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A Comparison of Self-Control Measures and Drug and Alcohol Use among College Students[*]

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ABSTRACT

Research has shown a link between drug and alcohol behaviors and self-control; however, much of the research focuses on only the general theory of crime (Gottfredson and Hirschi 1990), without regard to Hirschi's (2004) self-control theory. The purpose of the current study is to examine three measures of Hirschi's self-control theory and to understand the link between Hirschi's self-control theory and drug and alcohol behaviors. This study draws from a sample of undergraduate college students ($N = 640$) to examine the role of Hirschi's self-control in the explanation of drug and alcohol behaviors. The current study uses a previous measure of Hirschi's self-control [i.e., decisional self-control (alcohol)] and two measures (i.e., decisional self-control (cheat) and bond-based self-control) created by the researchers to analyze drug and alcohol behaviors. Results indicated that self-control based in social bonds (i.e., bond-based self-control) was significantly related to all drug and alcohol behaviors. The cost/salience scale measuring cheating behaviors [i.e., decisional self-control (cheat)] was significantly related to marijuana/hashish use, and the cost/salience scale measuring drinking and driving [i.e., decisional self-control (alcohol)] was significantly related to zero drug and alcohol behaviors. Results indicate that developing strong social bonds as a form of self-control can reduce the likelihood of drug and alcohol behaviors.

KEY WORDS Hirschi (2004); Self-Control; Drugs; Alcohol

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Drug- and alcohol-related behaviors (e.g., binge drinking, drinking to the point of not remembering, drunk driving, marijuana use, and prescription drug abuse) have been problematic on college campuses for years (Wechsler et al. 1994). Binge drinking (i.e., having five or more drinks in a row; Saylor 2011) has been found to be widespread among college students, with approximately 38–43 percent of college students identifying as binge drinkers (Hingson, Zha, and Weitzman 2009; Wechsler et al. 1998). Binge drinking is associated with drinking to the point of not remembering, and both behaviors are associated with negative consequences such as taking risks, neglecting schoolwork, and drinking and driving (see, for example, Ray et al. 2014). National data indicate that within the past month, approximately 25 percent of college students have driven while intoxicated (Beck et al. 2010), and the years from 1998 to 2005 saw a 3 percent increase in alcohol-related deaths among 18–24-year-olds (Hingson et al. 2009). Drinking behaviors among college students are associated with missing or falling behind in class, poor performance on papers and exams, and earning lower grades (Thombs et al. 2009; Wechsler et al. 1998). Moreover, some students use marijuana while drinking, and this leads to more negative consequences than drinking by itself (see Mallett et al. 2017).

Marijuana and prescription drug abuse are also concerns on college campuses.[1] Marijuana is the most widely used illicit drug among college students and is currently at its highest among college students (Johnston et al. 2014). Approximately 20 percent of people aged 18–25 have used marijuana in the past month, and 15 percent of persons aged 18–25 have a substance-use disorder. Additionally, around one in four college students have abused prescription drugs (National Council on Patient Information and Education 2010), with 6 percent of college students aged 18–22 illegally using psychotherapeutic drugs in the past month (Substance Abuse and Mental Health Services Administration 2016).

Overall, these five drug and alcohol related behaviors (i.e., binge drinking, drinking to the point of not remembering, drinking and driving, marijuana use, and prescription drug abuse) are issues on college campuses (Johnston et al. 2014; Substance Abuse and Mental Health Services Administration 2016; Wechsler et al. 1994). While these behaviors are related to self-control as measured using assessments from psychology or measures testing Gottfredson and Hirschi's self-control (see, for example, Baler and Volkow 2007; Ford and Blumenstein 2013), these behaviors are rarely measured using Hirschi's (2004) self-control theory. Thus, a gap is left in understanding the link between Hirschi's self-control and drug and alcohol behaviors. The main purpose of this study is therefore to understand if Hirschi's self-control theory explains drug- and alcohol-related behaviors. Accordingly, the present study is important for two reasons. First, the study will assist in providing an understanding of the link between Hirschi's self-control theory and drug and alcohol behaviors, particularly those behaviors not examined in previous literature, such as binge drinking, drinking to the point of not remembering, and prescription drug abuse. Second, this study will provide information that is helpful when developing policies to reduce drug and alcohol behavior.

THEORETICAL BACKGROUND

Self-control theory (Gottfredson and Hirschi 1990) states that individuals with low self-control, as opposed to persons with high self-control, are more likely to engage in delinquency and crime. Gottfredson and Hirschi claim their theory of self-control can "explain all crime, at all times, and for that matter, many forms of behavior that are not sanctioned by the state" (p. 117). More than a decade of research supports the idea that self-control predicts criminal behavior (see Lilly, Cullen, and Ball 2011; Pratt and Cullen 2000), but the theory is not without criticism (see, for example, Akers and Sellers 2013). One noted problem is that self-control alone cannot explain all criminal behavior, calling into question the general nature of the theory. For example, other factors, such as social bonds, have direct and/or indirect effects on self-control, and this relationship between social bonds and self-control may influence crime (Cretacci 2008, 2009; Doherty 2006; Evans et al. 1997; Li 2004; Longshore, Chang, and Messina 2005; Longshore et al. 2004; Polakowski 1994; Veenstra et al. 2010; Wright et al. 1999). The link between social bonds and self-control, and subsequently crime, is one reason why Hirschi (2004) created his version of self-control theory.

Hirschi (2004) argues that the original self-control theory undermines the assumption that people are rational. He further asserts that the most important factor of self-control lies in how calculations to offend are reached by each individual (2004:542). That is, individuals evaluate the perceived costs (e.g., harm to self and others, shame, disappointment) and benefits of their future actions and then act accordingly. Self-control theory needs an explanation that recognizes that people consciously and rationally make decisions by weighing the advantages and disadvantages of prospective behaviors. Hirschi's new theory accounts for this cognizant decision-making process by using a "decisional self-control," in which social bonds are a primary factor in the cost-benefit analysis related to self-control (Bouffard and Rice 2011). Self-control is no longer attitudinal- or behavioral-based. Rather, with Hirschi's self-control theory, self-control is more focused on the decision-making process influencing self-control, meaning on how people add together the costs of a behavior to make a decision to act or not (Bouffard and Rice 2011; Hirschi 2004).

Hirschi's new self-control is conceptually defined as "the tendency to consider the full range of potential costs of a particular act" (2004:543). The focus is no longer on long-term implications of the act; rather, with this new definition, individuals are more concerned with the opinions of those persons they value. This concern about others' opinions is considered a factor that inhibits behavior. For example, children do not need to know the health implications of drug use if these consequences are known to those persons whose opinion they value. The principal source of control is the approval of others, and this concern produces self-control inhibitions (Hirschi 2004); therefore, self-control is a set of inhibitions (i.e., social bonds) that modify individual behaviors in whatever environment a person finds him- or herself. The inhibitions can be understood by examining the elements of the bonds identified in social bond theory: attachment, commitment, involvement, and belief. The elements of the bond act as constraining factors during the cost-benefit analysis. The higher the level of social bonds, the more

likely a person will exert self-control, which reduces the probability of the individual choosing delinquent or criminal behavior.

To understand why people with strong bonds are less likely to commit crime, Hirschi (2004) created an empirical definition to assess self-control. Self-control is operationalized as the "number and salience of an individual's social bonds, rather than as a cognitive scale, or counts of previous deviant behaviors" (Morris, Gerber, and Menard 2011:584). According to Hirschi, the number of social bonds and how important they are to an individual (i.e., salience) is how self-control should be understood and measured. Hirschi claims that self-control is understood as social bonds (i.e., they are the same thing), but he also maintains that self-control is influenced by social bonds. Consequently, researchers have used different types of measures to examine Hirschi's self-control theory.

Piquero and Bouffard (2007) operationalized Hirschi's new self-control by using the number of costs (i.e., inhibiting factors or bonds) and their importance to the individual. In Piquero and Bouffard's study, college students were provided hypothetical offending scenarios (i.e., vignettes) about (1) drinking then driving and (2) sexual coercion and were then asked their likelihood of offending in each scenario. Participants were also asked to develop a list of up to seven "bad things" (costs) that might occur if they offended; a separate list was created for each offending scenario. Students then indicated, using a scale of 0 to 100, how important each cost was when making a decision to offend in each vignette. After all data were collected, Piquero and Bouffard used an equation to compute an individual's level of self-control; this measure of Hirschi's (2004) self-control focused on the consequences of behavior and the importance of the costs to an individual. This measure of Hirschi's self-control was significantly related to drinking and driving and to sexual coercion.

In a study similar to that of Piquero and Bouffard (2007), Bouffard and Rice (2011) also tested Hirschi's (2004) self-control theory using a hypothetical scenario on college students' decisions to drink and drive. Bouffard and Rice called their form of self-control "decisional self-control" because it involved how people add together the costs of a behavior to make a decision to act or not. Bouffard and Rice found that an individual who reported more social bonds had higher levels of decisional self-control, which was significantly related to future drunk driving. Like those of Piquero and Bouffard, Bouffard and Rice's results support Hirschi's redefinition of self-control.

Some researchers use a cost/salience analysis (i.e., decisional self-control) like that of Bouffard and Rice (2011), while others use Piquero and Bouffard's (2007) cost/salience assessment. Brown and Jennings (2014) used a decisional self-control measure identical to Bouffard and Rice's measure, and a social bonding scale to assess Hirschi's (2004) self-control. Brown and Jennings sampled college students to examine an array of criminal and analogous behaviors including, but not limited to, stealing, driving while intoxicated, fighting, acting aggressively toward others, and using marijuana. Hirschi's self-control measures were significantly related to criminal and analogous behaviors.

Other researchers, such as Higgins, Wolfe, and Marcum (2008), examined digital piracy among college students. Higgins and colleagues employed a cost/salience measure

similar to that of Piquero and Bouffard to measure Hirschi's self-control. Higgins and colleagues also used a social bond measure to assess Hirschi's self-control. They found that all self-control measures had a significant relationship with digital piracy. These findings are similar to those of Morris, Gerber, and Menard (2011), who used data from the National Youth Survey Family Study to examine the number and salience of each bond as a measure of Hirschi's (2004) self-control. Morris and colleagues' results demonstrated that self-control was significantly related to adult offending behavior (i.e., property offending, assaultive behavior, fraudulent behavior).

Ward, Bowman, and Jones (2015) used data from the Boys Town Study, which comprises 7th–12th grade adolescents, to examine Hirschi's (2004) self-control. Ward and colleagues used social bonds as a measure of Hirschi's self-control, and a cost/salience measure similar to that of Piquero and Bouffard (2007). Ward and colleagues found that both measures of self-control were significantly related to marijuana use. Moreover, findings indicated that the social bond measure was influenced by the cost/salience measure, meaning self-control partially mediated social control, or social bonds. Ward and colleagues state that social bonds and self-control are significantly related but are not the same thing. This is somewhat similar to findings from other studies (see Jones, Lynam, and Piquero 2011).

Jones, Lynam, and Piquero (2011) used data collected from a Drug Abuse Resistance Education (DARE) program that randomly selected schools participating in DARE. At the end of data collection, participants were between 19 and 21 years of age. Jones and colleagues employed a social bond scale as a measure of Hirschi's (2004) self-control. The perceived costs and benefits of deviant behaviors were included in the analysis. In this sense, the bonds were inhibitors to deviant behavior and the costs mediated how the inhibitors affected deviant behavior (e.g., tobacco cigarettes smoked, alcoholic drinks consumed, marijuana used). Jones and colleagues found that all measures of self-control were significantly related to deviant behavior, but they also concluded that self-control and social bonds independently influenced deviant behavior.

Altogether, some research on Hirschi's (2004) self-control theory has used bonds as a measure of self-control, while other research has analyzed bonds, costs, and self-control separately to understand their influence on one another (Bouffard and Rice 2011; Brown and Jennings 2014; Dodson 2009; Higgins et al. 2008; Hirschi 2004; Intravia, Jones, and Piquero 2012; Jo 2013; Jones et al. 2011; Morris et al. 2011; Piquero and Bouffard 2007; Ward et al. 2015). Regardless, bonds and their salience affect a person's decision-making process and subsequent behavior (Hirschi 2004). Hirschi's self-control is therefore understood using the social bonds a person has at any given point during his or her life.

THE PRESENT STUDY

The current research examined Hirschi's (2004) self-control using three different measures of self-control in an attempt to understand if Hirschi's self-control explains drug- and alcohol-related behaviors. Specifically, the measures of Hirschi's self-control included (1) a bond-based self-control scale created by the researchers, (2) a decisional

self-control scale related to alcohol that is based on Bouffard and Rice's (2011) measure, and (3) a decisional self-control scale related to cheating that was similar to Bouffard and Rice's measure but created by the researchers. The first measure was created based on Hirschi's idea that social bonds and self-control are the same and should be measured similarly. The last two measures were created based on Hirschi's idea that self-control is influenced by social bonds and that a cost/salience assessment is needed to account for this relationship.

METHODOLOGY

Data and Sample

The current study surveyed undergraduate students at three different rural, mid-sized universities in the northeastern United States during the fall 2016 and spring 2017 semesters. Institutional review board approval was obtained at each university. Two thousand student e-mail addresses were randomly selected from each university's undergraduate population, and these selected students received an e-mail with a link to the online survey; one university randomly sampled students twice, permitting 4,000 e-mails from that university. The university that sampled students twice ensured that different students were included in each sample. In total 7,979 students were e-mailed the survey, of which 640 students fully completed the survey (response rate = 8.02 percent). Informed consent was obtained from all participants included in this study. This sample was 74.8 percent female and 88.6 percent white (see Table 1) with an average age of 20.55 years (see Table 2). When compared to the demographics at the three universities, females and white students were overrepresented in the current sample, but the mean age of respondents was similar to the universities' demographics.

Table 1. Frequencies: Demographic Variables

Variable	Frequency	Valid %
Sex		
Male	161	25.2
Female	478	74.8
Race		
White	566	88.6
Black	39	6.1
Other	34	5.3
Scholarship		
No	369	57.7
Yes	271	42.3
Employment status		
Unemployed	300	46.9
Employed	340	53.1

Table 2. Descriptive Statistics: Demographic Variables

Variable	N	Mean	SD	Minimum	Maximum
Age	638	20.55	3.07	18	49
Credits	640	14.81	2.20	3	21
GPA	631	3.40	0.49	1.0	4.0

Dependent Variable

The dependent variables included five individual items measuring drug- and alcohol-related behaviors that the students self-reported engaging in during the past three months. Specifically, the survey asked, "In the past three months, how many times have you . . . ?" Students provided a ratio-level frequency as a response. Drug- and alcohol-related behaviors included binge drinking alcohol (i.e., five or more drinks in a row; Saylor 2011), drinking alcohol to the point of not remembering, driving while intoxicated, using marijuana/hashish, and using prescription drugs that were not prescribed to the individual or using more than the prescribed amount (referred to as "prescription drug abuse").

Independent Variables

Bond-Based Self-Control Scale. The bond-based self-control scale was a measure of Hirschi's (2004) self-control based on the idea that social bonds and self-control are the same concept. The bond-based self-control scale was constructed using previous research on social bond theory. The social bond "attachment" included two statements measuring attachment to parents, specifically affection for parents and parental supervision, and two items assessing bonds to teachers. The social bond "belief" was measured with three different statements that included belief in authority and obeying rules/laws.

The scale combined the bonds of commitment and involvement into one bond labeled commitment. Many studies have combined commitment and involvement or have entirely removed involvement as a social bond, as the two elements have conceptual overlap (see, for example, Dodson 2009; Hawkins and Weis 1980; Krohn, Lanza-Kaduce, and Akers 1984; Krohn and Massey 1980). Additionally, Hirschi (1969) admitted that involvement items have a tendency to perform poorly. In the current study, the social bond "commitment" was measured using three different statements that measured attitudes toward school, completion of homework, and preparedness for exams.

All together, these three bonds (i.e., attachment, belief, commitment) were measured with 10 Likert-scale items scored from 1 (*strongly disagree*) to 4 (*strongly agree*), producing a total score that could range from 10 to 40, with a higher score indicating higher levels of self-control. Participant scores ranged from 24 to 40 ($M = 34.22$, SD = 3.49). Principal component analysis and varimax rotation using maximum likelihood estimation indicated that the bond-based self-control scale comprised four factors, including commitment, belief, attachment to parents, and attachment to

professors. Analyses were run to check internal consistency across the four factors and as a unitary construct. Together, the factor analysis using principal components and reliability analysis suggested the scale was best understood as one construct comprising four factors. That is, all four factors coalesced into one construct that measured bond-based self-control. Overall, this scale was respectable ($\alpha = .73$; DeVellis 2012).

Bouffard and Rice's Decisional Self-Control. The other two measures of self-control were based on Bouffard and Rice's (2011) decisional self-control. These scales are based in the idea that a cost/salience assessment is needed to fully account for the influence of social bonds on self-control.

Bouffard and Rice (2011) argued that to more accurately test the link between social bonds and self-control proposed by Hirschi (2004), an individual's level of social bonds should be used to predict the number and salience of costs considered by an individual when making a decision to act. The current study used two separate measures, an alcohol measure and a cheat measure, to assess decisional self-control. These measures were referred to as decisional self-control (alcohol) [DSC (alcohol)] and decisional self-control (cheat) [DSC (cheat)].

To assess DSC (alcohol), students were asked to provide *up to* seven consequences (i.e., costs) if they "got caught drinking and driving intoxicated." Participants recorded, on average, 4.79 consequences (SD = 2.32). Next, using a scale of 0–100, students rated how important each cost was to them (i.e., salience). Zero signified that the cost was not important to the student, and 100 indicated the cost was highly important to the student. The salience scores were summed for each individual into one total salience score. Salience scores ranged from 0 to 700 (*M* = 427.50, SD = 222.04). Finally, the total salience score was divided by the total cost score to calculate an individual's level of decisional self-control; scores ranged from 1 to 100 (*M* = 88.94, SD = 17.52). The higher the decisional self-control score, the higher one's level of self-control at the time of the decision-making process.

For the DSC (cheat) scale, rather than have respondents list consequences, the survey listed six consequences of cheating on an exam, such as "fail the exam you cheated on," "disciplinary probation," and "parents/guardians are disappointed." Using a scale of 0–100, students rated how important each consequence (cost) of cheating was to them. This was considered the salience score for each cost. The salience scores were summed for each individual into one total salience score. The participants' salience scores ranged from 35 to 600 (*M* = 504.78, SD = 98.24). The total salience score was divided by the total cost score (6) to calculate an individual's level of decisional self-control; scores ranged from 5.83 to 100 (*M* = 84.13, SD = 16.37). The higher the decisional self-control score, the higher one's level of self-control at the time of the decision-making process. Principal component analysis and varimax rotation using maximum likelihood estimation indicated that the DSC (cheat) scale comprised two factors, including attachment to parents and belief in school rules. Analyses were run to check internal consistency across the two factors and as a unitary construct. Together, the factor analysis using principal components and reliability analysis suggested the scale was best understood as one construct comprising two factors. That is, both factors

coalesced into one construct that measured DSC (cheat). Overall, this scale had a very good level of reliability ($\alpha = .86$; DeVellis 2012).

> *Demographic Variables.* In this study, certain demographic variables were included to account for factors that were related to and/or influenced drug and alcohol behaviors. Demographic information measured as continuous variables included age, credit hours, and GPA. Other demographic variables included sex (0 = female, 1 = male), whether the student received any scholarships (0 = no, 1 = yes), and whether the student was employed (0 = no, 1 = yes). Given the limited variability of race in the current sample, race was removed from this study.[2]

RESULTS

Negative binomial regression (NBR) was the most appropriate statistic to analyze the dependent variable in this study. NBR is specifically designed for data that are overdispersed and have several zeros (Garson 2013).[3] Additionally, the researchers examined a summated dependent variable (i.e., the sum of all five items measuring the dependent variable) and each item individually that measured the dependent variable (e.g., drinking five or more drinks in a row, marijuana/hashish use). When running NBR, the researchers examined the goodness-of-fit statistics, specifically Akaike's information criterion (AIC) and the likelihood ratio chi-square (–2LL), and standard errors to understand if a summated dependent variable or individual measures were a better fit. Statistics were improved for the individual items that measured the dependent variable; therefore, each individual item was used as a dependent variable in this study, for a total of five dependent variables.

Table 3. Negative Binomial Regression: All Measures of Self-Control & Drinking Five or More Drinks in a Row

Variable	*b*	SE	*p*	OR
Intercept	6.071	1.5499	.000***	—
Bond-based self-control	–.070	.0269	.009**	.932
DSC (alcohol)	.000	.0047	.928	—
DSC (cheat)	–.001	.0062	.810	—
Age	.010	.0402	.804	—
Credits	.002	.0381	.956	—
GPA	–.643	.1862	.001***	.526
Sex	–.428	.1949	.028*	.652
Scholarship	.181	.1782	.309	—
Employment	–.341	.1600	.033*	.711

Notes: AIC = 2531.207; –2LL = 54.781; $p < .001$.

*$p < .05$ **$p < .01$ ***$p < .001$

The first three models examined problematic drinking behaviors. The first model examined drinking five or more drinks in a row (see Table 3; –2LL = 54.781, $p < .001$). Four variables were statistically significant, including GPA ($p = .001$), the bond-based self-control scale ($p = .009$), sex ($p = .028$), and employment status ($p = .033$). As GPA ($b = -.643$, OR = .526) or bond-based self-control ($b = -.070$, OR = .932) increased, the likelihood of drinking five or more drinks in a row decreased.[4] Being employed ($b = -.341$, OR = .711) and being female ($b = -.428$, OR = .652) also decreased the likelihood of drinking five or more drinks in a row.

Findings were similar for drinking to the point of not remembering (see Table 4; –2LL = 42.003, $p < .001$). Two variables were statistically significant, including GPA ($p = .002$) and the bond-based self-control scale ($p = .006$). As GPA ($b = -.878$, OR = .416) or bond-based self-control ($b = -.100$, OR = .905) increased, the likelihood of drinking to the point of not remembering decreased.

Table 4. Negative Binomial Regression: All Measures of Self-Control & Drinking to Point of Not Remembering

Variable	b	SE	p	OR
Intercept	6.2711	2.3280	.007**	—
Bond-based self-control	–.100	.0365	.006**	.905
DSC (alcohol)	.011	.0064	.099	—
DSC (cheat)	.000	.0090	.986	—
Age	–.069	.0593	.245	—
Credits	.020	.0492	.679	—
GPA	–.878	.2768	.002**	.416
Sex	–.057	.2637	.829	—
Scholarship	.394	.3493	.114	—
Employment	–.277	.2212	.211	—

Notes: AIC = 1277.732; –2LL = 42.003; $p < .001$.

*$p < .05$ **$p < .01$ ***$p < .001$

The third model analyzed driving while intoxicated (see Table 5; –2LL = 49.512, $p < .001$). Three variables were significant, including employment ($p = .003$), GPA ($p = .012$), and bond-based self-control ($p = .035$). Being employed decreased the likelihood of driving while intoxicated ($b = -1.404$, OR = .246). Additionally, as GPA ($b = -1.127$, OR = .324) or bond-based self-control ($b = -.144$, OR = .866) increased, the likelihood of driving while intoxicated decreased.

The last two models examined behaviors related to drug use. The fourth model examined marijuana/hashish use (see Table 6; –2LL = 50.840, $p < .001$). Four variables were statistically significant, including bond-based self-control ($p < .001$), GPA ($p = .027$), DSC (cheat) ($p = .043$), and scholarship status ($p = .045$). As bond-

based self-control (*b* = –.264, OR = .768) or GPA (*b* = –.889, OR = .411) increased, the likelihood of using marijuana/hashish decreased. Surprisingly, as self-control as measured by DSC (cheat) increased, the use of marijuana/hashish increased (*b* = .024, OR = 1.024). Additionally, the likelihood of using marijuana/hashish increased by two times when a student was awarded a scholarship (*b* = .024, OR = 1.024). Students on scholarships who use marijuana/hashish may be using it as a study tool or to relieve the stress and anxiety of constantly studying to achieve high grades. Regardless, in the current study, marijuana/hashish use is influenced more by scholarship status than by self-control.

Table 5. Negative Binomial Regression: All Measures of Self-Control & Driving while Intoxicated

Variable	*b*	SE	*p*	OR
Intercept	5.718	3.8962	.142	—
Bond-based self-control	–.144	.0682	.035*	.866
DSC (alcohol)	.042	.0228	.068	—
DSC (cheat)	–.034	.0193	.075	—
Age	–.022	.0967	.820	—
Credits	.095	.0945	.316	—
GPA	–1.127	.4464	.012*	.324
Sex	–.741	.5413	.171	—
Scholarship	.529	.4991	.289	—
Employment	–1.404	.4652	.003**	.246

Notes: AIC = 430.600; –2LL = 49.512; *p* < .001.

*p < .05 ***p* < .01 ****p* < .001

The last model examined prescription drug abuse (see Table 7; –2LL = 335.242, *p* < .001). Two variables were significant, including the bond-based self-control scale (*p* = .005) and scholarship status (*p* = .005). As bond-based self-control increased, the likelihood of illegally using prescription drugs decreased (*b* = –.240, OR = .787); however, the likelihood of illegally using prescription drugs increased by four times when students were awarded scholarships (*b* = 1.580, OR = 4.855). Students are awarded scholarships mainly for athletics and academics. Student athletes on scholarships may get injured, obtain prescription painkillers, and use more than prescribed; however, it could also be that those students who have academic scholarships are abusing prescription drugs (e.g., Adderall) to study, write papers, take exams, stay awake, and maintain their grades (see Chen et al. 2016; DeSantis, Webb, and Noar 2008). Regardless, in the current study, prescription drug abuse is greatly influenced by scholarship status, as opposed to self-control.

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**Table 6. Negative Binomial Regression: All Measures of Self-Control &
Marijuana/Hashish Use**

Variable	*b*	SE	*p*	OR
Intercept	10.121	3.4231	.003**	—
Bond-based self-control	–.264	.0656	.000***	.768
DSC (alcohol)	–.019	.0099	.051	—
DSC (cheat)	.024	.0116	.043*	1.024
Age	.102	.0903	.260	—
Credits	.055	.0736	.454	—
GPA	–.889	.4022	.027*	.411
Sex	–.689	.4119	.095	—
Scholarship	.706	.3523	.045*	2.026
Employment	–.373	.3227	.248	—

Notes: AIC = 1554.533; –2LL = 50.840; *p* < .001.

*p < .05 ***p* < .01 ****p* < .001

**Table 7. Negative Binomial Regression: All Measures of Self-Control & Prescription
Drug Abuse**

Variable	*b*	SE	*p*	OR
Intercept	6.657	4.9463	.178	—
Bond-based self-control	–.240	.0864	.005**	.787
DSC (alcohol)	–.004	.0127	.759	—
DSC (cheat)	–.006	.0190	.744	—
Age	–.016	.1284	.904	—
Credits	–.031	.1321	.817	—
GPA	.219	.6378	.731	—
Sex	–.107	.5772	.853	—
Scholarship	1.580	.5630	.005**	4.855
Employment	–.107	.4958	.829	—

Notes: AIC = 499.000; –2LL = 335.242; *p* < .001.

*p < .05 ***p* < .01 ****p* < .001

DISCUSSION

The purpose of this study was to provide an understanding of drug and alcohol behaviors
by examining three different measures of Hirschi's (2004) self-control in an
undergraduate college sample (*N* = 640). Little to moderate research exists on Hirschi's
(2004) self-control theory, particularly in relation to drug- and alcohol-related behaviors.
This study built on the existing research that has utilized different operationalizations of
Hirschi's (2004) self-control theory and, subsequently, different measures and vignettes.

The current study utilized two measures of self-control created by the researchers [i.e., bond-based self-control and DSC (cheat)] and one previously tested measure of self-control [i.e., DSC (alcohol)]. When examining drug- and alcohol-related behaviors against all measures of self-control, the bond-based self-control scale was significantly related to all five drug and alcohol behaviors (i.e., drinking five or more drinks in a row, drinking to the point of not remembering, driving while intoxicated, using marijuana/hashish, and abusing prescription drugs). The DSC (cheat) scale was only significantly related to one drug behavior (marijuana/hashish use), however, while the DSC (alcohol) measure was significantly related to zero drug and alcohol behaviors.

We argue that the bond-based self-control scale predicts offending, because of attachments to parents and professors, commitment to school, and belief in laws. The DSC (cheat) scale predicts offending, because of attachment to parents and belief in school rules. The DSC (alcohol) scale does not predict offending, because of the varied responses provided by students such as "harm to self" and "harm to others" along with "parents disappointed" and "kicked out of school." The different responses are indicative of social bonds (i.e., parents disappointed, kicked out of school), but they are also suggestive of a different type of self-control not based in social bonds (i.e., harm to self and others). The latter appear to be a moral type of self-control, in that one should not cause harm to self or others. Because social bonds have a significant relationship with drug and alcohol behaviors, and because there were varying types of self-control in the DSC (alcohol) responses, it makes sense that DSC (alcohol) was not significantly related to drug and alcohol behaviors. The DSC (alcohol) measure assesses a different type of self-control—one not based solely in social bonds.

The measures of Hirschi's (2004) self-control that are significant across all behaviors are those based in social bonds. Individuals are not likely to engage in drug and alcohol behaviors because they recognize their social bonds and feel attached to parents and professors and committed to school; they also believe in the school rules against drinking and drug use. These individuals believe that engaging in drug and alcohol behavior would reduce those attachments to people, reduce commitment to school, and break the school rules, which they believe should be followed. These attachments, commitments, and beliefs act as a form of restraint that reduces the probability of individuals engaging in drug and alcohol behaviors.

One surprising finding was that DSC (cheat) was related to an increase in marijuana/hashish use. That is, a greater attachment to parents and a higher belief in school rules were significantly related to an increase in the likelihood of engaging in marijuana/hashish use. It is possible that students want to do well in school and please their parents, and that they believe using marijuana will help focus them and relieve their stress/anxiety while writing papers or studying for exams. It is possible that a high attachment to parents equates to a high attachment to peers, and peers may use marijuana/hashish; therefore, a high attachment to peers who use marijuana/hashish is associated with the student being more likely to use marijuana/hashish, regardless of consequences. During the factor analysis of DSC (cheat), attachment explained more variance than did belief (34.02 percent as opposed to 26.19 percent). It therefore follows that attachment is a stronger predictor of behavior than is belief in school rules, so having

peers who use marijuana/hashish would increase marijuana use. Moreover, wanting to please one's parents and believing marijuana/hashish will help relieve anxiety and increase work productivity would increase marijuana/hashish use.

Another surprising finding is that DSC (alcohol) was significantly related to zero drug and alcohol behaviors. In this measure, students self-generated consequences (inhibitions) of drinking and driving. According to Piquero and Bouffard (2007), the more inhibitions listed, the less likely the person is to engage in deviant behavior, such as drug and alcohol behavior. The idea is that the more costs a person is able to list, the higher his/her level of self-control, but this was not the case in the current study. We found no significant association between inhibitions and drug and alcohol behavior.

The present study has implications for policymakers. Policymakers should consider improving parenting and the attachment a child has to his/her parents. By improving parenting skills, one can improve parental attachment to children and child attachment to parents. For example, the Nurse Family Partnership (NFP) targets low-income first-time mothers beginning in pregnancy and through two years after the birth of the mother's first child. This program works with the mother, family members, and infant to improve prenatal and maternal health, birth outcomes, child health and development, relationships between family members, competent infant and toddler care, and parental economic self-sufficiency (Olds 2010; Olds et al. 2003). The NFP is based in attachment theory, in that the program helps mothers to understand how to form bonds with their children during pregnancy, infancy, and into the toddler years and to learn practical parenting skills. The NFP improves maternal health during pregnancy, maternal mental health, use of community services, and maternal sensitivity and responsive interactions during free play with the child; reduces emergency room visits and hospitalizations, child abuse and neglect (Olds 2010; Olds et al. 2003), and incidents of domestic violence; and improves child language development, executive functioning, and behavioral adaptation to testing, which increases a child's readiness to enter elementary school (Olds 2010; Olds et al. 2004). During adolescence, the infants from the NFP have fewer instances of running away, fewer arrests, fewer convictions/violations of probation, fewer lifetime sex partners, fewer cigarettes smoked per day, and fewer days consuming alcohol (Olds 2010; Olds et al. 2003). Overall, the NFP addresses a multitude of concerns regarding maternal and child health outcomes, but the crux of the program relies on improving the bond between mother and child by providing the mother age-appropriate bonding activities and parenting techniques. By improving the mother-child bond, the NFP is able to improve child development and reduce adolescent antisocial behaviors. Overall, evidence-based programs such as the NFP improve parenting practices and strengthen the parent-child bond, and thus, children begin to value their parents' opinions. Ultimately, this bond of attachment between parent and child aids parents in their ability to instill in their children morals and values such as commitment to work and school and belief in societal values and school rules.

Moreover, attachment to parents can be argued as being associated with attachment to others (e.g., professors), which are both associated with drug and alcohol behaviors. Early childhood attachment is indicative of adulthood attachment (Fraley 2002). A widely accepted explanation of how childhood attachment to parents affects

attachments to others is the development of internal working models, which are memories and expectations that children carry into new interactions with other people (Bretherton and Munholland 1999). This influences whether children approach or avoid others and carry positive or negative emotions toward others. Thus, stronger attachment to parents would improve an individual's future attachments to other important people, such as professors, intimate partners, children, and authority figures. It would therefore behoove policymakers to focus on evidence-based practices that target parent-child attachment, because early attachment forms the basis for all other attachments in a person's life, and strong attachments reduce delinquency and criminal behavior (see Hirschi 1969, 2004).

Policymakers can also focus on programs aimed at improving commitment, such as after-school programs (see, for example, Durlak and Weissberg 2007; Huang and Dietel 2011; Lauer et al. 2006). For example, some after-school programs improve reading and math scores and student academic success (Lauer et al. 2006; Mahoney, Lord, and Carryl, 2005). Others improve academic standardized tests scores (Durlak and Weissberg 2007; Huang et al. 2008), and still other programs reduce juvenile offending rates (Goldschmidt, Huang, and Chinen 2007). After-school programs also improve youths' self-confidence and self-esteem, school bonding, positive social behaviors, and school grades (see Durlak and Weissberg 2007). Moreover, after-school programs appear to increase children's commitment to social institutions, such as school, and the positive benefits of increased commitment (e.g., academic success, improved self-esteem, reduced juvenile offending) can carry over into adulthood (see, for example, Goldschmidt et al. 2007). It is clear that program quality, exposure, and engagement are important factors influencing a child's outcomes in after-school programs (see, for example, Durlak and Weissberg 2007; Huang and Dietel 2011); therefore, it would benefit policymakers to focus on afterschool programs that utilize evidence-based approaches, thereby enhancing commitment to school and thus ensuring positive outcomes for students.

Policies should also focus on improving beliefs, such as beliefs in authority. People are more likely to follow rules and laws (Jackson et al. 2012) and cooperate with police (Tyler and Fagan 2008) when they view the police and laws as legitimate, meaning people trust and respect those in authoritative positions (see also President's Task Force on 21st Century Policing 2015; Tyler 2006). When involved with the criminal justice system (e.g., being arrested), people are concerned with the process and how they are being treated, as well as with the result (Tyler 2006). People are more likely to accept the outcome if they perceive the outcome as fair, even if it is not favorable to them (Higginson and Mazerolle 2014; Tyler 2006). This places the onus on police departments to implement policies that encourage procedural justice, which improves police legitimacy.

According to the President's Task Force on 21st Century Policing (2015), the public believes in authorities' legitimacy when those in authority are acting in procedurally just ways. Procedural justice focuses on the relationship between people in authority (e.g., police officers) and citizens. Procedural justice focuses on treating citizens with respect and dignity, giving people voices during interactions, being neutral when making decisions, and conveying motives that are trustworthy in nature (Mazerolle

et al. 2013). This would require police departments to train their officers in procedural justice and to communicate to police officers the effectiveness of police legitimacy, such as improving citizen cooperation and compliance with police. Certain jurisdictions already have police ride-along programs and citizen academies to help improve people's understanding of policing, public trust in the police, and police-community relations. We implore policymakers to implement procedural justice training, as this improves police-community relations and adherence to the law (Mazerolle et al. 2013; President's Task Force on 21st Century Policing 2015; Tyler 2006). Additionally, future research should examine police ride-along programs and citizen academies to understand how these programs alter citizens' perceptions of police and strengthen citizens' belief in the police and in the laws of society.

As for limitations to this study, one limitation is that the current research examined only drug and alcohol behaviors. In future studies, it would be prudent to study other specific behaviors (e.g., gambling, downloading media files illegally, stealing) to understand the effects of social bonds and self-control on those and other illegal behaviors. This would allow researchers to understand the influence of social bonds and self-control on delinquent behavior in general, thereby allowing researchers to have a broader understanding of social bonds and self-control.

Another limitation to this study is that the response rate was low (8.02 percent). It has been suggested that response rates do not necessarily indicate nonresponse bias (Davern 2013; Groves 2006), but there is still a concern of nonresponse bias when having a low response rate (Fincham 2008). It is expected that online surveys will have a lower response rate compared to other forms of survey administration (Dillman, Smyth, and Christian 2014; Sax, Gilmartin, and Bryant 2003), which is why the current study sampled 7,979 students to get a reasonable sample size of 640 students. Moreover, this study closely adhered to Dillman and colleagues' (2014) Tailored Design Method to increase the response rate. Regardless of the measures employed to increase response rates, it is possible that a nonresponse bias exists. Those students with moderate to high self-control may have responded to the survey, and those students with low self-control may have ignored the survey, thereby biasing the results of the current study.

A third limitation was the low counts of reported drug and alcohol behaviors. Very few sample students engaged in drug and alcohol behaviors. Arguably, college samples, in general, have higher levels of self-control and thus commit less crime. College students completed high school, applied for college, currently attend college, and are planning for their future careers; all these tasks require self-control. Low counts may therefore derive from the population being studied (i.e., college students). Regardless, to account for the majority of responses for drug and alcohol behaviors being zero, this study employed negative binomial regression.

Another limitation relates to demographic variables. Demographically, although the sample is close to representative of what one might find on a college campus, there are few males, which may have influenced the current findings. For example, statistics demonstrate that women are far less likely than men to be imprisoned (Federal Bureau of Prisons 2020), and adolescent females account for fewer than one-third of arrests of people under the age of 18 (Ehrmann, Hyland, and Puzzanchera 2019); however, 74.6

percent of the sample is female, which may indicate there is less deviance in the current sample than in the general population.

Additionally, this is a self-report survey. As expected with self-report data, respondents may over- or underreport deviant behavior (Thornberry and Krohn 2000). Students may not have remembered the amount of times they engaged in certain drug and alcohol behaviors or may not have been able to recall certain behaviors, especially if they were intoxicated to the point of not remembering their actions. Other students may have purposefully misrepresented themselves, meaning they made it appear that they engaged in drug and alcohol behaviors more or less often than was true. This could have potentially inflated or understated the degree to which current respondents reported drug and alcohol behavior.

Last, in the future, research should include other populations. The current study included only college students. Self-control theory intends to explain a variety of behaviors across various populations. Different populations therefore need to be surveyed, including the elderly, young and middle-aged adults, adolescents, children, and criminals. It is particularly important to examine self-control in a population that exhibits low self-control, such as offenders, since college students tend to have higher levels of self-control. Studying various populations will ultimately aid in the understanding of self-control and its measurements.

Despite the limitations, the results of the present study are important. Self-control, as measured using a bond-based self-control scale, is significantly related to drug and alcohol behavior; this is as Hirschi (2004) would predict. Future studies should include a wider variety of behavior and a broader sample that is more nationally representative and stretches beyond the scope of college students, as such research may be able to more effectively control for demographic variables such as socioeconomic status, education, gender, and race. Future research should also include various measures of Hirschi's self-control (i.e., bond-based self-control scales and decisional self-control scales) because the literature is conflicting regarding the use of these scales and their viability in predicting offending behavior. Last, in the future, researchers should utilize path analysis to understand the causal relationships between different measures of social bonds and behavior, and also social bonds, self-control, and behavior.

ENDNOTES

1. Other illicit drug use is low on college campuses (Substance Abuse and Mental Health Services Administration 2016), so the focus of this study was marijuana use and prescription drug abuse.
2. A one-way ANOVA examining the race categories of white, black, and other against each individual dependent variable demonstrated that the race categories were not statistically different from one another.
3. Poisson regression was run to check for overdispersion.
4. The bond-based self-control scale should be interpreted with caution because the odds ratio is near 1.0. An odds ratio of 1.0 indicates no difference; therefore, the bond-

based self-control scale is a very mild predictor of drinking five or more drinks in a row. All other odds ratios near 1.0 should also be interpreted with caution.

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