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Analyzing Predictors of Drinking and Driving Among Gender Cohorts within a College Sample

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ANALYZING PREDICTORS OF DRINKING AND DRIVING AMONG GENDER COHORTS WITHIN A COLLEGE SAMPLE

by

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(Under the Direction of Bryan Lee Miller)

ABSTRACT

The current study focuses on predominant predictors associated with each gender cohort's engagement in driving under the influence (DUI). Aker's social learning theory, Gottfredson and Hirshi's low self-control theory, and Agnew's strain theory are utilized to explore differences within two separate step-wise logistic regressions; one set of regressions contain a male only sample (n = 855), while the other model contains a female only sample (n = 968). This study uses self-report measures of DUI from a survey administered at a large Southeastern university focusing on risk-taking behaviors. Results indicate that social learning variables differential association and imitation are significant predictors for both gender cohorts' DUI behavior. Also, although low self-control was a significant predictor within all female-only models, it was only a significant predictor in the male-only models when separate from the other theoretical variables. Likewise, strain was a significant predictor when separated, but was insignificant when included in the final models. Policies and future research are discussed.

INDEX WORDS: Driving under the Influence, Low Self-Control Theory, Social Learning Theory, Strain Theory, Gender Differences

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INTRO

The dangers associated with driving under the influence (DUI) of alcohol have been a cause of concern for public officials and researchers alike, but little has been done to fully understand the differences associated with gender. The current study focuses on predominant predictors associated with each gender cohort's engagement in DUI in order to explore and analyze differences in an attempt to add to the current literature surrounding DUI behavior. Aker's social learning theory, Gottfredson and Hirshi's low self-control theory, and Agnew's strain theory are employed within two separate step-wise logistic regressions; one set of regressions contain a male only sample (n = 855), while the other model contains a female only sample (n = 968). This study aims to answer a research question in need of exploration: Are there differences between predictors for male and female DUI that could potentially inform prevention efforts?

These samples are comprised of undergraduate students from a large Southeastern university. Higston and colleagues (2009) estimated that around 3.36 million college students between 18 and 24 engaged in DUI during the year 2005. Compared to the estimated figure for non-students at 3.67 million, a college sample provides a substantial look into the key elements behind this behavior. Student data also avoids problems associated with studies using arrest data, as the likelihood that a person driving under the influence is arrested is around 1 in 200 (Beitel et al., 2000). By exploring gender differences in predictors of DUI using a self-report survey, we can better inform prevention efforts by developing genders specific targeting.

DUI

Legally, an individual engages in DUI when operating a motor vehicle with a blood-alcohol content (BAC) at .08 grams per deciliter (g/dL) and above; this definition is used in all states. The amount of consumed alcohol needed to reach the legal limit is unique for each individual and

depends on a number of conditions including body weight, biological sex, tolerance, speed of consumption, metabolism, medications, hydration, and the presence of food in the stomach. Estimates suggest that four dinks on an empty stomach for a 170-pound man and three drinks on an empty stomach for a 135-pound woman will reach the legal limit (Hingson & Winter, 2003). Once an individual has reached that limit, the alcohol in their system begins to interfere with communication pathways in the brain by increasing an inhibitory neurotransmitter known as GABA, while simultaneously decreasing the excitatory neurotransmitter glutamate. Once inhibited, this effect reduces vision, reaction time and coordination making it more difficult for the individual to think and drive clearly including the ability to estimate their own level of intoxication (Starkey & Charlton, 2014; Van Dyke & Fillmore, 2014).

The danger and potential damage presented by those engaging in DUI, both to themselves and others, is well documented. According to the National Highway Traffic Safety Administration, there were 10,076 motor vehicle accidents involving both a fatality and a driver over the legal limit during the year 2013. These incidents accounted for 31% of all the traffic fatalities for that year. Also, of the estimated 277 billion dollars in damages caused by all traffic accidents, 50 billion is estimated to be a result of DUI. Drinking and driving appears to be especially problematic for college students. Higston et al. (2009) reports that 1,825 college students died as a result of an alcohol-related unintentional injury. Prevalence rates for drinking and driving among college students vary depending on self-report measurements. A study using a college sample conducted by LaBrie et al. (2011) found that 19.1% of the sample had driven after 3 or more drinks and 8.6% after 5 or more drinks. Another study reports 35.5% had drove after drinking during the school year (Weschler et al., 2003). These statistics highlight the importance of research involving the

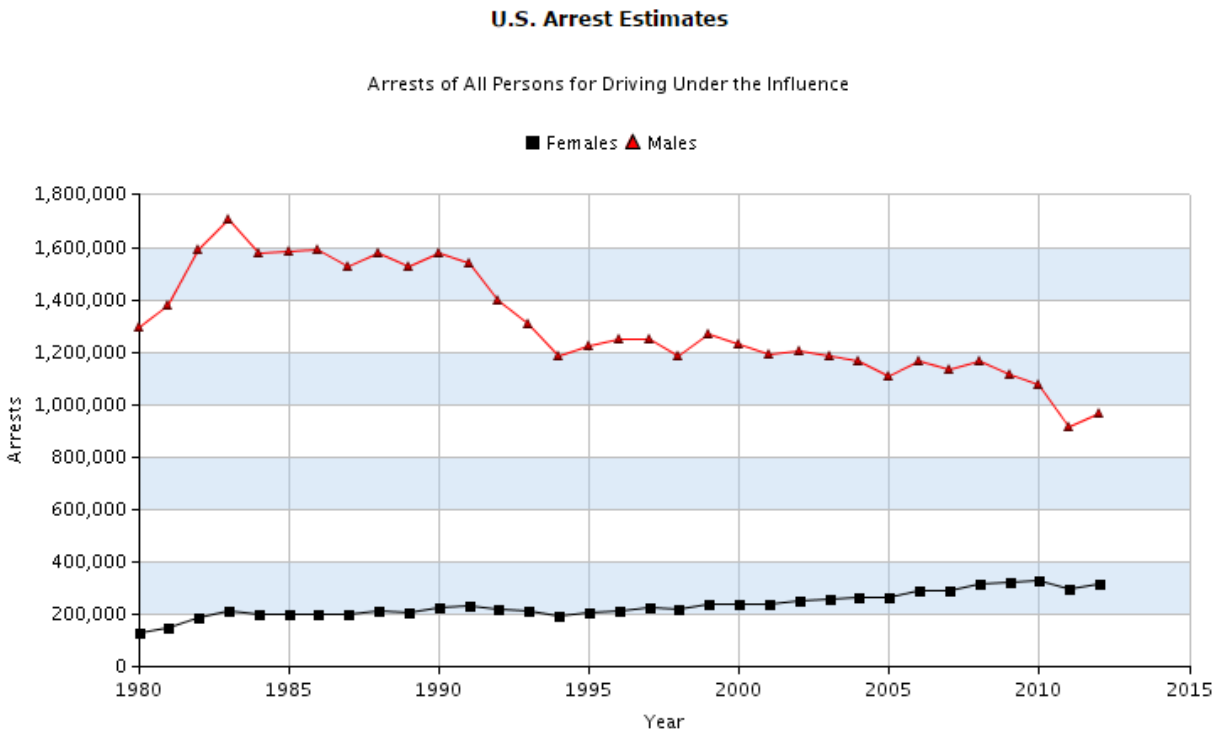
understanding of various aspects of DUI and the characteristics of individuals who engage in that behavior.

GENDER DIFFERENCES IN PREVELANCE

Focusing on the differences in gender in regards to DUI may shed much more light on the mechanisms behind this behavior as this study hypothesizes that male and female DUI samples may differ in predicting this behavior. Estimates found throughout the literature from multiple disciplines, including the social sciences, show that men are more likely to self-report DUI behavior than their female counterparts (Popkin, 1993; Zador, Krawchuk, & Voas, 2000). Using self-reported data gathered from the Center for Disease Control and Prevention, Schwartz (2008) found that self-reported instances of female DUI were less than a third of the self-reported instances of male DUI. However, when considering DUI arrest rates, current data shows that the trend is decreasing for males, while female arrest rates are increasing (see figure 1). This data alone may suggest that male and female engagement in DUI are more similar than dissimilar, but studies show that this relationship may not be indicative of actual DUI behavior due to changes in social control mechanisms such as lowering the legal blood-alcohol content level to .08, thus leading to an increased vulnerability for female offenders (Schwartz, 2008; Robertson et al., 2011).

Along with the disparity in prevalence there is also a disparity in the seriousness of offending. Comparing male and female engagement in DUI behavior, Wells-Parker et al. (1991) found that women who are arrested for DUI are less likely to have a prior incidence of DUI showing that women are less likely to be reoffenders. In 2013, of all female drivers involved in fatal crashes, 15% involved individuals over the legal limit as opposed to 23% among men (NHTSA, 2013). The results of these studies are not to say that female engagement in DUI isn't important, but only to say that it entails different dynamics than that of male DUI behavior.

FIGURE 1



*Graph made with the Arrest Data Analysis Tool from the BJS website:
- http://www.bjs.gov/index.cfm?ty=datool&surl=/arrests/index.cfm#

The majority of studies involving modern criminological theories' ability to predict DUI behavior either focuses on men alone or both men and women in the same model with gender as a control variable. As such, there is a lack of knowledge regarding the predictors associated with female drinking and driving as opposed to male drinking and driving. One study by Keane and colleagues (1993) using arrest data found that risk-taking behavior, such as not wearing a seatbelt, was a significant predictor of DUI in both a male and female sample which is consistent with low self-control theory. By analyzing models separated by gender and using self-report data, the current study will shed some light on this dark area within the DUI literature.

PREDICTORS OF DUI

Current literature has identified an interesting variety of variables significantly associated with DUI. Specifically, research suggests that individual-level variables are more effective predictors of alcohol-related delinquency than social variables (Lanza-Kaduce, 1988). Correlations of DUI behavior with excessive alcohol use and other alcohol use related problems are well established (MacDonald & Pederson, 1990; Begg, et al., 2003; Lapham et al., 2006; Flowers et al., 2008), while aggressive behavior and attitudes have also been shown to be effective predictors of DUI (MacDonald & Pederson, 1990; Begg et al., 2003). Among college students, research suggests that the risk of binge drinking and driving after drinking both increase with each progressive school year (Quinn & Fromme, 2012). College students who are involved in either a fraternity or sorority or those who have a history of family alcohol abuse are at a higher risk of driving after drinking (LaBrie et al., 2011).

Along with those variables, theoretical variables have also proven to be predictors of DUI. Low self-control has been linked to drinking and driving in previous literature (Bouffard & Rice, 2011). Sun and Longazel (2008) found that having low self-control was a better predictor than social bonds and routine activity variables. Also, low self-control has been shown to be a predictor of similar risky driving behavior such as texting while driving (Quisenberry, 2015). Peer drinking habits (amount and frequency) has been shown to be a significant predictor of drinking and driving (Zhang et al., 2012) which is consistent with social learning theory. There is little evidence to directly tie strain variables to DUI, but through mediating variables such as depression, strain has been linked to other alcohol related delinquency such as binge drinking (Hardaway & Cornelius, 2014; Walton et al., 2015). To date, there has not been a study that comparatively analyzed these three mainstream criminological theories in regards to DUI in gender specific models.

LOW SELF-CONTROL THEORY

According to Gottfredson and Hirschi's General Theory of Crime (1990), self-control develops during early childhood as a result of socialization by parents or guardians. Parents/guardians who do not recognize when the child engages in criminal or deviant behavior or do not negatively reinforce that unsocial behavior will fail to instill a sense of self-control within the child. Gottfredson and Hirschi argue that the root cause of an individual's participation in crime and analogous behaviors is the lack of self-control. They posit that self-control develops by the time a child reaches ten to twelve years of age, and this trait remains fairly stable throughout the life course. Individuals with low self-control have a "here and now" orientation, and they are more likely to respond positively to immediate, tangible rewards (i.e. pleasure from drug abuse) without much regard for long-term rewards or consequences. Self-control theory has been the subject of much criticism. These include claims that it is tautological, operationalization issues, and self-control being the cause of crime on the individual level (Akers, 1991; Piquero, MacIntosh, & Hickman, 2000; Pratt & Cullen, 2000; Tittle, Ward, & Grasmick, 2003). Despite these criticisms, Gottfredson and Hirschi's (1990) theory has gathered a substantial amount of empirical support in predicting drug and criminal behavior (Pratt & Cullen, 2000).

Grasmick et al. (1993) designed a scale measuring self-control focusing on the six factors of low self-control identified by Gottfredson and Hirshi. These six factors include risk taking behavior, temper, insensitivity, impulsivity, preference for easy/simple tasks, and preference for physical tasks. These factors are measured using a 4-point Likert scale. Since the development of this scale, studies have generally supported the continual use of the Grasmick et al. scale (Nagin & Paternoster, 1993; Piquero & Tibbetts, 1996; Tibbetts & Myers, 1999). Although the validity of the Grasmick et al. scale has been criticized on numerous occasions for lacking unidimensionality

(Longshore, Turner, & Stein, 1996; Arneklev et al., 1999; Piquero, MacIntosh, & Hickman, 2000; DeLisi et al., 2003; Higgins, 2007), Pratt and Cullen (2000) in a meta-analysis found that low self-control is a significant predictor of crime regardless of the differences in measurement (Pratt & Cullen, 2000). These measurement differences include operationalization, types of samples, and theoretical constructs used. Applying Grasmick's et al. (1993) unidimensional self-control scale, Vazsonyi and colleagues (2001) found that regardless of nationality and cultural settings, low self-control is significantly correlated with antisocial behavior.

SOCIAL LEARNING THEORY

Aker's social learning theory proposes that an individual's probability of engaging in criminal and deviant behavior is increased when the individual is associated with those who reinforce favorable definitions to such behaviors. Social learning theory is comprised of four fundamental dimensions: differential association, definitions, differential reinforcement and imitation.

Akers (2011) defines differential association with both behavioral-interactional and normative dimensions. The behavioral-interactional dimension explains deviance through immediate relationships with others and remote identification with reference groups. The normative dimension explains deviance through norm and value patterns to which the individual is exposed. Differential association provides the basis for the mechanisms defined in Aker's social learning theory as it allows for contact with definitions and models of behavior. It is also important to note the difference between primary associations and secondary associations. Primary association includes contact with immediate family and friends, while secondary association includes contact with a much wider range of people like neighbors and church groups. There are

also modalities of association that include variables such as frequency and intensity that affect how effective the association is toward influencing behavior.

Definitions are a person's own attitudes and values that is attached to a distinct behavior. Akers (2011) describes them as orientations that orient an individual to a code of right and wrong or good and bad. Definitions can either be general or specific. General definitions are moral, religious, and other conventional values that encompass a wide variety of behaviors, while specific definitions are more closely associated with the exact behavior. Akers also distinguish between the effects each definition have on behavior. Negative definitions discourage participation in behavior, positive definitions encourage participation, and neutralizing definitions allow for behaviors by justifying or excusing negative definitions.

Differential reinforcement is a process that either encourages or discourages behavior. This is a system of rewards and punishments. Like differential association, there are modalities of differential reinforcement as well. These modalities, such at frequency and probability, determine the effectiveness of reinforcement (Akers, 2011). The three types of reinforcement that are given by Akers are social, non-social, and self. Social reinforcement includes peer and other social contexts in which the behavior takes place. The non-social is the physiological and physical stimuli associated with the behavior. Lastly, self-reinforcement refers to the reinforcing or punishing of one's own behavior.

The last element of Akers' social learning theory, imitation, can be simply defined as acting out a behavior that is observed in others. The extent of imitation is determined by variables such as model characteristics, the specific behavior being observed, and the observed consequences of the behavior (Bandura, 1977). Imitation is noted as being more critical to the initial acquisition of behavior than whether the behavior is maintained or ceased after acquisition (Akers, 2011).

Support for Aker's social learning theory can be found for numerous types of deviant behavior and offenses (Winfree, Vigil-Backstrom & Mays, 1994; Mihalic & Elliott, 1997; Batton & Ogle, 2003; Chappell & Piquero, 2004; Fox, Nobles & Akers, 2010). Previous literature suggests that differential association and definitions are the strongest components of social learning theory (Pratt and Cullen, 2000). Comparative research has indicated that social learning variables have more empirical support than competitive theories (McGee, 1992; Rebellon, 2002; Preston, 2006; Smangs, 2010; Miller & Stogner, 2015).

GENERAL STRAIN THEORY

Agnew's general strain theory proposes that certain stressors cause crime and delinquency. Agnew identified three different forms of stressors/strain. These include the failure to achieve desired goals, the removal of positive stimuli, and the confrontation with negative stimuli (Agnew, 1985; Agnew 1992).

Failure to achieve positively valued goals is further divided by Agnew into three distinct types. The first is a disjuncture between aspirations (what one hopes to achieve in life) and expectations (what one thinks is realistically possible to achieve in life). The second is a gap between expectations and actual achievements, which means strain is created when anticipated rewards are not gained. The third is a discrepancy between what an individual views as a fair outcome and the actual outcome, meaning that strain is created from inadequate positive rewards for a relatively greater amount of effort.

The removal of positively valued stimuli creates strain by stimulating stress from the loss of someone or something of value. This could be a loss of a beloved family member or a child being forced to relocate to a different school. Confrontation with negative stimuli can result in

stress by interactions with the detrimental actions of others. Examples include child abuse, victimization, and other "noxious" stimuli (Agnew, 1985).

Agnew's theory states that these strains influence crime and deviance through negative emotions, most notably, anger. Access to coping mechanisms and other internal and external constraints also influence criminal/deviant behavior. According to strain theory, when an individual's strain results in negative emotions such as anger and the individual lacks sufficient constraints, the result is criminal/deviant behavior (Agnew, 1992).

Previous studies do support strain theory's model (Capowich, Mazerolle, & Piquero, 2001; Mazerolle, Capowich, & Piquero, 2003; Jang & Johnson, 2003), but these studies have shown that state/situational anger is a better fit with strain theory than trait/general anger. After revisions to Agnew's general strain theory, he listed specific strains that would lead to criminal/deviant behavior including victimization. Support for this has been demonstrated in the literature (Baron, 2009; Lin, Cochran, & Mieczkowski, 2011), along with other types of specific strain (Moon, Blurton, & McCluskey, 2008).

Cohen et al. (1983) as well as Cohen and Williamson (1988) used the Perceived Stress Scale (PSS) as a measure of non-specific strain. This 10-item scale includes questions measuring how often an individual experiences stress using five responses ranging from "never" to "very often". They found that high scores on the scale are associated with psychological distress, physical symptomatology, elevated life events and increased use of health services (Cohen & Williamson, 1988).

METHODS

Data

This study uses data (IRB H12032) focusing on substance use and high risk behaviors. The survey was taken by 2,349 students in 40 classes at a large, public university located in the South-Eastern U.S. A stratified random sample was used to identify 40 eligible classes with 15 selected from classes with 100 or more students and 25 selected from classes with 30 to 99 students. All university undergraduate classes were eligible except classes with 29 or fewer students, lab classes, physical education classes and online classes. Selected classes with professors unwilling to participate were replaced with another randomly selected course from the same strata.

A trained research assistant administered the surveys. Students who were in more than one selected class were instructed not to participate multiple times, and no attempts were made to contact absent students. Surveys were administered between November 2011 and March 2012. Based on enrollment data at the beginning of the semester (not including drops or withdraws), the total number of potential respondents in selected courses was 3,212 with 202 students enrolled in more than one of the selected classes. After removing incomplete surveys, 2,349 students completed the survey producing a conservative response rate of approximately 80 percent.

After removing 75 cases that reported having never driven a car, truck, and motorcycle and removing 245 female cases as well as 206 male cases with missing data, the total sample resulted in 968 female cases and 855 male cases. The combined sample is 53% female with a mean age of 20.07 and 29% non-white. The median family income was between $75,000 – $99,999, and 16% of respondents were affiliated with a fraternity/sorority. Of those surveyed 785 were freshmen, 471 were sophomores, 334 were juniors, and 233 were seniors. A notable difference between the

sample and the population of the university is the undersampling of non-white students with a significance of $p < .01$ (34.5% non-white among the university population).

Dependent Variable

Respondents were asked to indicate whether they had participated in driving a car/truck either on or off-road or a motorcycle at various levels of intoxication (sober, 1-2 drinks, 3-4 drinks, 5-9 drinks, 10+ drinks, high, and both drunk and high). In order to more accurately measure DUI among genders, this study uses two separate definitions of DUI for each model. For the male-only model we used 5 or more drinks as a measure of DUI, and for the female-only model, we used 3 or more drinks as a measure of DUI. This separation is due to the previously mentioned disparity (Hingson & Winter, 2003) between how many drinks it would take an average male and an average female to reach the legal limit. The data for this study did not allow us to use 3 and 4 drinks for the female and male samples respectively due to the previously mentioned design of the survey instrument.

Control Variables

The current study uses several demographic variables as controls. Age is measured using a continuous measure in number of years. Race and affiliation with a fraternity or sorority are measured as dummy variables (1 = non-white and frat/sorority member respectively). Class year was measured as an ordinal variable with values 1 - 4 corresponding from freshman to senior. Parent's income was measured as an ordinal variable (under 10k, 10k-24k, 25k – 49k, 50k – 74k, 75k - 99k, 100k - 124k, 125k - 149k, 150k - 174k, and 175k+).

Low Self-Control

Low self-control was measured using the Grasmick 24-item 4-point Likert scale. This scale measure 6 different factors linked to low self-control in the literature. These factors are risk taking behavior, temper, insensitivity, impulsivity, preference for easy/simple tasks, and preference for physical tasks. Respondents read a statement about themselves and responded with strongly agree, agree, disagree, or strongly disagree. This scale, within both the male and female models, has a high level of reliability ($\alpha = .88$ in the male sample, $\alpha = .87$ in the female sample). The variable was coded so that higher values are indicative of low self-control.

Social Learning Theory

Social learning variables were derived from Lee, Akers, and Borg (2004). To measure differential association, the survey asked respondent how many of their friends have driven while intoxicated. Responses include none, less than half, more than half, and almost all. Imitation was measured by asking how many times they have seen someone drive while intoxicated. Responses include never, once or twice, a few times, lots of times, and too many times to count. To measure definitions the survey asked respondents how they personally felt about driving while intoxicated. Responses include it is inappropriate in all circumstances, it is problematic, but acceptable within reason, it is positive as long as you are careful, and it is positive in all situations. Lastly, to measure differential reinforcement the survey asked respondents how fun they thought it was to drive while intoxicated. Responses include not fun at all, slightly fun, very fun, and extremely fun.

Strain Theory

The Perceived Stress Scale (PSS) was developed as a measure of non-specific strain first used by Cohen et al. (1983). The PSS consists of a series of questions designed to measure general

stress and is combined into a single, scaled variable. Possible responses include never, almost never, sometimes, fairly often, and very often. This scale has an adequate level of reliability in both the male and female samples ($\alpha = .72$ in the male sample, $\alpha = .66$ in the female sample). This scale is appropriate for a college sample as they are less likely to experience severe forms of strains such as homelessness (Miller & Stogner, 2015).

Research Question & Hypotheses

This study uses two sets of stepwise logistic regression models in order to answer the research question: Do theoretical variables have significant differences in their ability to predict DUI behavior in gender specific models? The hypothesized result is that higher rates of low self-control, more strain, and more associations with those engaging in DUI will all be significant predictors of both male and female DUI behavior due to the fact that all three theories posit that they can predict criminal and deviant behavior in both males and females.

DESCRIPTIVES

Female Sample

There was a total of 968 respondents within the female sample. Among the female sample, 31% of respondents self-identified as nonwhite, the average age was 19.83, and 18% of respondents were a member of a sorority. There were 456 freshmen, 246 sophomores, 166 juniors, and 100 seniors within the sample. 36% of the respondents were in the family income brackets between $50,000 to $100,000 per year, while 25% were in brackets below $50,000, and 38% were in brackets above $100,000. As for the prevalence of DUI, 12.5% of respondents had reported drinking and driving (3 or more drinks).

Table 1 - Descriptive statistics

	Female Sample n = 968				Male sample n = 855			
	Mean	SD	Min	Max	Mean	SD	Min	Max
Dependent measures								
DUI	0.125**	0.33	0	1	0.188**	0.39	0	1
Independent measures								
Differential association	2.08**	0.84	1	4	2.22**	0.84	1	4
Differential reinforcement	1.05**	0.32	1	4	1.17**	0.54	1	4
Definitions	1.09**	0.34	1	4	1.21**	0.5	1	4
Imitation	2.87**	1.32	1	5	3.11**	1.37	1	5
Low self-control	2.04**	0.4	1	3.75	2.19**	0.4	1	4
Perceived stress scale	3.11**	0.44	1	4.6	3.01**	0.48	1	4.6
Controls								
Age	19.83**	2.74	16	44	20.35**	3.28	16	58
Race (1 = nonwhite)	0.31	0.44	0	1	0.27	0.44	0	1
Class year	1.91**	2.74	1	4	2.12**	1.09	1	4
Sorority member	0.18*	0.46	0	1	0.14*	0.34	0	1
Family income	5**	1.02	1	9	5.32**	2.08	1	9

Differences measured with a 2-tailed T-test (* = $p < .05$, ** = $p < .01$)

Male Sample

Among the male sample, there was a total of 855 respondents. 27% of respondents self-identified as nonwhite, the average age was 20.35, and 14% of respondents were a member of a fraternity. There were 329 freshmen, 225 sophomores, 168 juniors, and 133 seniors within the sample. 37.2% of the respondents were in the family income brackets between $50,000 to $100,000 per year, while 19.2% were in brackets below $50,000, and 43.6% were in brackets above $100,000. As for the prevalence of DUI, 18.8% of respondents reported drinking and driving (5 or more drinks).

RESULTS

Female Sample

Models F1-F4 in Table 2 are models with the female sample. This stepwise series of logistic regression models test the varying predictive capabilities of three mainstream criminological theories on DUI behavior. Model F1 utilizes the perceived stress scale to assess strain's association with the dependent variable. The independent variable is significant at $p < .05$ with a coefficient of .551 and a standard error (SE) of .248 indicating that higher levels of general stress is indicative of DUI behavior among females. Every control variable was insignificant other than class year which was significant at $p < .01$ with a coefficient of .414 (SE = .105) indicating that with every progressive year, female respondents were more likely to have engaged in DUI. Moving to the second model, F2 assesses low self-control's association with the dependent variable. Low self-control is significant at $p < .01$ with a coefficient of 1.425 (SE = .272) indicating that among the female sample, low self-control is indicative of those choosing to engage in DUI. Also, class year remained significant at $p < .01$ in the same direction as the previous model. The third model uses

four separate variables to test social learning theory: differential association, differential reinforcement, definitions, and imitation. The variables differential association and imitation are significant at $p < .01$ with coefficients of .975 (SE = .149) and .591 (SE = .115) respectively indicating that exposure to those who engage in DUI predict engagement in DUI among female respondents. Differential reinforcement and definitions were not significant as well as all of the control variables. Class year lost significance when combined with the social learning variables. Finally, the fourth model includes all of the independent variables. Low self-control remains significant at $p < .01$ in the same direction, while strain loses its significance when placed in the final model. Social learning variables differential association and imitation remain significant at $p < .01$ in the same direction, while differential reinforcement and definitions remain insignificant. Finally, all control variables do not reach significance in the final model except for class year which was once again significant at $p < .05$ in the same direction showing a moderating effect of social learning variables as well as a mediating effect of low self-control, strain, or both.

Male Sample

The male sample utilized the same structure of modeling as the female sample. M1 shows that the strain variable is significant at $p < .01$ with a coefficient of .624 (SE = .213) indicating that higher levels of general stress is indicative of DUI behavior among males. Likewise, M2 shows that low self-control is significant at $p < .01$ with a coefficient of 1.079 (SE = 237) showing that the less self-control a male respondent has, the more likely they are to engage in DUI. M3 shows that two the four social learning variables, differential association and imitation, are significant at $p < .01$ with coefficients of .526 (SE = .134) and .486 (SE = .096) respectively indicating that association with those who engage in DUI predict higher rates of DUI within the male sample. The final model shows that the social learning variables retain their significance at $p < .01$ and direction when all

the independent variables are combined, but the strain variable and the low self-control variable lose their significance due to the moderating effect of the social learning variables. Throughout all four models, none of the control variables reach significance.

Comparison of Female and Male Models

Two notable differences are found within the male and female models. The first is that low self-control reaches significance in F4 while not reaching significance in M4. This difference, however, is not statistically significant at $p < .05$. Among the same models, class year is significant in F4 while not being significant in M4. Again, the difference was not significant, but with the variable class year, it did approach significance ($p < .10$). Differences associated with the variable class year was significant in the first and second pairs of models at $p < .01$ and $p < .05$ respectively. There are also two similarities between models F4 and M4 worth noting. The first is that differential association is significant among both the male and female samples. The second is that imitation is also significant between both models. However, while the difference between the coefficients of differential association is significant at $p < .01$, the difference between the coefficients of imitation were not statistically significant. Focusing on the similarity between models F1 and M1, strain was significant among the male and female samples. The difference of coefficients was not statistically significant.

Table 2 Logistic regression models predicting DUI behavior among gender cohorts

	Female cohort (n = 968)				Male cohort (n = 855)			
	F1	F2	F3	F4	M1	M2	M3	M4
Social learning measures								
Diff association	-	-	.975** (.149)	.951** (.152)	-	-	.526** (.134)	.490** (.135)
Diff reinforcement	-	-	-.145 (.276)	-.200 (.276)	-	-	.297 (.164)	.197 (.170)
Definitions	-	-	.386 (.278)	.399 (.276)	-	-	.079 (.191)	.125 (.198)
Imitation	-	-	.591** (.115)	.563** (.117)	-	-	.486** (.096)	.482** (.098)
Low self-control	-	1.425** (.272)	-	.876** (.296)	-	1.079** (237)	-	.482 (.279)
Percieved stress scale	.551* (.248)	-	-	.117 (.255)	.624** (.213)	-	-	.435 (.223)
Controls								
Age	.022 (.036)	.037 (.037)	.052 (.041)	.066 (.042)	.026 (.027)	.040 (.028)	.041 (.032)	.052 (.032)
Race (1 = nonwhite)	.080 (.237)	.110 (.234)	-.221 (.269)	-.182 (.272)	-.222 (.216)	-.201 (.218)	-.163 (.237)	-.140 (.239)
Class Year	.414** (.105)	.459** (.104)	.377 (.115)	.236* (.118)	.080 (.088)	.110 (.089)	-.069 (.099)	-.056 (.100)
Frat/Sor Member	-.029 (.275)	-.093 (.273)	.091 (.298)	-.088 (.303)	.133 (.250)	.110 (.251)	-.143 (.266)	-.152 (.267)
Family Income	.092 (.054)	.087 (.052)	.079 (.059)	-.027 (.059)	.051 (.044)	.057 (.044)	.056 (.048)	.068 (.048)
Constant	-5.487	-7.118	-7.931	-10.313	-4.305	-5.221	-5.837	-8.402
Psuedo R^2	0.064	0.110	0.342	0.358	0.029	0.051	0.220	0.234

Note: Coefficients are reported with standard errors in parenthesis. *p < .05, **p < .01

*After testing for multicollinearity, differential association held the highest VIF in the female sample at 1.743 while imitation had the highest VIF in the male sample at 1.714.

Table 3-1 Correlation matrix of male sample

	DUI	Age	Race	Year	Frat/Sor	Inc	LSC	Strain	DA	DR	Def	Im
DUI (5+)	1											
Age	.046	1										
Race (nonwhite = 1)	-.051	-.083*	1									
Class year	.050	.445**	-.056	1								
Frat/Sor member	.028	-.044	-.087*	.012	1							
Family income	.044	-.067*	-.245**	-.030	.125**	1						
Low self-control	.145**	-.155**	-.041	-.092**	.044	-.016	1					
Strain	.097**	-.037	-.005	-.013	.022	-.050	.159**	1				
Differential association	.321**	.039	-.060	.154**	.098**	.016	.167**	.105**	1			
Differential reinforcement	.166**	-.038	.043	-.018	.043	-.055	.253**	.055	.185**	1		
Definitions	.150**	-.010	.066	.079*	.052	-.069*	.155**	-.051	.269**	.455**	1	
Imitation	.329**	.051	-.082*	.160**	.141**	.072*	.219**	.060	.614**	.221**	.224**	1

* = p < .05, ** = p < .01

Table 3-2 Correlation matrix of female sample

	DUI	Age	Race	Year	Frat/Sor	Inc	LSC	Strain	DA	DR	Def	Im
DUI (3+)	1											
Age	.093**	1										
Race (nonwhite = 1)	-.005	.000	1									
Class year	.166**	.508**	.037	1								
Frat/Sor member	.000	-.110**	-.213**	-.057	1							
Family income	.053	-.101**	-.344**	-.008	.264**	1						
Low self-control	.156**	-.129**	-.057	-.086**	.078*	.061	1					
Strain	.077*	.014	-.022	.049	.037	.007	.135**	1				
Differential association	.409**	.037	-.012	.182**	.046	.165**	.207**	.149**	1			
Differential reinforcement	.123**	.011	.028	.074*	-.027	.002	.100**	-.050	.207**	1		
Definitions	.182**	.030	.099**	.081*	-.033	-.006	.075*	.003	.250**	.520**	1	
Imitation	.356**	.073*	-.036	.191**	.076*	.118**	.202**	.111**	.616**	.142**	.225**	1

* = p < .05, ** = p < .01

DISCUSSION

Consistent with previous findings (Popkin, 1993; Zador, Krawchuk, and Voas, 2000), men in this sample were more likely to engage in DUI than their female counterparts ($p < .01$). With the prevalence rate of this sample being 18.8%, male engagement of DUI is a continuing concern, but there is also a concern for female engagement of DUI with a prevalence rate of 12.5%. These rates show the difference may be much less than previously thought (Schwartz, 2008). It would seem that the gap in prevalence, at least among college students, is continuing to close. There was no evidence found supporting the LaBrie et al. (2011) findings that involvement with a fraternity or sorority is a significant predictor of DUI as in this study, it never reaches significance even at the bivariate level (see tables 3-1 & 3-2). There was support for the Quinn & Fromme (2012) findings that the risk of drinking and driving increase with each progressive school year at least among the female sample. Also noteworthy is that the significance of school year is moderated when social learning variables are added to the model and mediated by either strain, low self-control or both. Race, age, and family income do not reach significance in any of the models, but it is worth noting that age is significant among female respondents at the bivariate level (see table 3-2).

Among both male and female respondents, strain was a significant predictor of self-reported DUI, but only when included alone in the model. This would indicate that policies aiming at reducing stress and promoting pro-social coping strategies may be somewhat effective when targeting male college students. Policies and practices aimed at managing stress such as student counseling, tutoring services, or increased access to financial aid may serve to lower male student engagement in DUI, but other policies proposed by low self-control theory or social learning theory may be more effective. Low self-control was a significant predictor in both the male and

female models, but only in the female models does it retain significance when combined with other independent variables. However, this difference was not statistically significant at $p < .05$ suggesting that preventive policies focusing on opportunity to engage in DUI may benefit from specifically targeting females (especially those with low self-control) or may be effective for both male and females. Promoting alternate means to get home such as taxis or driving apps (i.e. Uber/Lift) along with encouraging students to connect with other students willing to drive them home (designated drivers) may lower both male and female engagement in DUI. Other policies focusing on enhancing public transportation such as running late night bus routes from bars to student housing on busy nights could further impact opportunities to engage in DUI. Differential association and imitation variables remained significant in all models. This suggests that prevention efforts should incorporate peer networks, such as the "friends don't let friends drive drunk" campaigns.

FUTURE RESEARCH AND LIMITATIONS

The findings of this research suggest two interesting avenues of research. Since strain was not significant in the final models among both the male and female sample, general stress and anxiety may play a smaller role in those choosing to engage in DUI, or it may be the case that since this study did not use a variable measuring a negative affective state such as depression in the model, a stronger link in either the male or female sample could not be found. This hypothesis provides an interesting avenue into future research involving gender differences in DUI behavior. Secondly, definitions were not a significant predictor of DUI in either sample. One explanation of this could be that current campaigns focusing on defining drunk driving as wrong or dangerous have reached their limit in preventing DUI. Future research should evaluate how effective this prevention strategy will continue to be. Apart from the findings in this study, there is also another

avenue in exploring the frequency of DUI behavior rather than prevalence as this study uses lifetime engagement of DUI as a dependent variable. This may shed even more light on the issue of DUI.

Lastly, there are some limitations that should be mentioned. First, the sample is limited due to the fact that data was only gathered at one university in the south. Geographical differences and the use of a college sample may limit the generalizability of these findings Also, this study uses a regressive dependent variable (lifetime engagement in DUI) while the independent variables are oriented in the present. This could present some time order issues (which is a concern with cross-sectional data). Future research should seek to confirm these findings with longitudinal samples. Another limitation is that there were several cases dropped from the sample due to missing data and those reporting that they have never driven a car, truck, or motorcycle. These removed cases may have impacted the results. Even with these limitations, this research remains important because it offers a unique look into DUI that has yet to be fully explored. The results of this study relating potential predictors to DUI by gender provides valuable information to better inform policies geared toward reducing drinking and driving, especially among college populations.

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