HLTH 4900, SEC 002
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Introduction

Over 91% of the American population, age 16 and older, own and operate a car on a daily basis (Bureau of Transportation Statistics, 2017). Out of the high-income countries, the United States (U.S.) ranks first on most vehicles imported and sold yearly (Neufeld, 2024). Unintentional injury, which includes motor vehicle deaths, is one of the leading causes of death in the U.S.; in 2020, more than 27% of the total number of unintentional injuries were caused by motor vehicle collisions (CDC, 2023). In the U.S. alone, over 38,000 accidental deaths are attributed to incidents involving cars (National Highway Traffic Safety Administration, 2020). Of the 6 million total automobile-related accidents in the U.S., over 1 million led to at least one death; approximately 3% of these casualties were blamed on road rage (The Zebra, 2024). Road rage has been knowingly influenced by several behavioral or non-biomedical factors, such as delayed self-gratification, gender, and college class (Deffenbacher et al., 1994). In 2022, the South Carolina Department of Motor Vehicles estimated that over 60% of the total car accidents might have been avoided had the driver been more patient– i.e., less angry or prone to emotion (South Carolina Department of Public Safety, 2023). In this particular study, the investigator aimed to study the behavioral factors most commonly associated with road rage or Driving Anger by answering the following questions: (1) Is there a relationship between the Drive Angry Scale and the Delayed Gratification Scale?; (2) Is there a relationship between gender and the Drive Angry Scale?; and (3) Is there a relationship between college years and the Drive Angry Scale?.

Methods

Based on the questionnaires designed by investigators in the reviewed literature, with a sample size of twenty-four (N=24) students enrolled in a college-level health research analysis course, this study used a questionnaire as an instrument to identify variables such as college year and gender with two scales: the Deffenbacher Driving Anger Scale (DAS) and the Delayed Gratification Inventory (DGI). The questionnaire set up a base for the scales; participants were asked to give their gender, age, college year, average sleep duration, physical activity, time spent seated, time spent driving, and most frequent mode of transportation. The investigator later assessed these variables to determine their association with the Drive Angry and Delayed Gratification scores. A shortened version of the DAS was used to ask that participants imagine curt scenarios in which they were being emotionally provoked from inside a vehicle and rate the amount of anger they would feel on a five-point Likert scale (1 = none at all; 5 = very much) for fourteen items which were scored by finding the sum of the ratings (Deffenbacher et al., 1994). The DGI aimed to measure the participants' ability to delay gratification in situations involving food, physical pleasure, social interactions, money, and achievement. It also used a five-point

Likert scale asking participants to rate how well they felt each statement described them (1 = somewhat disagree; 5 = strongly agree) with thirty-five items, which were reverse coded for scoring (Hoerger et al., 2011). Higher scores on the DAS may indicate intense emotions or anger while driving, while higher scores on the DGI may indicate a stronger capacity to delay or resist immediate rewards.

To analyze and sufficiently answer the three research questions of the study, the investigator used Statistical Package for the Social Sciences (SPSS) software to run descriptive, correlation, and inferential statistics on the input data while employing a coded syntax to generate output tables. A correlation analysis was run to answer the first research question regarding the existence of a relationship between the Drive Angry and Delayed Gratification scores. A simple linear regression was performed to answer the second research question regarding the association between gender and scores on the DAS. Lastly, a simple linear regression was also performed to answer the third research regarding the association between college year and scores on the DAS.

Results

Descriptive Statistics

Frequencies

Descriptive statistics were run on SPSS to show mean, standard error, median, mode, standard deviation, variance, and range, as well as a summary and response percentage for the four primary variables measured in this study: gender, Drivescore, college year, and Gratscore.

What year of college is the individual

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Freshman	4	16.7	16.7	16.7
	Sophmore	4	16.7	16.7	33.3
	Junior	8	33.3	33.3	66.7
	Senior	8	33.3	33.3	100.0
	Total	24	100.0	100.0	

Gender of the individual

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Male	11	45.8	45.8	45.8
	Female	13	54.2	54.2	100.0
	Total	24	100.0	100.0	

Drivescore

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	31.00	1	4.2	4.2	4.2
	33.00	2	8.3	8.3	12.5
	35.00	1	4.2	4.2	16.7
	37.00	2	8.3	8.3	25.0
	39.00	2	8.3	8.3	33.3
	40.00	3	12.5	12.5	45.8
	41.00	2	8.3	8.3	54.2
	44.00	3	12.5	12.5	66.7
	45.00	2	8.3	8.3	75.0
	51.00	1	4.2	4.2	79.2
	52.00	1	4.2	4.2	83.3
	53.00	1	4.2	4.2	87.5
	54.00	1	4.2	4.2	91.7
	56.00	1	4.2	4.2	95.8
	59.00	1	4.2	4.2	100.0
	Total	24	100.0	100.0	

Gratscore

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	98.00	1	4.2	4.2	4.2
	122.00	1	4.2	4.2	8.3
	128.00	1	4.2	4.2	12.5
	129.00	1	4.2	4.2	16.7
	130.00	1	4.2	4.2	20.8
	132.00	2	8.3	8.3	29.2
	133.00	1	4.2	4.2	33.3
	136.00	1	4.2	4.2	37.5
	139.00	2	8.3	8.3	45.8
	141.00	1	4.2	4.2	50.0
	142.00	2	8.3	8.3	58.3
	144.00	2	8.3	8.3	66.7
	148.00	2	8.3	8.3	75.0
	149.00	1	4.2	4.2	79.2
	150.00	1	4.2	4.2	83.3
	151.00	1	4.2	4.2	87.5
	153.00	1	4.2	4.2	91.7
	163.00	1	4.2	4.2	95.8
	164.00	1	4.2	4.2	100.0
	Total	24	100.0	100.0	

Statistics

		Gender of the individual	Drivescore	What year of college is the individual	Gratscore
N	Valid	24	24	24	24
	Missing	0	0	0	0
Mean		1.5417	43.0417	2.8333	139.8750
Std. Error of Mean		.10389	1.56325	.22252	2.82093
Median		2.0000	41.0000	3.0000	141.5000
Mode		2.00	40.00[a]	3.00[a]	132.00[a]
Std. Deviation		.50898	7.65835	1.09014	13.81969
Variance		.259	58.650	1.188	190.984
Range		1.00	28.00	3.00	66.00

a. Multiple modes exist. The smallest value is shown

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Correlation Statistics

Correlation Analysis

A correlation analysis was performed to answer whether a relationship existed between Drivescore and Gratscore in the data. The investigation found a negative, moderate relationship between Drivescore and Gratscore; as students' Drivescore increased, their Gratscore decreased (Pearson r = -0.410). This observed correlation was statistically significant at the 95% confidence level (p-value = 0.047).

Correlations

		Drivescore	Gratscore
Drivescore	Pearson Correlation	1	-.410*
	Sig. (2-tailed)		.047
	N	24	24
Gratscore	Pearson Correlation	-.410*	1
	Sig. (2-tailed)	.047	
	N	24	24

*. Correlation is significant at the 0.05 level (2-tailed).

Inferential Statistics

Simple Linear Regression

Inferential statistics, such as simple linear regression, were performed to answer the following research questions: (2) Is there a relationship between gender and the Drive Angry Scale? and (3) Is there a relationship between college years and the Drive Angry Scale?

Variables Entered/Removed[a]

Model	Variables Entered	Variables Removed	Method
1	What year of college is the individual[b]	.	Enter

a. Dependent Variable: Drivescore

b. All requested variables entered.

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.067[a]	.004	-.041	7.81296

a. Predictors: (Constant), What year of college is the individual

Coefficients[a]

Model		Unstandardized Coefficients B	Unstandardized Coefficients Std. Error	Standardized Coefficients Beta	t	Sig.
1	(Constant)	44.372	4.525		9.807	<.001
	What year of college is the individual	-.470	1.494	-.067	-.314	.756

a. Dependent Variable: Drivescore

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	6.025	1	6.025	.099	.756[b]
	Residual	1342.933	22	61.042		
	Total	1348.958	23			

a. Dependent Variable: Drivescore

b. Predictors: (Constant), What year of college is the individual

Test One. The first simple linear regression analyzed college year as the independent variable and Drivescore as the dependent variable. ***The ANOVA Table***. The relationship between college year and Drivescore does not appear statistically significant (p-value = 0.756); students' college year does not seem to be a predictor of their Drivescore (F-statistic = 0.099). ***The Model Summary Table.*** Approximately 0.4% of the variation in Drivescore can be explained by college year ($R^2 = 0.004$). ***The Coefficients Table.*** The slope for this model suggests a negative relationship between the two variables; as students' college year increases, their Drive score decreases (β = -0.067).

Comentado [1]: keep?

Variables Entered/Removed[a]

Model	Variables Entered	Variables Removed	Method
1	Gender of the individual[b]	.	Enter

a. Dependent Variable: Drivescore

b. All requested variables entered.

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.228[a]	.052	.009	7.62387

a. Predictors: (Constant), Gender of the individual

Coefficients[a]

Model		Unstandardized Coefficients B	Unstandardized Coefficients Std. Error	Standardized Coefficients Beta	t	Sig.
1	(Constant)	37.748	5.060		7.460	<.001
	Gender of the individual	3.434	3.123	.228	1.099	.284

a. Dependent Variable: Drivescore

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	70.245	1	70.245	1.209	.284[b]
	Residual	1278.713	22	58.123		
	Total	1348.958	23			

a. Dependent Variable: Drivescore

b. Predictors: (Constant), Gender of the individual

Test Two. In the second simple linear regression, the investigator analyzed gender as the independent variable and Drivescore as the dependent variable. ***The ANOVA Table.*** The relationship between gender and Drivescore does not appear to be statistically significant (p-value = 0.284); students' gender does not seem to be a predictor of their Drivescore (F-statistic = 1.209). ***The Model Summary Table.*** Approximately 0.9% of the variation in Drivescore can be explained by gender ($R^2 = 0.009$). ***The Coefficients Table.*** The slope for this model suggests a positive relationship between the two variables; if a student is female (responded with "2"), their Drivescore will be higher (β = 0.228).

Comentado [2]: keep?

Discussion/Conclusion

The findings from this study harbored only slightly shocking results. It was unsurprising to learn the direction of the relationships between college year, gender, Gratscore, and Drivescore. Still, there was a certain level of expectation regarding the statistical significance of the simple linear regression analyses: at least one regression would be significant, but both would at least be close. The moderate negative correlation observed between Drivescore and

Gratscore made sense as one would expect a calm driver to express the same patience in other aspects of their lives, but since the sample was composed primarily of college students, future studies could include a wider variety of age groups to increase generalizability. Understanding how behavior influences an individual's tendency to succumb to the pressure of stressful driving could be key to improving our roads' safety and ultimately reducing motor vehicle collisions.

Regarding this study's validity, the investigator observed several threats in the form of a less-than-ideal sample size as a greater sample size may have yielded greater statistical power, response bias as participants input the data themselves and could easily alter their responses based on what they saw others had said first, and the simple fact that the sample was composed of college students enrolled in one specific course. Additionally, because the participants were students of a health research course, they may have inferred the research's main objective and altered their data in response. The absence of randomization of the sample and random selection of participants also exacerbates the issue. Finally, some may even question if having participants respond to so many questions meant their attention span shrunk at the halfway point and led to rushed, inaccurate responses. These threats make it difficult to definitively conclude that the findings from this specific study make a difference, are accurate, or can be generalized to different populations, bigger samples, and tighter controls outside this context. Future studies could also consider looking into what else differs in the groups getting higher Drivescores vs getting lower Drivescores, such as factors relating to stress outside of driving: pressure at home, number of credit hours taken, hours spent studying, procrastination habits, socialization level, etc. It may also benefit society to further investigate the relationship between Drivescore/road rage and motor vehicle collisions (that may or may not have led to fatalities) or even if simply having "better" (full coverage) automobile insurance increases or decreases one's Drivescore – meaning their patience on the road would be influenced, in part, by knowledge of reduced punishment/consequences.

The investigator observed a negative, moderate relationship when analyzing the correlation between Drivescore and Gratscore. Although the simple linear regressions analyzing the relationship between college year, gender, and Drivescore were positive, the p-values were smaller than 0.05 and, therefore, statistically insignificant at the 95% confidence level.

References

Centers for Disease Control and Prevention. (2022). Leading Causes of Death. WISQARS Leading Causes of Death Visualization Tool. https://wisqars.cdc.gov/lcd/?o=LCD&y1=2022&y2=2022&ct=10&cc=ALL&g=00&s=0&r=0&ry=2&e=0&ar=lcd1age&at=groups&ag=lcd1age&a1=0&a2=199

Deffenbacher, J.L., Oetting, E.R., & Lynch, R.S. (1994). Development of a Driving Anger Scale. *Psychological Reports, 74*, 83-91.

Hoerger, M., Quirk, S. W., & Weed, N. C. (2011). Development and validation of the Delaying Gratification It is available free of charge for use by those trained in psychometrics. Inventory. *Psychological Assessment*, 23, 725-738.

Neufeld, D. (2024, February 21). Who owns the most vehicles per capita, by country?. Visual Capitalist. https://www.visualcapitalist.com/vehicles-per-capita-by-country/

Ritter, R., Williams, D., & Wijetunge, G. (n.d.). NHTSA's safe system approach: Educating and protecting all road users. Federal Highway Administration. https://highways.dot.gov/public-roads/winter-2022/04#:~:text=In%202020%2C%20the%20United%20States,and%20collaborative%20approach%20to%20safety

South Carolina Department of Public Safety. (2023). *South Carolina triennial highway safety plan (FFY 2024–2026)*. https://scdps.sc.gov/sites/scdps/files/Documents/ohsjp/South%20Carolina%20Triennial%20HSP%20(FFY%202024-2026)%20rev%207.21.23.pdf

The Zebra. (2024, November 7). Road Rage Statistics. https://www.thezebra.com/resources/research/road-rage-statistics/

United States Department of Transportation. (2017, May 31). *National Household Travel Survey Daily Travel Quick Facts.* Bureau of Transportation Statistics. https://www.bts.gov/statistical-products/surveys/national-household-travel-survey-daily-travel-quick-facts