الإلكترونية الشاملة متعددة التخصصات
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Introduction

Road traffic accidents represent one of the leading causes of death and debilitating injuries throughout the world. According to a 2018, road traffic accidents were found to account for approximately 1.3 million deaths and represent the leading cause of death for persons between the age of 5 and 29 years of age (World Health Organization, 2018). The distribution of road traffic accidents, and the fatalities and injuries that are associated with them are not uniformly distributed across all nations. Rates of traffic accidents and fatalities, for example, are significantly higher in developing countries when compared to industrialized nations. To illustrate, low- and middle-income nations account for 93 percent of all traffic fatalities worldwide, but they account for only 60 percent of all vehicles (World Health Organization, 2018). It is important to note, moreover, that traffic accidents not only are responsible for death, injury, and subsequent health-related problems, but they also exert a tremendous economic toll on society. According to some recent statistics from the World Health Organization (2018), traffic accidents cost nations, on average, about 3 percent of their gross domestic product.

Given the significant burden that traffic accidents pose to society, it stands to reason that an important line of inquiry should center on the causes of such accidents. Indeed, a large body of research has examined some of the leading contributors to accidents. The results from such studies have identified a number of salient factors related to accidents (Noland, 2003; Staubach, 2009), but of all the factors analyzed, individual-level factors appear to be the most salient.



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العدد السابعون شهر (4) 2024

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Driving at high speeds, driving while intoxicated, and human error have been found to be among the most consistent and important contributors to unsafe driving behaviors and road traffic accidents (Abdel-Aty & Abdelwahab, 2000; Allahyari et al., 2008; Cooper, 1997; Parker et al., 1995; World Health Organization, 2018).

There are at least two key individual-level traits that likely are associated with unsafe driving behaviors and accidents. First, Deffenbacher and his colleagues (1994) have developed a driving anger scale. A considerable amount of research has examined this scale in relation to driving behaviors and the results have consistently revealed that persons scoring high on this scale tend to also score high on measures of unsafe driving behaviors (e.g., Dahlen et al., 2005; Deffenbacher et al., 2003; Li et al., 2014). The second individual-level trait that has been found to be related to unsafe driving behaviors is low self-control. Specifically, variation in levels of self-control have been found to be associated with a wide-range of outcomes, including social behaviors, health, risky misconduct, and criminal behaviors (Moffitt et al., 2011; Miller, Barnes, & Beaver, 2011; Pratt & Cullen, 2000). Of particular interest is that research has examined whether self-control and traits that overlap with it (e.g., impulsivity and sensation-seeking) are related to unsafe driving behaviors and accident proneness. Overall, the results generated from this body of research have shown that persons with relatively lower levels of self-control are at-risk for engaging in unsafe driving behaviors and they are also at heightened risk for being



ISSN: 2617-958X

المجلة الإلكترونية الشاملة متعددة التخصصات
Electronic Interdisciplinary Miscellaneous Journal

العدد السبعون شهر (4) 2024

Issue 70, (4) 2024

involved in an automobile accident (Dahlen et al., 2005; Hartos, Eitel, & Simons-Morton, 2002; Junger & Tremblay, 1999; Keane, Maxim, & Teevan, 1993).

One of the key limitations in the existing literature on driving anger and low self-control and their relation to traffic accidents and driving behaviors is that almost all of the research is generated from samples in industrialized nations, not from developing nations. This is a particularly salient gap as a disproportionate amount of all traffic accidents and traffic fatalities occur in developing nations. As a result, to understand the causes of such accidents, it is necessary to conduct research among drivers within these developing nations.

Against this backdrop, the current study is designed to examine whether driving anger and low self-control are associated with unsafe driving behaviors in a sample drawn from the Kingdom of Saudi Arabia (KSA). The KSA represents a unique area from which to examine the association between driving anger and self-control and unsafe driving behaviors as traffic accidents and deaths and injuries from these accidents are among the highest in the world. To illustrate, the overall rate (adjusted for age and gender) of non-fatal traffic accidents in KSA has been reported to be 20.7 per 100 persons annually (Mansuri et al., 2015). In addition, the World Health Organization has estimated that there are approximately nine traffic-related deaths in the KSA per 10,000 vehicles (World Health Organization, 2010). Moreover, fatal traffic accidents are exceedingly high with approximately 4.7 percent of all deaths annually being attributable to automobile accident fatalities. To put this number in perspective, automobile fatalities account



المجلة الإلكترونية الشاملة متعددة التخصصات
Electronic Interdisciplinary Miscellaneous Journal

العدد السابعون شهر (4) 2024

Issue 70, (4) 2024

ISSN: 2617-958X

for no more than 1.7 percent of all deaths in the USA, Australia, and the United Kingdom (Mansuri et al., 2015). In addition to fatalities, injuries associated with road traffic accidents have been found to account for more than 80 percent of all trauma admissions in the KSA (Ansari et al., 2000; Mansuri et al., 2015). Overall, traffic accidents exert a tremendous economic toll on the KSA, with estimates being more than SR 21 billion annually (in 2000 values; Ansari et al., 2000).

There is no doubt that a multifactorial arrangement of factors are involved in why the KSA has such relatively high rates of traffic accidents and fatalities (e.g., unsafe vehicles, unsafe road infrastructure, and human error). To date, there has only been a relatively small body of research that has attempted to uncover some of the etiological factors that might contribute to road traffic accidents in the KSA. Most of the available research has not offered any definitive conclusions, but the limited evidence, however, has pointed to a number of factors that might be causally related to road traffic accidents. For instance, one study found that most accidents in the KSA are the result of human error and more than 65 percent of all road traffic accidents in the KSA are the result of excessive speeding and/or drivers ignoring traffic signals (Ansari et al., 2000). Additionally, a relatively recent study revealed that 40 percent of youth from the KSA engaged in risky driving behaviors (Ramisetty-Mikler & Almakadma, 2016). This same study revealed that youth who were most likely to engage in risky driving behaviors were also more likely to not wear a seat belt, to use a telephone while driving, and to have a lack of respect for



ISSN: 2617-958X

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Electronic Interdisciplinary Miscellaneous Journal

العدد السبعون شهر (4) 2024

Issue 70, (4) 2024

driving laws. Whether these behaviors and attitudes are associated with being involved in a traffic accident was not examined in this study, though previous research has shown these types of attitudes and behaviors to be strong correlates to accident proneness in other nations (World Health Organization, 2018).

In another study, Hassan (2016) analyzed the driving behavior of 242 young male Saudi Arabian drivers to examine contributors to traffic violations and to traffic accidents. The results of this analysis revealed two key findings. First, the majority of traffic violations were the result of excessive speeding. Second, the main contributor to at-fault traffic accidents was aggressive driving behaviors. Collectively, these results suggest that speeding and aggressive driving are integral to understanding unsafe driving behaviors and accident proneness in the KSA.

In a more recent study, Mohamed and Bromfield (2017) examined the potential association between accident involvement, driving behaviors, and attitudes toward traffic safety in the KSA. Analysis of young male drivers revealed three categories of drivers: those who are characterized as error makers, those who are characterized as aggressive drivers, and those who are characterized as speeding drivers. The results of their study revealed that attitudes toward traffic safety were related to being an aggressive driver and a speeding driver. Moreover, the study also revealed that males in the aggressive driver group or the speeding driver group were at a significant increased risk for being involved in accidents. Importantly, being in the error



ISSN: 2617-958X

المجلة الإلكترونية الشاملة متعددة التخصصات
Electronic Interdisciplinary Miscellaneous Journal

العدد السبعون شهر (4) 2024

Issue 70, (4) 2024

making category was unrelated to being in an accident and, moreover, driving experience, level of education, and socioeconomic status were also unrelated to accident involvement.

The current study uses these findings as a springboard to examine the distribution of moving violations, involvement in minor traffic accidents, and involvement in major traffic accidents in the KSA. Moreover, and of particular salience, we also examine the role that driving anger and low self-control play in the prediction of these unsafe driving behaviors. To address these issues, we analyze data drawn from male students enrolled in a large university in the KSA.

Methods

Data

Data for this study come from a sample of undergraduate students attending a large university in Saudi Arabia during the 2017-2018 academic school year. Students were recruited across programs at the university. To be eligible, students had to be full-time college students. Participants were informed that that study would focus on driving behaviors, that the survey could be completed within about 30 minutes, and that all participation was voluntary and uncompensated. The self-report surveys were developed in English, translated into Arabic, and then back-translated into English to ensure that the meaning and content of the surveys did not change during the translation process. Overall, a total of 958 students ($N = 808$ males and $N =$



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Electronic Interdisciplinary Miscellaneous Journal

العدد السابعون شهر (4) 2024

Issue 70, (4) 2024

150 females) agreed to participate in the study and submitted surveys that had usable information. The final analytical sample consisted only of males given the relatively smaller sample size for females and the limited driving experience that females have been afforded historically in Saudi Arabia.

Measures

Unsafe Driving Behavior Measures

Three unsafe driving behavior measures were included in this study. First, respondents were asked to indicate the number of moving violations, such as speeding tickets, they received in the previous year. Second, they were asked to indicate the number of minor accidents that they were involved in during the previous year. Third, they were asked to indicate the number of major accidents they were involved in during the previous year. Importantly, these types of measures have been used in previous research (Dahlen et al., 2005; Deffenbacher et al., 2001) and can be used to help gauge driver abilities, accident proneness of drivers, and driver risk taking. Table 1 presents descriptive statistics for these three measures along with all of the other variables and scales employed in the analyses.

Table 1. Descriptive Statistics for Selected Variables and Scales

	Mean (Percentage)	SD	Min – Max
Number of moving violations	2.39	2.11	0 – 6
Number of minor traffic accidents	1.84	1.45	0 – 5
Number of major traffic accidents	0.43	0.70	0 – 2
Driving anger	43.54	9.20	18 – 65
Low self-control	49.56	8.96	23 – 75
Age	21.51	1.47	19 – 25
Nationality			
Saudi Arabian	(97.0)	---	0 – 1
Non-Saudi Arabian	(3.0)		
Education level			
No college credit	(18.8)	---	0 – 1
College credit/degree	(81.2)		
Driver's license			
No	(9.4)	---	0 – 1
Yes	(90.6)		
Age 1 st drove	15.62	2.07	10 – 21

Note: SD = standard deviation



ISSN: 2617-958X

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Electronic Interdisciplinary Miscellaneous Journal

العدد السبعون شهر (4) 2024

Issue 70, (4) 2024

Individual Differences Traits

Two individual difference traits were included in the analyses to examine whether they are associated with driver abilities. First, the short-form version of the Driving Anger Scale (DAS; Deffenbacher, Oetting, & Lynch, 1994) was included. This is a 14-item scale that is designed to measure individual variation in driving anger. Respondents are asked to imagine different situations and then indicate the amount of anger that it would cause them. For example, participants were asked to imagine situations such as someone weaving in and out of traffic, someone running a red light or stop sign, and being stuck in a traffic jam. They were then asked to rate their anger level, with responses being coded as follows: 1 = none at all, 2 = a little, 3 = some, 4 = much, and 5 = very much. The responses were then summed together to create a total driver anger score with higher values representing more driver anger ($\alpha = .79$). Importantly, this scale has been shown to be reliable and to predict accidents, risky driving practices, and aggressive driving behaviors (Deffenbacher et al., 2000, 2001).

Second, the widely used Grasmick et al. (1993) scale for measuring self-control was included in the study. This scale includes 24 items that tap various dimensions of self-control. The current study included 23 of the original 24 items outlined by Grasmick et al.² Participants,

² The one item that was excluded was: I will try to get things I want even when I know it is causing problems for other people. This item was omitted because of an issue with translating/back translating it. The remaining 23 items were identical to those included in the original Grasmick et al. (1993) scale.



ISSN: 2617-958X

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Electronic Interdisciplinary Miscellaneous Journal

العدد السابعون شهر (4) 2024

Issue 70, (4) 2024

for example, were asked whether they often act on the spur of the moment without stopping to think, whether they take risks for the fun of it, and whether they lose their temper pretty easily. Responses to these items were coded, such that 1= strongly disagree, 2 = somewhat disagree, 3 = somewhat agree, and 4 = strongly agree. These items were then summed together to create the low self-control scale, wherein higher values reflect lower levels of self-control ($\alpha = .78$). This scale has been widely used to measure individual variation in self-control and it has been shown to be valid and reliable (e.g., DeLisi, Hochstetler, & Murphy, 2000; Pratt & Cullen, 2000; but see Higgins, 2007).

Control Variables

Five control variables were included in the analyses to help account for confounding. First, age was included as a continuous variable that was measured as the age (in years) of each respondent. Second, nationality was included as a dichotomous variable, where 0 = non-Saudi Arabian and 1 = Saudi Arabian. Third, education level was entered into all of the analyses and was measured dichotomously, such that 0 = no college credit earned and 1 = earned at least some college credit. Fourth, a single-item measure indicating whether the respondent currently has a driver's license was included in all of the analyses (0 = no driver's license and 1 = have a driver's license). Fifth, all of the analyses included a continuous variable measuring the age at which the respondent first drove a car.



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Electronic Interdisciplinary Miscellaneous Journal

العدد السابعون شهر (4) 2024

Issue 70, (4) 2024

Plan of Analysis

The analysis for this paper proceeded in three steps. First, ordinary least squares (OLS) regression was used to predict the number of self-reported moving violations. Four models were estimated for this outcome: a baseline model (that included only the control variables), a model that included the driving anger scale and all of the control variables, a model that included the low self-control scale and all of the control variables, and a full model that included the driving anger scale, the low self-control scale, and all of the control variables. Second, OLS regression models were estimated to predict the number of minor traffic accidents. Once again, the same four models were estimated for this outcome measure. Third, OLS regression models were estimated to predict the number of major traffic accidents. As with the other two outcomes, four models were estimated.

Results

The analysis for this paper began by examining the factors that were involved in predicting moving violations. Table 2 contains the results of these analyses. Model 1 depicts the results of the baseline model which contains only the control variables. As can be seen, education level, driver's license, and age first drove were all statistically significant and inversely related to number of moving violations. Specifically, persons accrued more moving



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Electronic Interdisciplinary Miscellaneous Journal

العدد السابعون شهر (4) 2024

Issue 70, (4) 2024

violations, on average, who had lower education, who did not have a driver's license, and who drove at an earlier age when compared to their counterparts. Model 2 is identical to the previous model except that it includes the driving anger measure. The results of this model show that driving anger maintains a statistically significant and positive association with number of moving violations, meaning that respondents who scored higher on driving anger also tended to report having a greater number of moving violations. Once again, education level and age of first driving were associated with moving violations, but having a driver's license was not. Model 3 removed the driving anger measure, but added the low self-control scale. As Model 3 shows, the low self-control scale is positively and significantly associated with number of moving violations, indicating that persons who have lower levels of self-control also tend to self-report more moving violations on average. Age, education level, having a driver's license, and age of first driving are also associated with number of moving violations. Last, Model 4 is the full model that contains the driving anger scale, the low self-control scale, and all of the control variables. Similar to the previous models, both driving anger and low self-control are positively associated with number of moving violations. In addition, age, education level, having a driver's license, and age first driving were also related to the number of self-reported moving violations.

Table 2. OLS Regression Models Predicting Number of Moving Violations

	Model 1		Model 2		Model 3		Model 4	
	<i>b</i>	<i>Beta</i>	<i>b</i>	<i>Beta</i>	<i>b</i>	<i>Beta</i>	<i>b</i>	<i>Beta</i>
Driving anger	---	---	0.04 (0.01)	0.18*	---	---	0.05 (0.01)	0.22*
Low self-control	---	---	---	---	0.04 (0.01)	0.15*	0.03 (0.01)	0.12*
Age	0.04 (0.05)	0.03	0.05 (0.05)	0.03	0.13 (0.06)	0.10*	0.14 (0.06)	0.10*
Nationality	-0.27 (0.43)	-0.02	-0.56 (0.42)	-0.05	-0.11 (0.49)	-0.01	-0.27 (0.48)	-0.02
Education level	-0.60 (0.20)	-0.11*	-0.85 (0.21)	-0.15*	-0.66 (0.21)	-0.12*	-0.94 (0.21)	-0.18*
Driver's license	-0.55 (0.26)	-0.08*	-0.43 (0.28)	-0.06	-0.98 (0.26)	-0.15*	-0.85 (0.28)	-0.12*
Age 1 st drove	-0.30 (0.04)	-0.30*	-0.31 (0.04)	-0.31*	-0.33 (0.04)	-0.33*	-0.35 (0.04)	-0.35*
R-squared	0.10		0.15		0.17		0.24	
N	672		624		560		516	

Notes: standard errors are in parentheses;

* indicates that $p < .05$, two-tailed test



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العدد السابعون شهر (4) 2024

Issue 70, (4) 2024

We next turn our attention to the results of the OLS regression models predicting number of minor traffic accidents. Table 3 presents the results of these models. The format and organization of the table is the same as in Table 2. Model 1 shows that nationality, having a driver's license, and age of first driving are all significantly associated with self-reported minor traffic accidents. Specifically, Saudi Arabians, persons without a driver's license, and respondents who drove earlier in life reported, on average, more minor traffic accidents than their counterparts. Model 2 shows the results that include the driving anger scale and reveals that driving anger is positively associated with number of minor traffic accidents. Nationality, having a driver's license, and age of first driving are also associated with self-reported minor traffic accidents. The next model presents the results for the equation that includes the low self-control scale. This model shows that the low self-control scale is positively related to number of minor traffic violations. Nationality, having a driver's license, and age of first driving are also associated with number of minor traffic violations. The results for the full model are depicted in Model 4. Once again, the driving anger scale and the low self-control scale are positively and significantly associated with number of minor traffic violations. Importantly, the pattern of results for the control variables is the same as it was in the previous three models.

Table 3. OLS Regression Models Predicting Number of Minor Traffic Accidents

	Model 1		Model 2		Model 3		Model 4	
	<i>b</i>	<i>Beta</i>	<i>b</i>	<i>Beta</i>	<i>b</i>	<i>Beta</i>	<i>b</i>	<i>Beta</i>
Driving anger	---	---	0.02 (0.01)	0.15*	---	---	0.02 (0.01)	0.13*
Low self-control	---	---	---	---	0.02 (0.01)	0.12*	0.02 (0.01)	0.12*
Age	-0.05 (0.04)	-0.05	-0.09 (0.04)	0.05	0.01 (0.04)	0.01	0.03 (0.04)	0.03
Nationality	1.15 (0.31)	0.14*	1.01 (0.31)	0.13*	1.18 (0.37)	0.14*	1.06 (0.36)	0.13*
Education level	-0.11 (0.14)	-0.03	-0.14 (0.15)	-0.04	-0.04 (0.15)	-0.01	-0.09 (0.15)	-0.02
Driver's license	-0.45 (0.19)	-0.09*	-0.61 (0.21)	-0.11*	-0.53 (0.20)	-0.11*	-0.70 (0.22)	-0.13*
Age 1 st drove	-0.07 (0.03)	-0.11*	-0.09 (0.03)	-0.13*	-0.08 (0.03)	-0.11*	-0.10 (0.03)	-0.14*
R-squared	0.05		0.08		0.07		0.10	
N	684		632		564		520	

Notes: standard errors are in parentheses;

* indicates that $p < .05$, two-tailed test



ISSN: 2617-958X

المجلة الإلكترونية الشاملة متعددة التخصصات
Electronic Interdisciplinary Miscellaneous Journal

العدد السابعون شهر (4) 2024

Issue 70, (4) 2024

The last set of statistical models—contained in Table 4—estimate the factors predicting the number of self-reported major traffic accidents. This table is organized in the same fashion as the previous two tables. Model 1 shows that none of the control variables are related to the number of major traffic accidents. Model 2 shows that the driving anger scale is positively related to the number of self-reported major traffic accidents. The only other variable in this model to emerge as statistically significant is age of first driving and it is positively related to the number of major traffic accidents. Model 3 reveals that none of the measures—including the low self-control scale—are statistically significant. Last, Model 4 shows that only one measure—the driving anger scale—is significantly related to the number of self-reported major traffic accidents; all of the other measures, including the low self-control scale, are null.

Table 4. OLS Regression Models Predicting Number of Major Traffic Accidents

	Model 1		Model 2		Model 3		Model 4	
	<i>b</i>	<i>Beta</i>	<i>b</i>	<i>Beta</i>	<i>b</i>	<i>Beta</i>	<i>b</i>	<i>Beta</i>
Driving anger	---	---	0.01 (0.00)	0.17*	---	---	0.01 (0.00)	0.18*
Low self-control	---	---	---	---	0.00 (0.00)	0.02	-0.00 (0.00)	-0.00
Age	0.02 (0.02)	0.04	0.02 (0.02)	0.03	0.03 (0.02)	0.07	0.03 (0.02)	0.07
Nationality	-0.01 (0.15)	-0.00	-0.05 (0.15)	-0.01	-0.03 (0.19)	-0.01	-0.05 (0.18)	-0.01
Education level	-0.05 (0.07)	-0.02	-0.10 (0.08)	-0.05	-0.01 (0.08)	-0.01	-0.07 (0.15)	-0.04
Driver's license	0.15 (0.10)	0.06	0.08 (0.10)	0.03	0.10 (0.11)	0.04	0.01 (0.11)	0.00
Age 1 st drove	0.03 (0.01)	0.08	0.03 (0.03)	0.09*	0.02 (0.02)	0.07	0.03 (0.02)	0.08
R-squared	0.01		0.04		0.01		0.04	
N	668		620		556		516	

Notes: standard errors are in parentheses;

* indicates that $p < .05$, two-tailed test



ISSN: 2617-958X

المجلة الإلكترونية الشاملة متعددة التخصصات
Electronic Interdisciplinary Miscellaneous Journal

العدد السابعون شهر (4) 2024

Issue 70, (4) 2024

Discussion

A tremendous amount of death, destruction, and financial costs are associated with road traffic accidents throughout the world (World Health Organization, 2018). The KSA, in particular, has extremely high rates of road traffic accidents, traffic fatalities, and injuries that are the result of traffic accidents (Ansari et al., 2000; Mansuri et al., 2015). As a result, it is essential to understand some of the factors that account for traffic accidents so that that information can be used to help implement policies and approaches to reduce such accidents. To date, however, there is not a great deal of knowledge regarding some of the individual-level factors that might be partially responsible for traffic accidents and unsafe driving behaviors in the KSA. The current study sought to address this gap in the literature by analyzing data from male college students. Analyses of these data revealed three main findings.

First, descriptive data provide some much needed insight into the unsafe driving behaviors of young males from the KSA. Based on the data available from our sample, males reported an average of more than two moving violations annually. Moreover, they also reported, on average, involvement in 1.84 minor traffic accidents and 0.43 major traffic accidents during the previous year. These estimates, while not necessarily representative of all males in the KSA, do strongly suggest that unsafe driving behaviors and accident proneness are relatively high. This is all the more salient given that this sample consists of males who were attending college



ISSN: 2617-958X

المجلة الإلكترونية الشاملة متعددة التخصصات
Electronic Interdisciplinary Miscellaneous Journal

العدد السابعون شهر (4) 2024

Issue 70, (4) 2024

and thus they should be at lower risk for risky types of behaviors when compared to their same-age peers not attending a university.

Second, the only measure to be statistically significant across all of the multivariate models predicting moving violations, minor traffic accidents, and major traffic accidents, was the driving anger scale. The analyses revealed that males who scored higher on driving anger also self-reported, on average, more moving violations as well as greater involvement in both minor and major traffic accidents. On the one hand, the robustness of this scale to predict these outcomes should not be all that surprising given that this driving anger scale has been shown to consistently predict unsafe driving behaviors and traffic accidents across a large number of studies (Dahlen et al., 2015; Deffenbacher et al., 1994; 2003). On the other hand, however, this is a noteworthy finding because it is the first time, to our knowledge, that the driving anger scale has been used in a sample drawn from the KSA. The results of this study, combined with those generated from other studies using international samples (e.g., Li et al., 2014), strongly suggest that this scale is a valid and reliable indicator of driving anger and is a strong and consistent predictor of unsafe driving behaviors and accidents.

The third key finding to emerge from the analyses was that the low self-control scale was associated with number of moving violations in the past year and number of minor traffic accidents during the previous year. The association of low self-control with these two driving measure was relatively consistent as it was predictive in the models without the driving anger



ISSN: 2617-958X

المجلة الإلكترونية الشاملة متعددة التخصصات
Electronic Interdisciplinary Miscellaneous Journal

العدد السابعون شهر (4) 2024

Issue 70, (4) 2024

scale and in the models with the driving anger scale. Interestingly, the low self-control scale was unrelated to the major traffic accidents measure. The reason(s) why it was related to moving violations and minor traffic accidents, but not major traffic accidents, is not entirely clear from the analyses. Future research, however, would benefit by exploring this issue in greater detail to determine if the same pattern of results can be replicated and, if so, why there is a differential effect of low self-control across these outcome measures.

While these findings provide some of the first evidence linking driving anger and low self-control to unsafe driving behaviors and accidents in the KSA, the results should be viewed with caution in light of a number of limitations. First, all of the measures were derived from self-reports. As a result, shared methods variance could be driving at least part of the statistically significant associations detected. At the same time, it is not possible to determine the accuracy with which the respondents reported their involvement in traffic accidents or their citations of moving violations. It would be beneficial in future studies if official traffic data were used to examine whether the same pattern of results would emerge. Second, no information was collected regarding the circumstances of the traffic accidents. So, it was impossible to determine whether the accident involved another vehicle, whether the respondent was at-fault, or even whether other factors were at play (e.g., weather). Such information would have been helpful in trying to isolate the effects of the driving anger and low self-control scales on the driving outcome measures. Last, while the sample was collected from the KSA, the results are not



ISSN: 2617-958X

المجلة الإلكترونية الشاملة متعددة التخصصات
Electronic Interdisciplinary Miscellaneous Journal

العدد السابعون شهر (4) 2024

Issue 70, (4) 2024

generalizable to all male college students in the KSA because only students from one university were sampled. Future research should expand on this study and begin to collect data from other parts of the KSA to determine whether these results would be replicable in other regions of the country.

The causes of road traffic accidents can be quite complex. At the same time, however, often the cause of a traffic accident can be quite straightforward and, in these cases, it often comes down to the decisions and traits of the driver. Understanding how driver error and traits might contribute to the propensity of being in a traffic accident is key because then prevention efforts can begin to be implemented to help reduce accidents. In the current study, if the results can be replicated in the future, then it stands to reason that one way that traffic accidents might be able to be reduced in the KSA would be by decreasing driving anger and increasing levels of self-control. While this would not be an easy feat, there is at least some evidence indicating that programs are available that might be helpful with reducing anger and also increasing self-control (Hay et al., 2010; Herrmann & McWhirter, 2003). Against this backdrop, it would be interesting and important to examine whether these types of programs might actually have an impact on accidents in the KSA.



ISSN: 2617-958X

المجلة الإلكترونية الشاملة متعددة التخصصات
Electronic Interdisciplinary Miscellaneous Journal

العدد السابعون شهر (4) 2024

Issue 70, (4) 2024

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ISSN: 2617-958X

المجلة الإلكترونية الشاملة متعددة التخصصات
Electronic Interdisciplinary Miscellaneous Journal
العدد السابعون شهر (4) 2024
Issue 70, (4) 2024

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المجلة الإلكترونية الشاملة متعددة التخصصات
Electronic Interdisciplinary Miscellaneous Journal
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Issue 70, (4) 2024

ISSN: 2617-958X

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المجلة الإلكترونية الشاملة متعددة التخصصات
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Issue 70, (4) 2024

ISSN: 2617-958X

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Electronic Interdisciplinary Miscellaneous Journal
العدد السابعون شهر (4) 2024
Issue 70, (4) 2024

ISSN: 2617-958X

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المجلة الإلكترونية الشاملة متعددة التخصصات
Electronic Interdisciplinary Miscellaneous Journal
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Issue 70, (4) 2024

ISSN: 2617-958X

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ISSN: 2617-958X

المجلة الإلكترونية الشاملة متعددة التخصصات
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العدد السابعون شهر (4) 2024
Issue 70, (4) 2024

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