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Learning to E-Cheat: A Criminological Test of Internet Facilitated Academic Cheating

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An increasing problem of great concern for academic institutions is the pervasiveness of cheating among students. Further compounding this problem is advancements in technology that have created new ways for students to engage in cheating. Despite a growing interest in technology facilitated cheating, little is known about why students may employ electronic resources to cheat. However, Akers' social learning theory offers one plausible explanation. Surveys were collected from a sample of 534 college students at a large southeastern university in order to quantify the prevalence and frequency of Internet facilitated cheating. These surveys allowed for an exploration of factors associated with this form of cheating and a comparison between what we refer to as E-cheating and traditional forms of cheating. Results indicate that approximately 40% of students have engaged in some form of E-cheating in the last year. Social learning variables emerge as the strongest predictors of both the occurrence and frequency of E-cheating while self-control and strain variables have little effect. An exploration of the relationship between E-cheating and similar technology free cheating behaviors suggests that there is significant overlap, but that some students do "specialize" in E-cheating or technology free cheating. We conclude by offering suggestions for teaching strategies, course and assignment design, and testing that will best limit E-cheating.

Computers have dramatically changed the college learning environment with the modern classroom looking dramatically different from one of just a decade ago. Current students have come to expect professors to use multimedia, powerpoint slideshows, offer courses online, and post grades online. Unfortunately, with all of the benefits of an increasingly connected and online world come several challenges for academic institutions. One of these challenges is the increasing use of technological resources for students to cheat. Renard (1999, p. 38) once warned that, "Educators unaware of the possibilities and resources available to computer-age students are at the mercy of these technologically hip kids." Further compounding the problem is how often students

are able to "get away" with it. In a 1998 survey, 80% of students reported cheating on an exam, and of those who had cheated 95% reported never being caught. In addition, 50% of the students did not believe cheating was necessarily wrong (Kleiner & Lord, 1999).

As noted by scholars, technologies at their best "help us do our work more efficiently, accurately, and even creatively. However, these technologies can also make it easier to steal and cheat, or otherwise deceive and defraud others" (Stephens, Young, & Calabrese, 2007, p. 234). Unfortunately, many students given the opportunity to cheat will engage in this activity (Hartshorne & May, 1928-1930). A growing concern for academic institutions is how to discourage students from using dishonestly those same tools they are trained to employ to succeed legitimately. In order to address the problem, we must first understand why individuals engage in E-cheating and determine if these motivations mirror those that drive traditional forms of cheating. We employ one of the most prominent theories of crime and deviant behavior for this explanation–Akers' (1998) social learning theory.

This research has three main goals: (1) to evaluate to what extent students are employing technology to cheat; (2) to evaluate social learning theory relative to other leading "core" criminological theories in predicting E-cheating; and (3) to explore the differences between the use of technology to cheat and more traditional forms of cheating.

Literature Review

Cheating and Academic Dishonesty

As early as 1933, H. W. James reported that 94% of high school students had admitted to allowing someone else look at their exam during a test. More recently, a comprehensive study of cheating involving 60 institutions and close to 50,000 students suggests that 70% of undergraduates have participated in some form of cheating (McCabe, 2005). Other studies have had similar estimates (Davis, Grover, Becker, & McGregor, 1992; Diekoff et al., 1996; Haines, Diekhoff, Labeff, & Clark, 1986; McCabe, 1992; McCabe & Pavela, 2000; McCabe & Trevino, 1993, 1996, 1997; McCabe, Trevino, & Butterfield, 1999, 2001; Newstead, Franklyn-Stokes, & Armstead, 1996), although these studies find variations when considering the type of cheating, frequency, and type of student population.

Several studies suggest that academic cheating has been increasing over time (Diekoff et al., 1996; McCabe, 2005; McCabe & Trevino, 1996). In contrast, McCabe and Bowers' (1994) comparison of cheating in the 1960s and 1990s shows little change in the reported amount of cheating. Despite whether cheating has increased, it is apparently evident that the ways in which students cheat has dramatically changed (Stephens et al., 2007). As more technology is introduced into the classroom and many colleges and universities

move towards "virtual" classrooms, the issue of technology facilitated cheating will likely become one of the great challenges for academic institutions in the future (Renard, 1999).

Internet Facilitated Deviance

Different forms of online deviance are becoming more prevalent in our education system. While the Internet has provided extensive opportunities to improve teaching and learning, it has also been credited with decreasing academic integrity in student populations (Ma, Wan, & Lu, 2008). According to Lathrop and Foss (2000), there is a relationship in the decline of ethics amongst students and technological advances. In other words, Lathrop and Foss believe the ease in participating in school-related cheating online, such as sharing and copying homework and purchasing term papers from various websites, is associated with a decline in our students' morals. Students can even use cell phones and personal digital assistants (PDAs) as a method of sharing information during class. A contributing factor may be the decrease in fear of apprehension. Stricherz (2001) analyzed a survey taken by 4,500 high school students and found that 47% of the sample believed their teachers were not aware of or even chose to ignore student cheating. They also noted 26% of respondents believed that even if the teacher was aware of the issue, he/she would not want to go to the trouble of reporting the behavior.

One of the more prominent forms of cheating amongst students is plagiarism. The Josephson Institute of Ethics (2006) surveyed high school students ($n = 36{,}000$) and found that 33% had copied a document from the Internet within the past 12 months. The Center for Academic Integrity (McCabe, 2005) reported that over half of high school students (polled in a sample of 61 schools) admitted to participating in plagiarism. The behavior may be even more of a problem in institutes of higher learning, as the Center for Academic Integrity (McCabe, 2005) conducted a nationwide survey of 60 universities ($n = 50{,}000$ undergraduates) and found that almost 80% of students believed that cutting and pasting one or two lines from an online sources was not a serious problem.

There is a gap in the literature in regard to comparing the prevalence of conventional cheating vs. digital cheating. Of the few studies performed, results indicate that conventional forms of cheating are used more often. Lester and Diekhoff (2002) found that while 68% of their sample of students admitted to cheating, only 12% used the Internet. Moreover, Stephens et al. (2007) found that students more often use conventional means to copy homework and exams, and collaborate on assignments when not permitted. However, participation in digital plagiarism was more likely than conventional plagiarism, and digital cheating tools (i.e. use of cell phones or PDAs) were used more than written cheat sheets during tests.

The purpose of this study is to fill in the gap in the current literature by attempting to explain students' choices to E-cheat through the application of

criminological theory. It also provides current estimates of this behavior as its prevalence and incidence may be rapidly shifting with the expansion of technology. The following section discusses how social learning theory, one for the most empirically supported theories of deviance, can provide explanation for this particular form of deviant behavior.

Theories of Deviant Behaviors such as Cheating

Several factors have been well established as being associated with cheating such as being younger, male, and having a lower grade point average (Davis et al., 1992; McCabe et al., 2001). Going beyond demographic characteristics, many have attempted to use criminological theory to predict academic dishon- esty, such as self-control (Bichler-Robertson, Potchak, & Tibbetts, 2003; Bolin, 2004; Cochran, Aleska, & Chamlin, 2006; Cochran, Aleska, & Sanders, 2008; Cochran, Wood, Sellers, Wikerson, & Chamlin, 1998; Gibson, Khey, & Schreck, 2008; Muraven, Pogarsky, & Shmueli, 2006; Tibbetts & Myers, 1999), general strain theory (Smith, 2000), and social learning theory (Bonjean & McGee, 1965; Bowers, 1964; Eve & Bromley, 1981; Lanza-Kaduce & Klug, 1986; Liska, 1978; Michaels & Miethe, 1989).

The goal of this research is to focus on the theoretical explanations that are considered to be at the "core" of the criminological theory field (Cullen, Wright, & Blevins, 2006), and have received empirical validation for other forms of deviance. Specifically, we focus on Akers' social learning theory of crime and deviance, but also examine alternative criminological theories (Gottfredson & Hirschi's (1990) self-control theory and Agnew's (1992) general strain theory) independently and in light of the others to assess their ability to predict academic dishonesty.

Social learning theory argues that behavior is learned through interactions with others. Specifically, normative *definitions* and behaviors are influenced by both positive reinforcement and punishment from control groups (Akers, 1998). According to Akers (1998), *differential association* is the most important influence in the learning process and refers to behavior learned in the context of intimate groups (consisting primarily of friends and family). Modeling or *imitation* is one way in which behaviors are directly learned from others. Learned behavior is then reinforced through the principles of operant conditioning in which the behavior is rewarded or punished (*differential reinforcement*). When behavior is rewarded, favorable *definitions* of the behavior are reinforced. Thus, those who receive rewards from deviance (possibly by gaining acceptance from peers) are more likely to form positive definitions surrounding that behavior. Social learning theory has received tremendous empirical support over the years, and routinely has a consistent, moderate to strong ability to predict crime and deviance (e.g. Lanza-Kaduce, Akers, Krohn, & Radosevich, 1984; Warr, 2002). Notably, the effects of the four main social learning constructs (imitation, definitions, differential association, and differential reinforcement),

individually and combined, are especially robust predictors of crime and deviance (Akers, 1998). To date, only one study has employed social learning theory to explain E-cheating. Stephens et al. (2007) performed a partial test of social learning theory and found that peer cheating behavior and acceptability of digital cheating were the strongest positive predictors of digital cheating in their model. These measures were stronger than demographic factors, moral cognition, and the use of technology. The current study builds on this work and is the first research to test all of the constructs of social learning theory in predicting E-cheating.

Gottfredson and Hirschi (1990) argue that those with low self-control are more likely to engage in crime and crime analogous behaviors. Put another way, Gottfredson and Hirschi argue that low self-control should affect analogous behaviors, such as cheating, in the same that it affects traditionally measured forms of deviance such as theft and vandalism. They theorize that this causes these behaviors to coexist in the same subset of the population: "People who rob and steal are more likely than people who do not rob and steal to smoke and drink, use illegal drugs, break into houses, and cheat on tests" (Hirschi & Gottfredson, 2001, p. 82). Low self-control has emerged as one of the most consistent predictors of deviant behavior (Pratt & Cullen, 2000). It has been shown to significantly affect drunk driving (Keane, Maxim, & Teevan, 1993), bullying (Unnever & Cornell, 2003), fraud (Holtfreter, Reisig, Piquero, & Piquero, 2010), general delinquency (Lagrange & Silverman, 1999), intimate partner violence (Sellers, 1999), occupational delinquency (Wright & Cullen, 2000), drug use (Wood, Pfefferbaum, & Arneklev, 1993), and property crimes (Cretacci, 2008; Vazsonyi, Pickering, Junger, & Hessing, 2001). More relevant to the present analysis, several studies have found empirical support for low self-control in predicting academic dishonesty (Cochran et al., 1998; Gibson et al., 2008; Muraven et al., 2006) though none of these studies focuses on E-cheating. In contrast, Bolin (2004, p. 109) argues that there is "no direct relationship between self-control and academic dishonesty" and that attitude towards academic dishonesty is the most important factor in why people cheat.

Agnew's (1992, 2006) general strain theory expanded upon the type of strains that may lead to deviance and has become the most examined strain theory. He argues that those who encounter strains in the form of noxious stimuli, the removal of positive stimuli, or not being able to obtain a positively valued goal may cope with the strains deviantly in the absence of positive coping skills and resources. Relevant to the current study, those who find their educational goals unobtainable would potentially seek to lessen their strain in an illegitimate way. While general strain theory (GST) has received support in the explanation of violent behavior (Aseltine, Gore, & Gordon, 2000; Mazerolle, Burton, Cullen, Evans, & Payne, 2000; Mazerolle & Piquero, 1998; Paternoster & Mazerolle, 1994), property crimes (Piquero & Sealock, 2000), drug use (Carson, Sullivan, Cochran, & Lersch, 2009; Preston, 2006; Swatt, Gibson, & Piquero, 2007), sui- cidal behavior (Stack & Wasserman, 2007), white-collar crime (Langton & Piquero, 2007), reckless driving (Ellwanger, 2007), and workplace problems (Arter,

2008), empirical support for strain in predicting cheating has not been established. Mazerolle et al. (2000) did include a cheating measure as a part of their school-related deviance measure, but did not separate cheating from behaviors such as skipping school and damaging school property in their analysis. Smith (2000) and Vowell and Chen (2004) were unable to find support for general strain theory, each finding that perceived strains were not significant predictors of academic dishonesty. The lack of support for GST and cheating may be partially due to those strains suggested to be most relevant to deviant behavior by Agnew being rare in collegiate settings, an issue we correct in the present study by exploring strains likely to be experienced by undergraduate students.

Methods

Data

Original data were collected at a major southeastern university from 544 undergraduate students enrolled in sophomore and junior-level criminology courses during the 2009–2010 academic year. While this sample is not generalizable to noncollegiate populations, it is quite appropriate for examining behavior in those we, as criminologists, typically teach. Furthermore, those respondents in this sample all have ample access to technology. The field of criminology and deviance has routinely used undergraduate samples to evaluate various theoretical propositions and how they apply to academic cheating (Payne & Chappell, 2008). A common method for doing this is to directly question students about their involvement in academic dishonesty (Eskridge & Ames, 1993; Mustaine & Tewksbury, 2005; Tibbetts, 1998). As Hollinger and Lanza-Kaduce (2009, p. 590) explain "a self-administered survey provides the best opportunity to obtain detailed information from students about their academic dishonesty."

Participants were recruited using a participant pool, which grants study credits in exchange for participation and were asked to fill out a short survey that largely focused on health, stress, substance use, and academic honesty. Their participation was completely voluntary and other alternatives for gaining course credit were provided. Of the 544 participants, 534 completed all of the items relevant to the current study. The 10 respondents with missing data for items directly related to the present study were dropped from the analysis.[1] The resulting sample was 32.4% male, 58.2% white, 15.7% black, 17.2% Hispanic, 5.6% Asian, and 3.2% other which is not unlike that of the college (41.7% male, 55.6% white, 13.1% black, 16.8% Hispanic, 10.3% Asian, and 4.2% other).[2] The

1. Allison (2000) recommends using listwise deletion when it will eliminate less than 15% of the total cases in a model. As only 2% were missing data relevant to this study, we utilized this technique.

2. We compare the demographic makeup of our sample to that of the college that houses the criminology program since similar data were not readily available for the criminology program.

sample had a mean age of 19.94, a mean grade point average (GPA) was 3.33, and a median family income of $75,000–$99,999 per year.

Measures

Internet facilitated cheating

Due to the complexity and varied levels of academic dishonesty, multiple measures were created to serve as dependent variables in the present analysis. The dataset contained 20 Likert-type items that assess each participant's self-reported behavior at the university since the start of the academic year. These items were adapted from Passow, Mayhew, Finelli, Harding, and Carpenter (2006) and the Internet-Triggered Academic Dishonesty Scale (Akbulut et al., 2008). Each item asked the participant to report how often they committed a particular behavior that violated the university's honor code (such as copied from another student's test or purchased a term paper online) on a scale ranging from never (coded 0) to more than five times (coded 4). A measure of Internet facilitated cheating, or E-cheating, was created from five of the items that assessed how often they used technology to violate the honor code (a = .725). These items asked if respondents had purchased a paper online, used an inappropriate online test bank, plagiarized from an online source, copied homework from online sources, or cheated on web-based assignments by using other websites.[3] This scale was positively skewed with 62.2% reporting no academic dishonesty in the past year. This measure was also dichotomized to create a variable that indicated the individual self-reported no cheating in the last year (coded 0) or that they had committed at least one act that qualified as technology facilitated academic dishonesty (coded 1).

Items that mirrored this Internet facilitated forms of cheating were used to create variables we chose to label as technology free parallel cheating behaviors. This scale was composed of five items with each item closely paired with those making up the Internet facilitated cheating scale (e.g. "paying another student to write a term paper" and "purchased a term paper online"). This scale showed similar reliability (a = .683) and had a similar distribution. Though 10 additional items neither utilize technology, nor mirror an Internet facilitated behavior (e.g. "looked at another student's paper during a test/exam" or "had another student take an exam for you") and are therefore not contained in either measure, we briefly explore descriptive statistics for all items prior to the presentation of the studies primary results so that the data can be

3. While some students may be differentially able to commit advanced forms of computer crime, the types of online cheating explored in this study do not require advanced skills. As the sample was collected from a state's flagship institute, all of the students are assumed to have basic web-browsing and word processing skills.

more easily compared with other studies and to inform readers of what behaviors may be occurring within their classes.[4]

Social learning variables

Measures of each of the four core constructs of social learning theory are included in the present analysis. Differential association measures adapted from Lee, Akers, and Borg (2004) were used to assess the proportion of the respondent's friends that "cheat, plagiarize, or are otherwise academically dishonest." Four questions asked specifically about the behavior of the friends the respondent considers their best friends, those they have known the longest, those they see the most often, and those they spend the most time with in an attempt to tap into the four dimensions of association (intensity, priority, recency, and duration) as described by Akers (1998). Responses ranged from none to all, and these items were averaged to create a scale in which higher scores indicated more association with those who were academically dishonest ($\alpha = .928$).

Definitions specific to academic dishonesty were measured using the average of nine Likert items ranging from strongly agree (coded 1) to strongly disagree (coded 5) that assessed respondents level of agreement with statements that specified that it was wrong to cheat in a variety situations (if the instructor does not grade fairly, if the material was too hard, no matter what the circumstances, etc.). These items scaled well ($\alpha = .974$) and were coded so higher scores indicated definitions in favor of cheating.

Imitation was measured using a scale composed of three Likert items that asked the respondent how often they had seen individuals cheat on exams, work in groups on individual assignments, or plagiarize assignments. These items were coded so higher scores indicated witnessing more cheating ($\alpha = .823$).

Two measures of differential reinforcement were created. The first, a combination of five items that assessed the perceived academic benefits of cheating, was used to represent direct rewards. These items include perceived academic benefits such as higher grades, saving time, and low chances of being caught ($\alpha = .864$). The second, a six-item measure, assesses the respondent's perceptions of social ramifications of cheating as friends' potential disapproval or approval may be an additional form of expected reinforcement ($\alpha = .903$). Both scales were coded so higher scores indicate that the balance of expected rewards leans toward academic dishonesty.

Self-control theory

The scale first utilized by Grasmick, Tittle, Bursik, and Arneklev (1993) was utilized to quantify low self-control. The Grasmick et al. scale includes 24 Likert

4. In order to be more comprehensive in our analysis, we also created a scale from these 10 items and all 20 cheating items and estimated models identical to those created for E-cheating and the parallel behaviors for each. Results were congruent with the E-cheating models and parallel behaviors models.

type items that assessed their impulsivity, penchant for risk taking, and preference for physical activities. Items were coded so that higher values indicate lower levels of self-control (a = .887) and averaged to create a composite scale.

General strain theory

Three forms of strain relevant to the population of interest were included in the present analysis. These measures are used rather than traditional strain measures (abuse, homelessness, victimization, etc.) as the target population is unlikely to have experienced many of the strains argued to be most important in the general population. Among other things, those college students within the sample are unlikely to be homeless, live in a disadvantaged community, under excessive supervision, or lack autonomy and education. We, therefore, choose measures that should more accurately differentiate between levels of stress within college students. In each case, the scales range from 1 to 5 and are coded so that higher values indicate more strain.

First, the 10 item Perceived Stress Scale (see Cohen & Williamson, 1988) that assesses whether recent life events have caused individuals to feel stress, led them to feel overwhelmed, or caused them to feel behind in their tasks was included as an overall measure of life strain (a = .822). Second, a five-item measure was included that determined whether the student was reaching their educational aspirations. These items asked the respondent to report on a Likert scale whether their grades were as high as they would like them to be, whether they expected them to be in the future, whether they felt their performance was strong enough so that they can obtain the job they desire or could gain admittance into their graduate school of choice. This scale is referred to as measuring the educational aspiration and expectation gap throughout the results and discussion sections and showed strong reliability (a = .804). A third measure of strain was created from items that asked the respondent whether they felt too much pressure to succeed academically, extracurricularly, socially, and financially. They were asked five questions about whether they felt too much pressure from their parents, five about feeling too highly pressured to succeed by their friends, and five that assessed whether they placed too much pressure on themselves. These items all included the phrase "too much pressure" so that the responses indicate that their subjective interpretation of the pressure they are experiencing which is most relevant to strain theories.[5] As Agnew (1992) has argued that strain operates through negative emotions, situational specific measures of anger and sadness were created in order to test for mediation should strain variables have significant coefficients in the final model for any of the cheating outcomes. As

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Controls

Four controls were included in the current analysis. Respondents reported their gender (coded male = 1), age, race (collapsed into white/nonwhite due to the small number of some racial groups; coded nonwhite = 1), and whether or not they had ever been diagnosed with a learning disability.[6]

Analytic Strategy

We begin our analysis with a brief examination of cheating prevalence and the forms of cheating that appear to be most common. To answer the first research question, we examine the prevalence of cheating overall, Internet facilitated cheating, and of technology free parallel behaviors and also report which individual forms of cheating are most often reported.

To determine which criminological theory best predicts Internet facilitated academic dishonesty, we then estimate logistic regression models predicting whether or not individuals have engaged in this type of cheating. In a series of models, we look at the effects of constructs related to social learning, self-control, and strain theories independently and then in combination. The analysis then moves from predicting whether or not individuals cheat to predicting the amount that they cheat. Due to the distribution of the data, we report negative binomial models for this dependent variable. Though the outcome is continuous data, it has a highly positively skewed distribution for which this type of modeling is appropriate and avoids the potential for biased or artificially deflated standard errors associated with using ordinary least squares (OLS) for skewed distributions. Tests for overdispersion were significant demonstrating that negative binomial rather than Poisson modeling was appropriate.

The third and final research question is focused on exploring the relationship between E-cheating and their parallel behaviors. We first repeat the previous series of models replacing the Internet facilitated measures with the technology free parallels to determine if the same factors are associated with the

6. We feel that inclusion of the diagnosed with a learning disability control is important as the university allows for special testing procedures that these students may utilize (such as testing in a more spacious and quiet room as opposed to the classroom and having 1.5 times the length of time allowed to other students). Since we are unaware of the effect of these procedures and no item assessed whether students with disabilities utilize this option, we included this measure as a control. We choose to exclude GPA as a control as it may have been directly affected by the dependent variable. Those who reported cheating in the prior semester would likely have had their GPA affected by this behavior (current GPA was recorded as opposed to GPA prior to the start of the current academic year) and GPA would therefore be inappropriate to include into models. The strain educational aspirations variable does assess subjective dissatisfaction with previous academic performance and in a way accomplishes the same goal as introducing GPA into the models.

choice to engage in each type of behavior. Following these models, we explore the bivariate relationship between each Internet facilitated cheating analog item and its mirror.[7]

Results

Prevalence of Internet Facilitated Cheating and Other Academically Dishonest Behavior

Descriptive statistics (reported in Table 1) show that over half the students in the sample (58.1%) had engaged in at least one form of cheating or otherwise academically dishonest behavior. Further, one-quarter of the students self-report engaging a form of academic dishonesty considered severe (24.9%). At least one type of Internet facilitated cheating was reported by 37.8% of respondents. Similarly, 42.5% reported committing at least one of the technology free parallel behaviors.[8]

In order to determine which specific types of cheating are occurring in our classrooms and driving these results, we also looked at the distribution of each of the items.[9] Asking students in sections of a class taking tests earlier details about the test prior to taking it themselves is the most commonly reported violation (27.5%), but it is closely followed by cheating on web-based quizzes (26.7%). Other common reported violations include copying from another student during a test (19.5%), copying homework (19.3%), and working in groups on individual take home exams (16.7%). Even severe forms of cheating appear somewhat common. Within the present sample, 6% have used a cheat sheet, 5.2% have had others do their homework, 3% have had other students write entire papers, and 2.1% have purchased term papers from an online source. Fourteen students (2.6%) even report having or paying other students to take exams for them.

7. Since we cannot determine which form of cheating preceded the other from the available data, we can only report whether or not individuals engaged in both the Internet facilitated behavior and its analog, and cannot make any assumptions about one behavior affecting the other. We examine this topic as a direction for future research in the discussion section.

8. These numbers are lower than most estimates of academic dishonesty at universities in the literature. The authors believe this can be partially attributed to the sample population. The survey was administered at the flagship university of the state with substantially higher SAT scores than other institutions.

9. Though individual item response analyses are not the purpose of the present study, we report this information as a guide which may help faculty by alerting them to the forms of cheating which are most common among students in criminology courses. For the sake of parsimony and since different cheating behaviors may be differing deviant ways of reaching the same goal, we do not explore factors related to individual cheating types within the regression analysis, and instead use the composite measure. We do, however, return to single item comparisons in Table 4. For more information about measurement of academically dishonest behavior and specific forms of cheating, we refer the reader to Passow et al. (2006) and Akbulut et al. (2008).

Table 1 Descriptive statistics

	Mean	SD	Min.	Max.
Dependent measures				
E-cheating (dichot.)	.378	.485	0	1
E-cheating (cont.)	1.330	2.62	0	16
Parallel (dichot.)	.425	.495	0	1
Parallel (cont.)	1.408	2.482	0	16
Social learning measures				
Differential association	1.487	.602	1	4
Definitions	1.947	.925	1	5
Imitation	3.149	1.136	1	5
Diff. reinforcement (academic)	2.453	1.035	1	5
Diff. reinforcement (social)	2.354	.771	1	5
Low self-control	2.076	.411	1	4
Strain measures				
Perceived stress scale	2.781	.618	1	4.7
Perceived pressure	3.103	.678	1	5
Expectation–aspiration gap	2.953	.935	1	5
Controls				
Age	19.94	1.978	17	42
Gender (1 = male)	.324	.468	0	1
Race (1 = nonwhite)	.418	.494	0	1
Learning disability	.017	.129	0	1

Factors Associated with the Incidence of Internet Facilitated Cheating and Parallels

The first four models of Table 2 display results from a series of logistic regression models that examine theoretical construct's potential association with students choosing to use technology to cheat. The first model (labeled A) regresses E-cheating on social learning variables and relevant controls. Differential association, definitions, imitation, and differential expectations of social reinforcement all have positive and significant effects on the dependent variable.[10] The coefficient for differential expectations of academic reinforcement is in the expected direction, but it and the controls all fail to reach significance. Prior to adding variables associated with other theories into the social learning model to determine if these constructs retain significance, we ran

10. We choose not to discuss effects in terms of odds ratio since the units of the theoretical constructs do not have a clear intuitive meaning. We instead focus on the direction and significance of each coefficient (for similar reasons coefficients are presented in the tables rather than odds ratios). In addition, there seems to be no logical reason to compare effect sizes within a theory since each variable is a piece of the same theory. Such comparisons are therefore avoided.

Table 2 Logistic regression models predicting internet facilitated cheating and technology free parallel behaviors

	Internet facilitated cheating				Technology free parallel behaviors			
	A	B	C	D	E	F	G	H
Social learning measures								
Differential association	.389* (.17)	-	-	.375* (.17)	.468* (.17)	-	-	.422* (.17)
Definitions	.444* (.12)	-	-	.444* (.12)	.359* (.12)	-	-	.342* (.12)
Imitation	.220* (.10)	-	-	.216* (.10)	.318* (.10)	-	-	.332* (.10)
Diff. reinforcement (academic)	.198† (.11)	-	-	.186† (.11)	.078 (.10)	-	-	.039 (.11)
Diff. reinforcement (social)	.323* (.15)	-	-	.337* (.15)	.315* (.14)	-	-	.343* (.15)
Low self-control	-	.633* (.23)	-	.157 (.27)	-	.705* (.23)	-	.243 (.26)
Strain measures								
Perceived stress scale	-	-	.127 (.16)	-.079 (.18)	-	-	.248 (.16)	.079 (.17)
Perceived pressure	-	-	.067 (.15)	.186 (.16)	-	-	.140 (.15)	.206 (.16)
Expectation–aspiration gap	-	-	.089 (.11)	.046 (.12)	-	-	.193† (.11)	.189 (.12)
Controls								
Age	-.031 (.06)	-.056 (.05)	-.066 (.05)	-.031 (.06)	-.037 (.05)	-.065 (.05)	-.082 (.05)	-.049 (.05)
Gender (1 = male)	-.336 (.21)	-.242 (.20)	-.128 (.20)	-.328 (.22)	-.315 (.21)	-.272 (.20)	-.126 (.19)	-.295 (.22)
Race (1 = nonwhite)	-.016 (.20)	.036 (.18)	.034 (.19)	-.065 (.20)	.129 (.19)	.155 (.18)	.127 (.18)	.067 (.20)
Learning disability	-1.140 (.85)	-.876 (.83)	-.679 (.82)	-1.201 (.86)	-.161 (.73)	.018 (.70)	.190 (.71)	-.322 (.75)
Constant	-3.213	-0.626	0.023	-3.979	-2.882	-.465	-.396	-.322
Pseudo R^2	0.106	0.016	0.009	.110	.099	.020	.024	.114

Note. Coefficients are reported with standard errors in parenthesis. *$p < .05$, †$p < .10$.

individual models with low self-control and strains (labeled B and C, respectively) and the appropriate controls. Low self-control has a positive and significant coefficient in Model B indicating that those with low self-control are more likely to choose to engage in Internet facilitated academic dishonesty. None of the strain variables reach significance in Model C. The complete model which includes social learning measures, controls, and low self-control, and the measures of strain (Model D) has four significant independent variables: differential association, definitions, differential expectations of social rewards, and imitation (all in the direction anticipated by theory). Differential expectation of academic reinforcement and low self-control fail to reach significance.

Models E–H represent the same series of regressions as A–D with parallel cheating behaviors replacing Internet facilitated academic dishonesty as the dependent variable in each model. For the most part, it appears that the same factors that influenced the incidence and the frequency of cheating with technology also influence cheating without technology. The four social learning variables that were significant in the prediction of whether or not someone engaged in Internet facilitated cheating (differential association, definitions, imitation, and differential expectations of social rewards) are also significant predictors of whether a person reports having engaged in a parallel behavior in the basic model (Model E) and the full model (Model H) that controls for low self-control and strain variables. As was the case in the Internet facilitated models, low self-control had a significant effect on whether or not the individual committed a parallel behavior independent of learning variables (Model F), but had no effect in the full model (Model H). Strain variables and the demographic controls all lacked significant effects on this dependent variable.

The Frequency of Internet Facilitated Academic Dishonesty and Parallels

We now turn our attention to models exploring how frequently individuals choose to utilize technology to cheat by repeating the same series of predictors and replacing the dependent variable with the continuous measure of Internet facilitated academic dishonesty. Negative binomial regression models are displayed in Table 3.[11] In Model A, four of the five social learning measures have significant coefficients in the expected directions with imitation having no significant effect on how often an individual cheats. Low self-control has a significant effect in Model B as does the perceived stress scale in Model C. However, none of the other strain variables reach significance. In the final model, the four social learning measures significant in Model A (differential association, definitions, and both measures of differential reinforcement) each retain their significance. Imitation, low self-control, and each of the strain measures do not have significant effects. Of the control variables, only gender has a significant effect in the final model.

11. Zero inflated models were also estimated since a large portion reported no cheating. Results were substantively equivalent.

Table 3 Negative binomial regression models predicting internet facilitated cheating and technology free parallel behaviors

	Internet facilitated cheating				Technology free parallel behaviors			
	A	B	C	D	E	F	G	H
Social learning measures								
Differential association	.399* (.15)	-	-	.364* (.15)	.333* (.13)	-	-	.302* (.13)
Definitions	.389* (.10)	-	-	.359* (.10)	.445* (.09)	-	-	.419* (.10)
Imitation	.094 (.09)	-	-	.121 (.09)	.276* (.08)	-	-	.303* (.08)
Diff. reinforcement (academic)	.310* (.09)	-	-	.258* (.10)	.150† (.08)	-	-	.107 (.09)
Diff. reinforcement (social)	.306* (.13)	-	-	.319* (.13)	.256* (.12)	-	-	.264* (.12)
Low self-control	-	.909* (.23)	-	.353 (.22)	-	.762* (.21)	-	.297 (.21)
Strain measures								
Perceived stress scale	-	-	.400* (.17)	.081 (.15)	-	-	.297* (.15)	.026 (.14)
Perceived pressure	-	-	-.136 (.14)	.067 (.14)	-	-	-.055 (.13)	.101 (.13)
Expectation–aspiration gap	-	-	.197 (.11)	.057 (.10)	-	-	.199* (.10)	.131 (.09)
Controls								
Age	-.064 (.05)	-.110* (.05)	-.106† (.06)	-.066 (.05)	-.070 (.04)	-.096* (.05)	-.104* (.05)	-.079† (.05)
Gender (1 = male)	-.386* (.18)	-.279 (.20)	-.116 (.20)	-.426* (.19)	-.215 (.17)	-.151 (.18)	-.027 (.18)	-.260 (.17)
Race (1 = nonwhite)	-.059 (.17)	.073 (.18)	.162 (.19)	.010 (.17)	.141 (.15)	.113 (.16)	.153 (.17)	.094 (.16)
Learning disability	-.481 (.63)	-.169 (.71)	-.263 (.70)	-.607 (.64)	.318 (.53)	.505 (.60)	.947 (.59)	.221 (.55)
Constant	-1.798	0.577	1.046	-2.955	-1.755	.603	1.05	-2.858
	.060	.013	.010	.063	.060	.012	.011	.064

Note. Coefficients are reported with standard errors in parenthesis.*$p < .05$, †$p < .10$.

Models examining factors associated with the frequency of committing parallel behavior are displayed in Models E–H. As was the case for Internet facilitated academic dishonesty, definitions, differential association, and differential expectation of social reinforcement have significant coefficients both independent of and controlling for other theoretical constructs (Model E, H). Differences emerge with respect to the other two social learning constructs. Imitation, which had no effect on the frequency of Internet facilitated academic dishonesty, is significant in these models and differential expectations of academic rewards, which was significant, is insignificant independently and once other theoretical controls are entered into the model (Models E and H).

As was the case for Internet facilitated behaviors, low self-control and strain variables are insignificant when controlling for learning variables (Model H), but low self-control (Model F) and perceived student stress (Model G) have significant effects when regressed without learning variables. Unlike with E-cheating, strain due to differences in academic expectations and aspirations reached significance in Model G, but as was the case with all strain variables was insignificant in models that included learning variables.[12]

A Comparison of Internet Facilitated Academic Dishonesty and Parallels

It should be noted that the models presented earlier for E-cheating and the parallel behaviors were expected to be somewhat similar as many of those who have used technology to cheat may have also committed one of the parallel behaviors. We now turn to determining whether committing Internet facilitated academic dishonesty is associated with the parallel behaviors, both in whole and on a per item basis.[13] As shown in Table 4, of the 534 cases with complete data, 202 report some form of Internet facilitated academic dishonesty. Slightly over three-quarters of these (155) also report engaging in one of the parallel behaviors. Similar findings are apparent when single items are compared with their analogs. For each item, at least 45% of those that report engaging in the Internet facilitated behavior also report engaging in the parallel form of the behavior. The behavior that showed the most similarity with its analog was purchasing term papers; 91% of those who had purchased a term paper online had also purchased one from a fellow student. At the other end of the spectrum was cheating on web/take home quizzes with 47% of those

12. In order to be comprehensive, models were estimated using a scale of the 10 items that were neither Internet facilitated or the mirror of one of these behaviors as the dependent variable. Results were substantively equivalent to the models predicting the parallel behaviors. Similarly, a scale of all 20 cheating items produced congruent results.

13. Since the measures are cross-sectional and time ordering cannot be ascertained it would be inappropriate to make any arguments stating that one potentially caused the other or including one as a predictor of the other in the previous regression models. We simply examine the degree of overlap which may speak to the degree of specialization students have in their academically dishonest behaviors. Though there is substantial overlap between online and analogous, sufficient differences exist to warrant examining separate regression models as was previously done.

Table 4 Number of individuals that cheat by type and strategy ($N = 534$)

	Neither Internet facilitated nor parallel	Only Internet facilitated	Only parallel	Both Internet facilitated and parallel	w^2
Overall (at least one type)	260 (48.7)	47 (8.8)	72 (13.5)	155 (29.0)	155.71⁄
Purchasing papers	517 (96.8)	1 (0.2)	6 (1.1)	10 (1.9)	298.66⁄
Cheating on quizzes	372 (69.6)	73 (13.7)	25 (4.7)	64 (12.0)	119.80⁄
Plagiarism	454 (85.0)	19 (3.6)	17 (3.2)	44 (8.2)	240.91⁄
Utilizing test banks	362 (67.8)	25 (4.7)	100 (18.7)	47 (8.8)	59.45⁄
Copying homework	406 (76.0)	25 (4.7)	47 (8.8)	56 (10.4)	152.40⁄

⁄Percentage of sample engaging in behavior is listed in parenthesis. For each form, a 2×2 w^2 test indicated significant association between the cheating strategies.

that cheated on web-based quizzes reporting cheating on take home quizzes. Results seem similar when looking from the other direction, for all but one form of cheating (utilizing test banks), nearly or more than half report also engaging in the corresponding Internet facilitated behavior.

Discussion

Three robust findings emerge from the results. First, a large number of undergraduate students are utilizing technology to engage in Internet facilitated academic dishonesty. Within our sample, almost two out of every five had engaged in at least one form of E-cheating. Second, social learning constructs have significant positive effects on both Internet facilitated cheating and parallel cheating behaviors controlling for strain, low self-control, and demographics. Further, social learning measures are so closely related to each of these cheating behaviors, that the effects of low self-control and strain seen prior to adding social learning measures to the model are reduced to insignificance once these measures are included. Finally, there is a clear association between engaging in a specific type of E-cheating and its analog. While the cross-sectional data employed in the study prevents us from being able to determine if a specific time order pattern occurs, we should be concerned that engaging one form may increase the likelihood of engaging in the other. We will now discuss each of these findings sequentially in light of previous research prior to discussing the study's limitations, future directions,

and making suggestions that may help faculty avoid E-cheating in their classroom.

The prevalence of cheating within our sample (58.1%) was slightly lower than what has been found in other collegiate samples (see e.g. McCabe (2005) or Lester and Diekhoff (2002) which each report approximately 70% prevalence), but still indicates that dishonest behaviors are committed by over half of those within university classrooms within a given year. The discrepancy may be due to the university's specific policies or because the sample consisted of students in criminology courses as opposed to a general sample and these students may be more concerned with justice and law-abiding behavior than students in other fields. Further, nearly 40% of students are utilizing the Internet in some fashion to cheat. Previous works had suggested that these behaviors were less prevalent than we found them to be in our sample (see Lester & Diekhoff, 2002, which reports 12% prevalence). The higher rate may be related to technology becoming more abundant and user friendly in the last decade, which could enable more students to engage in Internet facilitated academic dishonesty. More recently, Stephens et al. (2007) reported a similar prevalence rate to the present study (49.8%), however direct comparisons between the two studies are problematic as Stephens et al. (2007) explored "digital cheat- ing" as opposed to "Internet facilitated cheating" and included items that would fall outside the operationalization of our dependent variable.[14] Overall, our work confirms the findings of previous studies and supports the conclusion that Internet facilitated cheating and academic dishonesty in general are major problems in university classrooms.

Though Internet facilitated cheating is likely to be a behavior committed in solitude, social learning theory provided the best explanation for this form of academic dishonesty. Four social learning constructs[15] had a significant effect on whether or not an individual reported E-cheating and also on the frequency with which they reported E-cheating. A number of works had shown support for social learning constructs in the explanation of cheating (Eve & Bromley, 1981; Lanza-Kaduce & Klug, 1986; Michaels & Miethe, 1989), but only one examined technology-assisted behaviors (Stephens et al., 2007). While the Ste- phens et al. (2007) study did demonstrate that peer's behaviors and values affected cheating using technology, it was not designed as a test of social learning theory. The present work, as the first full test of social learning the- ory and E-cheating, shows strong support for the theory. Definitions, differen- tial association, imitation, and differential expectation of social reinforcement were all significant predictors of *whether or not* an individual reported E-cheating. Additionally, definitions, differential association, differential

14. For example: Storing information in a calculator. This is a behavior that utilizes technology, but not the Internet.

15. We remind the reader that we examined separate measures for differential expectations of social reinforcement and differential expectations of academic reinforcement rather than a single differential reinforcement measure so five social learning measures were evaluated as opposed to four.

expectations of academic reinforcement, and differential expectation of social reinforcement were significant predictors of the *amount* of E-cheating. It is not unexpected for imitation to be insignificant for the frequency of the behavior as Akers (1998) predicts imitation becomes less important after the individual has first engaged in the activity.

While self-control, and to a lesser degree strain, was found to have a significant effect on Internet facilitated academic dishonesty in models without social learning constructs similar to those found in studies examining traditional forms of cheating (Cochran et al., 1998; Muraven et al., 2006), these factors were rendered insignificant by the inclusion of social learning constructs. This would seem to mirror patterns seen in other forms of deviance. As Akers and Sellers (2009, p. 99) note: "When social learning variables are included in integrated or combined models that incorporate variables from different theories, it is the measures of social learning concepts that have the strongest main and net effects."

Another key finding is that the predictors of Internet facilitated academic dishonesty and the technology free parallel behaviors are quite similar. More specifically, social learning constructs emerge as the key predictors of both. In addition, many of those that engage in E-cheating also report cheating in some other way and those that report a specific Internet facilitated behavior often report also committing that behavior's analog. This, along with the similar findings of Stephens et al. (2007), would seem to indicate that, in a population where technology is readily available, that efforts to change one behavior would also affect the other. Definitions favorable to academic dishonesty in general are likely to affect both forms of cheating so helping students develop respect for academia and belief in academic integrity should reduce each form of cheating. Similarly, perceiving peers to be academic dishonest may increase each behavior so altering the perception that cheating is rampant and socially acceptable may affect each form of academic dishonesty.

Limitations and Future Directions

As data collection was cross-sectional, the relationship between Internet facilitated cheating and the parallel behaviors cannot fully be unraveled. The current findings point to similar factors affecting the likelihood and frequency of each, but leave open the question of whether E-cheating is a replacement, analogous, or gateway cheating behavior. It may simply be that the same underlying propensity and learning mechanisms affect both. However, it may be that students who have successfully cheated using parallel behaviors may over time replace those with more efficient E-cheating techniques. Similarly, E-cheating may be an easy way and accessible way to begin cheating and act as a gateway to both parallels and more severe forms of cheating. Determining which of these is most accurate may assist in designing educational activities in a way which best discourages E-cheating and the parallels. It is suggested

that future research employ multiwave data or segmented retrospective data to determine the temporal relationship of these behaviors.

As academic dishonesty plagues elementary and high schools as well as universities, it is recommended that future research attempt to determine if the relationship between E-cheating and parallel cheating behaviors is consistent throughout adolescence and young adulthood. Research focused on a younger population may suggest that the recommendations for dealing with E-cheating at the collegiate level could be helpful for those teaching at secondary schools. We also suggest that future research attempt to determine if there is a relationship between E-cheating and other forms of technology-based deviance such as hacking, identity theft, software piracy, or cyberbullying.

Avoiding E-Cheating in Your Classroom

As a solution to the problem, Renard (1999) asserts we need to be proactive in preventing this behavior, rather than reactive through punishment. Moreover, Akers has stated an environment with positive reinforcement (i.e. encouragement for participating in ethical academic procedures) produces definitions of acceptable behavior for a person and their peer group. In others words, if educators perform simple steps to curb the cheating (whether traditional or E-cheating) before it begins, this will become the standard for students in an academic setting. There are several things educators can do to be proactive against cheating.

First, creating unique assignments reduces the likelihood of students recycling a peer's paper from a previous semester or purchasing one online. Though they may ask a peer to help with authoring new material that fits the assignment or order a custom paper online, the costs (both social and financial) are likely to be much more prohibitive. When attempting to design "plagiarism resistant" assignments, instructors should make themselves aware of the availability of related papers online. They should then create assignments that differ from these and require students to incorporate lecture material and either personal or local knowledge in their responses. This may lead to assignments that are less amenable to downloading and/or purchase.

Educators are also suggested to use online tools for educational rather than assessment purposes. Online quizzes specified as "open book" that are designed to cause the student to seek out answers and new information are preferable as to those that simply ask them to resuscitate information covered in class and readings. Students should be encouraged to utilize resources and continue to attempt the assignment (or different forms of it) until they do so successfully. In this way, the impetus to cheat is removed while the online tool is still used to further learning. We suggest similar alterations to the philosophy of minor homework assignments and class projects. These works should be used to encourage students to work, either individually or as a group, to obtain knowledge through completing an assignment and not as a way of differentiat-

ing student grades. Assessment can then occur in the classroom setting, where educators have more control over the environment. If it is the case that E-cheating operates as a gateway to other cheating behaviors, removing the opportunity to cheat in this way may lessen both forms of cheating.

On an institutional level, both forms of cheating may be deterred by efforts directed at attempting to modify perceptions of peer behavior. Akers would argue that the most powerful factor influencing one's definitions and behaviors are the behaviors of peers and this study showed a clear relationship between perceived peer behavior and one's own cheating. If students are incorrectly overestimating the frequency of cheating among their peers as is the case for many minor deviant behaviors (Miller, Boman, & Stogner, in press) and this misperception is influencing them towards cheating, then programs aimed at modifying perceptions would likely reduce the incidence of cheating. Similar efforts are being undertaken on collegiate campuses related to binge drinking with the assumption that if the overestimation of peer misbehavior is remedied then the occurrence of the behavior will further decrease.

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