FACTORS INFLUENCING ENGINEERING STUDENTS' DECISIONS TO CHEAT BY TYPE OF ASSESSMENT

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Academic dishonesty (cheating) has been prevalent on college campuses for decades, and the percentage of students reporting cheating varies by college major. This study, based on a survey of 643 undergraduate engineering majors at 11 institutions, used two parallel hierarchical multiple regression analyses to predict the frequency of cheating on exams and the frequency of cheating on homework based on eight blocks of independent variables: demographics, pre-college cheating behavior, co-curricular participation, plus five blocks organized around Ajzen's Theory of Planned Behavior (moral obligation not to cheat, attitudes about cheating, evaluation of the costs and benefits of cheating, perceived social pressures to cheat or not to cheat, and perceived effectiveness of academic dishonesty policies). The final models significantly predict 36% of the variance in "frequency of cheating on exams" and 14% of the variance in "frequency of cheating on homework". Students don't see cheating as a single construct and their decisions to cheat or not to cheat are influenced differently depending on the type of assessment. Secondary findings are that a student's conviction that cheating is wrong no matter what the circumstances is a strong deterrent to cheating across types of assessment and that a student who agrees that he/she would cheat in order to alleviate stressful situations is more likely to cheat on both exams and homework.

KEY WORDS: cheating; examinations; homework; theory of planned behavior; engineering; higher education.

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INTRODUCTION

Academic dishonesty, or cheating, is widespread on college campuses throughout the United States (McCabe and Drinan, 1999). Reported percentages vary widely, although the percentages remained consistent over 30 years in the only known replication study. In 1993, McCabe worked with Bowers to resurvey nine of the schools that Bowers had surveyed in 1963. Although Bowers received responses from 5422 students at 99 institutions, the subset of these at the nine schools that McCabe resurveyed consisted of 452 responses (D.L. McCabe, personal communication, April 1, 2002). This study, replicated over time, indicates that the *percentage* of undergraduates self-reporting engagement in various cheating behaviors during college has not changed substantially from Bower's 1963 survey (82% of 452 respondents) to McCabe and Trevino's 1993 survey (84% of 1793 respondents) (McCabe, 1997). The steady percentage of self-reported cheating has been substantiated by a meta-analysis (Brown and Emmett, 2001) and an additional study (Spiller and Crown, 1995). However, the *severity* of the cheating has increased substantially. McCabe (1997) offers examples:

> For example, students admitting to copying from another student on an examination doubled from 26% to 52% between 1963 and 1993. Instances of helping someone else cheat on an examination and the use of crib notes each increased more than 50%. McCabe and Trevino also observed a four-fold increase (from 11% to 49%) in the number of students who admitted they had collaborated on assignments when the instructor had specifically asked for individual work. (p. 435)

Ten studies indicate that the *percentage* of undergraduates reporting engagement in various cheating behaviors differs by college major (Baird, 1980; Bowers, 1964; Brown, 1996; Harp and Taietz, 1966; Jackson, Levine, Furnham, and Burr, 2002; McCabe, 1997; Newstead, Franklyn-Stokes, and Armstead, 1996; Rawwas and Isakson, 2000; Roberts, Anderson, and Yanish, 1997; Shaughnessy, 1988). The findings are consistent: percentages of undergraduates reporting cheating are highest for those enrolled in "vocationally oriented majors such as business and engineering" (McCabe, 1997, p. 444), where business majors report the highest levels. McCabe collected survey data from 1,946 undergraduates at 16 highly selective institutions in 1995–1996, including questions about engagement during college in five different cheating behaviors on examinations, four different cheating behaviors on writing assignments, plus collaboration with other students on assignments when the instructor wanted individual work. Percentages of students reporting *any type* of cheating on the survey differed significantly

($p < .05$) by college major: business (91%), engineering (82%), social sciences (73%), and natural sciences (71%).

The prevalence and increasing severity of cheating should be distressing to educators because of their implications. First, most U.S. colleges and universities have a mission that includes preparation for citizenship, character development, moral leadership, and/or service to society; each of these has a moral dimension (King and Mayhew, 2002; Whitley and Keith-Spiegel, 2002). Prevalent undergraduate cheating undermines efforts to accomplish such missions. Also, in professions such as engineering, there is a growing, nationwide emphasis on graduating students who understand professional and ethical responsibility (Stark and Lattucca, 1997). Prevalent academic dishonesty indicates that many students will approach learning experiences in professional ethics with attitudes and habits that may interfere with their learning. Thus, interventions that effectively encourage a student not to cheat during college could help institutions fulfill their missions.

Second, acts of academic dishonesty undermine the validity of measures of student learning. This, in turn, interferes with faculty's ability to correctly diagnose gaps in student learning for the purpose of both re-teaching current students and re-designing instruction for future students. Whitley and Keith-Spiegel (2002) make related claims that cheating undermines equity in grading and the mission to transfer knowledge. Third, there are several costs to the entire educational enterprise that result from high levels of cheating. Student and faculty morale, the reputation of the institution, and public confidence in higher education are all damaged by rampant cheating, especially when it is ignored by faculty and administrators (Whitley and Keith-Spiegel, 2002). Any interventions that effectively encourage a student not to cheat during college could increase the validity of measures of student learning and also reduce damage to morale, institutional reputations, and public confidence in higher education.

Fourth, research has shown that students who cheat in college are more likely to cheat in graduate and professional schooling (Baldwin, Daugherty, Rowley, and Schwartz, 1996), to engage in unethical workplace behavior (Harding, Carpenter, Finelli, and Passow, 2003, 2004; Hilbert, 1985; Nonis and Swift, 2001; Ogilby, 1995; Sims, 1993; Todd-Mancillas, 1987), to shoplift (Beck and Ajzen, 1991), to cheat on income taxes (Fass, 1990), and to abuse substances (Blankenship and Whitley, 2000; Kerkvliet, 1994). For college graduates whose workplace had a strong corporate code of ethics, employees whose undergraduate school had an honor code were less likely than graduates of non-code schools to report engaging in unethical workplace behavior (McCabe, Trevino,

and Butterfield, 1996). Note that much lower rates of cheating are reported by students at honor code schools (McCabe and Trevino, 1993). All of these correlations, though not known to be causal, raise the possibility that interventions that effectively encourage a student not to cheat during college could reduce the frequency of his or her decisions to engage in other unethical behavior during college and beyond.

These four implications of the prevalence and severity of cheating have inspired a substantial body of research on cheating among college students. Eleven reviews (including three meta-analyses) of college cheating behavior have been published since 1977 (Brown and Emmett, 2001; Bushway and Nash, 1977; Cizek, 1999; Cole and McCabe, 1996; Crown and Spiller, 1998; Dowd, 1992; Kibler, 1993; McCabe, Trevino, and Butterfield, 2001; Whitley, 1998; Whitley and Keith-Spiegel, 2002; Whitley, Nelson, and Jones, 1999). There are three veins of published studies, addressing three different overarching goals: (1) documenting the *prevalence* of college student cheating to establish the importance of the problem, (2) understanding the factors that influence students' decisions to cheat (or *correlates* of cheating), and (3) informing faculty and institutional *policy* for preventing cheating and for handling cheating incidents when they occur. As will be explained in the literature review, most literature pertaining to *policy* separates the construct of cheating into more specific behaviors on specific types of assessments, such as plagiarism on term papers and copying answers from other students on homework (Cizek, 1999; Whitley and Keith-Spiegel, 2002). However, most studies aimed at documenting *prevalence* and understanding *correlates* of cheating combine cheating behaviors on an assortment of assessments into a single measure of cheating, presenting an unfortunate obstacle to informing policy.

The purpose of our survey study was to understand the factors that explain the frequency of cheating by undergraduate engineering students on two types of assessments: exams and homework. To this end, we identified two dependent variables for use in this study: frequency of cheating on exams and frequency of cheating on homework. The blocks of independent variables used in the two analyses were demographics, pre-college cheating behavior, co-curricular participation, plus five blocks organized around the theory of planned behavior (Ajzen, 1991; Beck and Ajzen, 1991): moral obligation not to cheat; attitudes about cheating; evaluation of the costs and benefits of cheating; perceived social pressures to cheat or not to cheat; and perceived effectiveness of academic dishonesty policies. The sample selection controlled for the students' major. A secondary purpose of our study was to test Ajzen's theory of planned behavior (TPB) for predicting cheating behavior.

Hierarchical multiple regression analyses were performed to determine how blocks of variables organized around the TPB work together to predict the two dependent variables.

LITERATURE REVIEW

In this section, we explain how we selected the TPB for organizing our independent variable in our respective models, and we describe the constructs in the theory and the construct we use to modify the basic theory. Next, we explain why we selected dependent variables based on the type of assessment by showing how the TPB, previous empirical work on cheating, and policy discussions pertaining to cheating all indicate that a decision to cheat is highly affected by the type of assessment. Then, we describe how we selected independent variables guided by the TPB and previous research on cheating. Finally, we share our rationale for selecting a sample composed entirely of engineering undergraduates.

The Theory of Planned Behavior

Two recent reviews of cheating among *college students* (Crown and Spiller, 1998; Whitley, 1998) each cite over 100 relevant studies published from 1970 to 1997. Only a few of the studies have used a theoretical framework to explain or predict cheating among college students. Theoretical frameworks used include models of deviance (used by Genereux and McLeod, 1995; Liska, 1978; Michaels and Miethe, 1989), deterrence theory (used by Buckley, Wiese, and Harvey, 1998; Cochran, Chamlin, Wood, and Sellers, 1999), cognitive consistency theory (used by Tang and Zuo, 1997), moral development models (used by Lanza-Kaduce and Klug, 1986; Whitley and Kost, 1999), rational choice theory (used by Buckley et al., 1998; Cochran et al., 1999; Tibbetts, 1997), anomie (used by Caruana, Ramaseshan, and Ewing, 2000), and the theory of planned behavior (used by Beck and Ajzen, 1991; Genereux and McLeod, 1995; Nonis and Swift, 2001; Whitley, 1998) or its earlier version, the theory of reasoned action (used by Pratt and McLaughlin, 1989). Because a number of researchers have demonstrated its applicability to academic cheating, we used the theory of planned behavior (Ajzen, 1991; Beck and Ajzen, 1991) as the theoretical framework for organizing our independent variables in our models.[1]

Ajzen's[2] theory of planned behavior (TPB) postulates that human behavior is guided by rational decisions that are influenced by both the intention to perform the behavior and also a perception of control over

the behavior (Ajzen, 1991). Intention is determined by three components: (1) attitude toward a behavior (Attitude), (2) perceived social pressures to engage in or not engage in the behavior (Subjective Norms), and (3) the perceived ease of performing the behavior (Perceived Behavioral Control). Note that beliefs are the antecedents of attitude, subjective norms, and perceived behavioral control. ''Beliefs about the likely [positive and negative] consequences or other attributes of the behavior (behavioral beliefs)'' (Ajzen, 2002, p. 665) produce the attitude toward the behavior. ''Beliefs about the normative expectations of other people (normative beliefs)'' (p. 665) lead to subjective norms, and ''beliefs about the presence of factors that may further or hinder performance of the behavior (control beliefs)'' (p. 665) result in perceived behavioral control. Further, perceived behavioral control is theorized to have a direct influence on *both* actual behavior and intention. The direct influence of perceived behavioral control on actual behavior allows for the study of behaviors that are not under the complete volitional control of the individual (Ajzen, 2002). Despite substantial support for the TPB as a means of predicting actual behavior (Armitage and Conner, 2001), research continues to examine variables that might enhance the predictive capabilities of the theory (Conner and Armitage, 1998). For example, Beck and Ajzen concede that ''understanding the determinants of dishonest behaviors can be more problematic than understanding performance of socially acceptable behaviors'' (1991, p. 300). They propose that factors in addition to those encompassed by the TPB, such as moral obligation, may be critical in understanding cheating and other dishonest behaviors. We include moral obligation as a modifying construct in the TPB for the purpose of organizing our independent variables.

Rationale for the Selection of Dependent Variables

The TPB implies that the precursors of intention to act will vary by situation, and consideration of each construct (attitude, subjective norms, and perceived behavioral control) for different assessment situations, such as exams and homework assignments, reveals that type of assessment should greatly affect each construct in the TPB resulting in different behaviors. This notion that the type of assessment will greatly affect behavior has been verified by multiple veins of literature as described below and is the basis for the selection of our dependent variables: frequency of exam cheating and frequency of homework cheating.

Empirical Evidence that Prevalence of Cheating is Affected by the Type of Assessment

Several studies have reported on *prevalence* of cheating separately *by type of assessment*, finding differences in rates of engagement by assessment type (e.g., Baird, 1980; Bowers, 1964; Brown, 1996; Diekhoff et al., 1996; Hanson, 1990; Jensen, Arnett, Feldman, and Cauffman, 2002; McCabe, 1997; Michaels and Miethe, 1989; Stearns, 2001; Storch and Storch, 2002; data from McCabe's 1993 study reported in Whitley and Keith-Spiegel, 2002). Also, research has shown that two components of the TPB as applied to cheating differ by type of assessment: attitudes and perceived behavioral control. In the realm of attitude toward cheating behavior, two types of attitudes have been shown to differ by type of assessment, specifically, general attitudes (Jordan, 2001; Lipson and McGavern, 1993; Michaels and Miethe, 1989; Newstead et al., 1996; Nuss, 1984; Thorpe, Pittenger, and Reed, 1999) and evaluation of costs, benefits, and risks (Jensen et al., 2002; Lipson and McGavern, 1993; Michaels and Miethe, 1989). In the realm of perceived behavioral control, the ease or difficulty of performing the behavior has been shown to differ by type of assessment (Lipson and McGavern, 1993). Although several studies have addressed perceived social pressures (subjective norms in the TPB) (e.g., Jordan, 2001; Newstead et al., 1996; Whitley and Kost, 1999), none were found that report pressures by type of assessment.

Further evidence that prevalence of cheating is affected by the type of assessment is provided by 30-year trends. In a 1993 study, McCabe, et al. (2001) replicated a 1963 survey (Bower, 1964) of nine state universities. McCabe et al. found that while the number of students reporting that they had copied on a test or exam doubled from 26% to 52%, the number who admitted to plagiarism declined slightly from 30% to 26%. Over the same period, the number of students who said that they had done un-permitted collaboration on assignments more than quadrupled from 11% to 49%. If the percentages had all risen or fallen in tandem, even if their values differed in magnitude, the data might have indicated that these different behaviors could and should be investigated as a single phenomenon. However, some fell as others rose and the changes occurred at different rates, which indicates that these behaviors are controlled by different mechanisms and should be studied separately.

Treating "Cheating" as a Unitary Construct: A Flaw in Previous Research

Thus, the TPB and empirical evidence both indicate that a decision to cheat is highly affected by the type of assessment. As we explain in this section, research on academic dishonesty, or cheating, has often suffered

from the indiscriminant combination of widely varying behaviors that are fundamentally different. In this statement, we make two claims: (1) indiscriminant combination of behaviors is common in the literature, and (2) indiscriminant combination of behaviors is a problem because it treats fundamentally different behaviors as unitary. Woven into our support for these claims, we supply evidence for the indiscriminant combination of behaviors in two of the three main veins of cheating research: *prevalence* and *correlates* of cheating. We also discuss the third vein—*policy*.

A direct illustration of combining multiple behaviors into a single measure of cheating is Brown and Emmett's (2001) review of empirical studies of the *prevalence* of cheating among college students. They identified 22 studies, published over 33 years, which simply summed responses for separate behaviors (2 to 36 behaviors, mean = 11.5) to create a single measure: "overall level of cheating" (p. 531). In the study that included 36 different behaviors (Stern and Havlicek, 1986), three of the specific behaviors are "copying from another student during a quiz or examination" (p. 133), "working in a group on a homework assignment that was assigned as individual work" (p. 134), and "'making up' sources for bibliographic citation" (p. 134). Respondents were asked about attitudes toward each behavior (i.e., whether or not the behavior is "academic misconduct" (p. 131)) and also about engagement in the behavior (i.e., whether or not the respondent had "done this at least once while in college" (p. 131)). Students classified the behaviors differently: for one of the 36 behaviors, 7% classified it as misconduct while for another behavior 96% classified it as misconduct. Despite the wide range in perceptions about the behaviors, all 36 were combined into a single measure of "frequency of misconduct" (p. 138).

A second illustration of combining multiple behaviors into a single measure of cheating is Whitley's (1998) meta-analysis of empirical studies of *correlates* of cheating among college students. For the 107 studies reviewed, Whitley created a single dependent measure of prevalence of "cheating" by combining 19 estimates of total cheating, 36 estimates of examination cheating, 12 estimates of homework cheating, and 9 estimates of plagiarism.

Such decisions to combine behaviors on all types of assessments into a single prevalence measure is typical of correlates research on cheating (e.g., Baird, 1980; Deikfhoff et al., 1996; Jordan, 2001; McCabe and Trevino, 1997; Tang and Zuo, 1997). Typically, researchers choose to create a single prevalence measure as the dependent variable by combining all cheating behaviors, regardless of the type of the assessment.

There is a notable exception to this trend of combining *all* behaviors into a single dependent variable. In a correlates study of cheating

among college students, Pratt and McLaughlin (1989) used factor analysis on 26 behaviors relating to assessments such as examinations, homework, and writing term papers to create four separate dependent variables relating to "obtaining help in an examination situation" (p. 203), "obtaining help outside of a test situation" (p. 203), "obtaining unfair credit...in nontest situations" (p. 203–204), and directly substituting for an assessment, such as one person taking an examination for another or submitting a paper that someone else wrote. They found that "different path models fit different types of behaviors" (p. 214) for the 323 undergraduates in this multi-institutional study, substantiating our claim that prevalence of cheating is affected by type of assignment.

Summary: Why Research Should Distinguish Between Types of Assessments

The TPB and empirical evidence both indicate that a decision to cheat is highly affected by the type of assessment. Yet in two of the primary veins of cheating research, *prevalence* and *correlates* of cheating, cheating behaviors have almost always been combined indiscriminately. Recently concerns have been raised about this common practice by Crown and Spiller (1998), Whitley (1998), and Thorpe, et al. (1999) "treating all cheating behaviors as a whole may ignore important interactions among variables" (1999, p. 57).

In the third primary vein of cheating literature, *policy* pertaining to cheating, classifications by type of assessment dominate discussions in areas such as prevention and detection, policy, working definitions, and strategies for teachers who must deal with academic dishonesty (Cizek, 1999; Lipson and McGavern, 1993; Whitley and Keith-Spiegel, 2002). This dominance of categorization by type of assessment is echoed in two schemes for categorizing cheating behaviors. Pavela's (1978) scheme distinguishes between two broad classes of *assessments*—"cheating" and "plagiarism"—in addition to two types of *behavior*—"facilitation" and "fabrication". Whitley and Keith-Spiegel (2002) extend Pavela's categories by specifying type of assessment, such as cheating on examinations and cheating on assignments. Collectively, studies in all three veins of cheating research demonstrate the need to use distinct dependent variables for each type of assessment in any research on cheating behavior.

Thus, to evaluate whether the prevalence of cheating is affected by type of assessment, we separated our analyses by type of assessment. Of the many available types of assessments, we chose two dependent variables: *frequency of cheating on exams* (an index of nine exam cheating behaviors from our survey) and *frequency of cheating on homework* (an index of four homework cheating behaviors) (Table 1). We selected

TABLE 1. Dependent Variables for the Regressions (with Student's Categorizations of Behaviors)

Dependent Variables	Definition of cheating		
	"Cheating"	"Unethical but not cheating"	"Neither"
Frequency of cheating on exams—Index of each student's self-reported cheating on *exams* as a college student			
Copying from another student during a test or quiz	96.0%	2.9%	1.2%
Permitting another student to look at your answer during a quiz or exam	72.7%	23.7%	3.6%
Asking another student about questions on an exam that you have not yet taken	27.0%	45.5%	27.4%
Copying from an unapproved reference sheet during a closed book test/ quiz	91.6%	6.1%	2.3%
Taking an exam for another student	92.0%	6.0%	2.0%
Witnessing a case of cheating in a class and not reporting it to the instructor	9.4%	59.4%	31.1%
Storing answers to a test in a calculator or Personal Digital Assistant (PDA)	73.6%	16.1%	10.2%
Working in groups on web-based quizzes	41.2%	28.1%	30.0%
Working in groups on take-home exams	39.5%	28.4%	32.1%
Frequency of cheating on homework—Index of each student's self-reported cheating on *homework* as a college student			
Copying an old term paper or lab-report from a previous year	60.8%	26.4%	12.8%
Copying another student's homework when it is not permitted by the instructor	72.5%	22.9%	4.6%
Copying a passage out of the textbook for homework assignments	19.5%	36.9%	43.7%
Submitting or copying homework assignments from previous terms	52.4%	30.5%	17.1%

exams and homework because they are the backbone of assessment in many mathematics, science, and engineering courses. Surprisingly, homework cheating behaviors have almost never been distinctly included in cheating surveys. We selected only behaviors that at least 50% of the respondents defined as either "cheating" or "unethical but not cheating" because previous research has shown that *cheating* is difficult to define (e.g., Kibler, Nuss, Paterson, and Pavela, 1988; Ratner, 1996) and that students often do not define a behavior as cheating even when faculty do (e.g., Stern and Havlicek, 1986; Whitley and Keith-Spiegel, 2002).

Rationale for the Selection of Independent Variables

Our 139-item survey was designed based on a review of literature on academic dishonesty (Carpenter, Harding, Montgomery, and Steneck, 2002; Harding, Carpenter, Montgomery, and Steneck, 2001). For our analysis, we selected 37 items (Table 2) for our independent variables. Thirty-three individual items refer to cheating in general with no possible reference to any particular type of assessment. Another four items used as independent variables are a matched set: two refer unambiguously to exam cheating and two have parallel wording but refer to homework. Only the two exam items were used as independent variables in the exam cheating model, and only the two homework items were used as independent variables in the homework cheating model. The selected independent variables were organized into eight blocks according to demographics, pre-college cheating behavior, co-curricular participation, and five blocks organized around the TPB. As noted below, variables were checked for effect size (small, medium, or large) and statistical significance in Whitley's (1998) meta-analysis, which was also based on the TPB. All correlations listed below are from Whitley (1998) unless otherwise noted.

The *demographics* block is composed of age (negative correlation, medium effect), gender (males more likely, small effect), socioeconomic status (parental education—positive correlation, small effect in a single study), year in college (no correlation), and grade point average (negative correlation, small effect). Our *pre-college cheating behavior* block is a single variable, frequency of high school cheating (related to Whitley's "have cheated in the past" (p. 257), positive correlation, large effect). Variables in the *co-curricular participation* block are membership in a fraternity or sorority (positive correlation, small effect) and involvement in clubs, teams, professional societies, or community service organizations (positive correlation, small effect).

There are five blocks of independent variables organized around our theoretical framework: the TPB. Our purpose was to organize our study

TABLE 2. Independent Variables Used in Regression to Predict Frequency of Cheating

Theoretical Construct	Independent Variables	Values
Demographics	Age	Continuous self-report
	Gender	Male, female
	Socioeconomic status (Highest parental education level)	6 education levels
	Year in college	First year, second year, third year, fourth year, fifth year or more
	Grade point average	Continuous self-report
Pre-college cheating behavior	How often did you cheat in high school?	4-point frequency scale[a]
Co-curricular participation	Do you belong to a fraternity or sorority?	Yes, no
	Do you participate in any clubs, student teams, professional societies, or community service organizations?	Yes, no
Moral obligation not to cheat	See Table 4 for description of factor, *moral obligation not to cheat*	Factor made up of 9 items on 5-point agreement scale[b]

Attitudes about cheating (Corresponds with *attitude* in the theory of planned behavior (TPB))	See Table 4 for description of factor, *diffusion of responsibility for cheating to external sources*	Factor made up of 2 items on 5-point agreement scale[b]
	See Table 4 for description of factor, *personal responsibility for cheating*	Factor made up of 3 items on 5-point agreement scale[b]
Evaluation of the costs and benefits of cheating (TPB: *attitude*)	How would you rate your course load in an average term?	Light, average, heavy
	Do you think that you have heavy family responsibilities?	Yes, no
	How many hours/week do you work at a non co-op job during a school term?	Continuous self-report
	What is your primary method of paying for your education?	Paying own way, scholarship, parents paying
	See Table 4 for description of factor, *situational cheating*—the predicted decision to cheat in situations when the benefits outweigh the costs	Factor made up of 4 items on 5-point agreement scale[b]
Perceived social pressures to cheat or not to cheat (TPB: *social norms*)	Prediction of consequence-embarrassment: Most of the people whose opinion I value would lose respect for me if they found out I had benefited from looking at my neighbor's exam.*	3-point agreement scale[c]
	Deterrent effect-embarrassment: This potential loss of respect would prevent me from looking at my neighbor's exam.*	3-point agreement scale[c]

TABLE 2. (*Continued*)

Theoretical Construct	Independent Variables	Values
Perceived effectiveness of academic dishonesty policies (TPB: *perceived behavioral control*)	Do students and faculty understand academic policies of institution?	3-point likelihood scale[d]
	Do faculty support academic dishonesty policies of institution?	3-point likelihood scale[d]
	Do academic dishonesty policies at institution deter cheating?	3-point likelihood scale[d]

[a]Frequency scale (1 = never, 2 = once, 3 = a few times, 4 = frequently).
[b]Agreement scale (1 = disagree strongly, 2 = disagree somewhat, 3 = neutral, 4 = agree somewhat, 4 = agree strongly).
[c]Agreement scale (1 = disagree, 2 = not sure, 3 = agree).
[d]Likelihood scale (1 = not at all, 2 = somewhat, 3 = a lot).
*Wording for this item varies depending on the dependent variable (either exam or homework) but the two wordings of the parallel items are identical other than the type of assessment.

around a theoretical framework that previous research has shown is useful in describing cheating behavior. We separated the block that we named *moral obligation not to cheat* (negative correlation, medium effect) from attitudes about cheating per Beck and Ajzen's (1991) adjustment to the TPB when applied to dishonest behaviors. This block was a single factor composed of nine items.

We split the TPB construct of attitude into two blocks. One block, general *attitudes about cheating*, is composed of two factors on attitudes about responsibility for cheating. Although Whitley's meta-analysis includes a number of attitudes about cheating, some of which have large effects, our survey items did not match the essence of his constructs, and so cannot be compared directly. In another block, *evaluation of the costs and benefits of cheating*, we include pressures that students typically experience: course load (positive correlation, medium effect); family responsibilities (this apparently pertinent pressure was not included in Whitley's meta-analysis); employment responsibilities (Whitley included an odd dichotomous variable from fewer than five effect sizes. His finding, a small effect, was that students employed less than full time were more likely to cheat.); and means for financing education (students "supported by their parents" (p. 257) were more likely to cheat than an undefined reference case, small effect). Also included in this block is a factor of four items that propose a situation in which the respondent would be under pressure and ask for a prediction of a decision to cheat or not. These items embody several effects in Whitley's meta-analysis (p. 257–258): "feel pressure to get high grades" (positive correlation, medium effect), are "faced with important outcomes" (positive correlation, medium effect), "perceive a higher benefit-to-risk ratio" (positive correlation, medium effect), and "perceiving higher competition for grades" (positive correlation, medium effect).

The block corresponding to the TPB's subjective norms is *perceived social pressures to cheat or not to cheat*. In this block, we include predicted feelings of embarrassment after a decision to cheat and the deterrent effect of those predicted feelings (oppositely related to Whitley's "perceive that norms allow cheating" (p. 257) which had a positive correlation, large effect).

Our survey's only reference to the TPB construct of perceived behavioral control was three items referring to *perceived effectiveness of academic dishonesty policies*. In this block, we include three items about student and faculty understanding of academic dishonesty policies, faculty support for those policies, and the deterrent effect of those policies. Related items in Whitley's meta-analysis are: subjection to honor codes (negative correlation, medium effect) and "expect less punishment if caught" (p. 258) (positive correlation, small effect).

Rationale for the Selection of the Sample

Our sample, comprised entirely of engineering undergraduates at eleven institutions, is appropriate for our analysis for three reasons. First, because students in different majors engage in cheating at different rates, using a sample of students exclusively from one area of study controls for students' major. Second, engineering students self-report higher frequencies of cheating than all other majors except for business majors, yet, other than our own research (Carpenter et al., 2002; Carpenter, Harding, Montgomery, Steneck, and Dey, 2002; Finelli, Harding, Carpenter, and Passow, 2003; Harding, 2000, 2001; Harding, et al., 2001; Harding, Carpenter, Montgomery, and Steneck, 2002; Harding et al., 2003, 2004), we know of only nine studies of cheating have specifically distinguished engineering students from students in other majors (Bowers, 1964; Brown, 1994, 1996; Harp and Taietz, 1966; McCabe, 1997; Newstead et al., 1996; Shaughnessy, 1988; Singhal, 1982; Sisson and Todd-Mancillas, 1984). Of these, only Bowers (1964) and McCabe (1997) conducted multi-institutional studies. Third, the importance of studying cheating among engineering undergraduates (100% of our sample) is heightened by nationwide emphases among engineering faculty on assessing student learning outcomes and explicitly teaching professional ethics. Both of these emphases were codified in changes to the nationwide accreditation requirements for engineering programs (Moore, 1996) and are still in effect (Engineering Accreditation Commission, 2004).

Rationale for Using Blocked-Hierarchical Analysis

We had two goals for our analysis: (1) to allow comparison of the *patterns* in the relationships between the independent variables and the two dependent variables and (2) to test Ajzen's TPB for predicting cheating behavior. By entering variables into the models in hierarchical blocks, we achieved both goals.

RESEARCH QUESTIONS

Altogether, the TPB includes the three elemental constructs of attitude, subjective norms, and perceived behavioral control. For dishonest behaviors such as cheating, moral obligation is an additional construct in the theory. We used the TPB, which has proven effective in describing cheating behavior, as a theoretical framework for organizing our

independent variables in our models. Based on the items in our survey, we represented TPB constructs with five blocks of variables: moral obligation not to cheat; attitudes toward cheating; evaluation of the costs and benefits of cheating; perceived social pressures to cheat or not to cheat; and perceived effectiveness of academic dishonesty policies. Our research addressed three questions:

1. Which of the constructs represented by these five blocks of variables predict the frequency of *cheating on exams* among engineering students?
2. Which of the constructs represented by these five blocks of variables predict the frequency of *cheating on homework* among engineering students?
3. Among engineering students, what are the *differences in the predictive power* of these constructs for cheating on two different types of assessments: *exams* and *homework*?

METHODS

Data Collection

Survey Instrument, Distribution, and Collection

Our study is based on data collected during the 2001 calendar year using a direct-question survey. After a review of studies of college cheating (Carpenter et al., 2002), the survey was designed to identify perceptions and attitudes about cheating on the types of assessments typical in engineering curricula, including exams, homework, and calculator usage. Questions were strongly influenced by Cochran, et al. (1999), McCabe and Trevino (1993), and McCabe, Trevino, and Butterfield (1999). The survey was designed to incorporate published empirical findings and was not based on theory. The items we selected for this study fitted the TPB.

The seven-page survey contains 139 questions, subdivided into seven parts. Part 1 addresses students' definitions of cheating and the frequency with which they have engaged in twenty distinct cheating behaviors. Parts 2 through 5 investigate attitudes, beliefs, and situational factors that might affect a student's decision to cheat or not. Part 6 addresses deterrents to cheating and students' perceptions of their effectiveness, and Part 7 covers student demographics. We reduced the possibility of underreporting due to desirability by posing questions in a manner that assumed the behavior had occurred (Sudman and Bradburn, 1982).

Sample: Institutions

The survey was completed by 695 students (643 undergraduates) in engineering and pre-engineering courses at eleven institutions in the United States and abroad, including large public universities, small private universities, and community colleges (Table 3). Student participation in the study was voluntary and unmonitored, and the students and institutions were informed that results would remain anonymous to protect each participant. Institutions were selected based on the willingness of a faculty member to distribute the surveys in a course. Thus, our sample of convenience is not necessarily representative of the engineering students on any single campus or of the types of institutions involved.

Response Rate

Because of the informal method of selecting volunteer faculty to distribute surveys for this study, records that would enable the calculation of response rates were not kept. However, in each class in which the survey was distributed, nearly all students completed the survey—yielding an estimated response rate above 90%. Possibly because of the length of the survey, several students did not respond to all questions and the response rate declined near the end of the survey. For statistical analysis, list-wise deletion was used to ensure that our study included only respondents who answered all the items we selected for our analysis.

TABLE 3. Demographic Information for Institutions in the Data Set

Carnegie Classification (in 2000)	Number of respondents	Percent of respondents	Number of institutions
Doctoral/Research Universities—Extensive	205	29.5	3
Doctoral/Research Universities—Intensive	42	6.0	1
Master's Colleges and Universities I	233	33.5	3
Associate's Colleges	42	6.0	2
Specialized Institutions: Schools of Engineering and Technology	138	19.9	1
International	30	4.3	1
Institutional Affiliation Unknown for Respondent	5	0.7	–
Totals	695	100.0	11

Sample: Respondents

The mean age of students in the analytical sample ($n = 643$) was 21.6 years with a range of 17 to 48 years of age. A total of 81.2% of respondents were male and 18.8% female, which is close to U.S. national figures. (In the most recent data published by the National Science Board of the National Science Foundation (2004), 20.5% of all engineering bachelor's degrees granted in 2000 were granted to females). Information on students' ethnicity and race was not collected for reasons of protecting student identities within small sample subsets.

There was a wide range of socioeconomic status with parents' household incomes ranging from less than $20,000 (7.3% of respondents) to more than $200,000 (6.6%) annually. Only 31.3% of respondents indicated their parents were the primary method of paying for college, with 41.3% paying their own way and 27.5% on scholarship. Most respondents (78.8%) were raised in the United States, including 59.0% who were from the Midwest.

There is a variety of class level in this sample: 22.9% of respondents reported they were in their first year, 13.7% were in their second year, 24.1% were in their third year, 21.3% were in their fourth year, and 18.0% were in their fifth year (or more) of their undergraduate engineering career. In addition, the discipline of engineering with which the participants were affiliated represents a wide variety—surveys were administered in first year engineering or pre-engineering programs and to students in electrical, civil, chemical, and mechanical engineering courses.

The mean grade point average of students in the sample was approximately a 3.2 ± 0.5 on a 4.0 scale, and a majority of students (59.7%) indicated they typically carried a heavy course load. Some of the respondents (12.9%) had at least one dependent, with 3.6% having three or more dependents. For this sample, 18.9% of the students were members of a fraternity or sorority. Further, 64.1% participated in some form of student team, professional society, or community service organization. Finally, 29.0% of respondents reported that they never cheated in high school, while 60.6% admitted to cheating in high school more than once.

Variables

We investigated two dependent variables for this study. Both variables are summative indices of items from a 20-part question: one reflecting self-reported frequency of cheating on exams and the other reflecting self-reported frequency of cheating on homework. The question read: "if you have ever engaged in any of these actions as a college

student please indicate how many times you have engaged in [it]''. This question was followed by a list of 20 specific ''cheating'' behaviors, including the thirteen behaviors selected for this study (the behavior items are listed in Table 1). The time period for these questions was defined by the question, which asked how many times the respondent engaged in the action ''as a college student''. The *frequency of cheating on exams* dependent variable was constructed by summing nine items. Similarly, the *frequency of cheating on homework variable* was created by summing four items. Dependent variables were standardized for ease of interpretation across models and both are normally distributed.

Independent variables were organized into eight blocks around a theoretical framework (Ajzen's TPB): student demographics (i.e., age, gender, socioeconomic status, year in college, and grade point average); pre-college cheating behavior; co-curricular participation (i.e., fraternity and sorority membership and club participation); moral obligation not to cheat (a single factor composed of nine items); attitudes about cheating (a two-item factor and a three-item factor); evaluation of the costs and benefits of cheating (one four-item factor and four separate items); perceived social pressures to cheat or not cheat (two items); and perceived effectiveness of academic dishonesty policies (three items). Table 2 presents an overview of independent variables including a description of the scale for each item.

Analysis

Descriptive and exploratory analyses were performed on the 13 individual items which, when summed and standardized, comprise the two dependent variables for this study, frequency of cheating on exams and frequency of cheating on homework. These analyses identify which behaviors the respondents defined as cheating, as unethical but not cheating, or as neither unethical nor cheating (Table 1). In order to reduce the number of independent variables used in the regression model, exploratory factor analyses were conducted using principle axis factoring and orthogonal rotation methods. Factor loadings that contained a score of at least .69 or higher were used in the development of subsequent summated scales. Internal validity for each of these scales was high, with Cronbach's alpha reliabilities ranging from .69 to .95. Table 4 contains a complete description of the four factors used in the final model for this study.

Hierarchical multiple regression analyses were performed to determine how the eight blocks of independent variables work together to predict the two dependent variables used for this study. Regression diagnostics

TABLE 4. Variable Names, Loadings and Reliability of Factors Created for this Study

Scale and Individual Item Measures	Loading	Alpha
Moral obligation not to cheat		.95
Indicate the extent to which you agree. 1 = Strongly disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, 5 = Strongly agree		
It is wrong to cheat even if the course material was too hard	.89	
It is wrong to cheat even if other students' scores are not affected	.89	
It is wrong to cheat even if I am in danger of failing the class	.86	
It is wrong to cheat even if the instructor assigned too much material	.86	
It is wrong to cheat even if the course material seemed useless	.86	
It is wrong for me to cheat even if the instructor does not grade fairly	.86	
It is wrong to cheat even if the instructor has done an inadequate job of teaching the course	.85	
It is wrong to cheat even if the instructor didn't seem to care if I learned the material	.84	
It is wrong to cheat no matter what the circumstances	.79	
Situational cheating—Predicted decision to cheat in situations when the benefits outweigh the costs		.87
Indicate the extent to which you agree. 1 = Strongly disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, 5 = Strongly agree		
I would cheat if doing so helped me retain financial assistance	.88	
I would cheat to avoid letting my family down if I failed	.87	
I would cheat to avoid getting a poor or failing grade in class	.85	
I would cheat in a class if it seemed that everyone else was cheating	.82	
Diffusion of responsibility for cheating to external sources		.80
Indicate the extent to which you agree. 1 = Strongly disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, 5 = Strongly agree		
It is the institution's responsibility to prevent cheating	.87	
It is the instructor's responsibility to prevent cheating	.86	
Personal responsibility for cheating		.69
Indicate the extent to which you agree. 1 = Strongly disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, 5 = Strongly agree		
If I saw another student cheating, I would report the student to the instructor	.80	
If I saw another student cheating, I would confront the student	.75	
It is my responsibility to prevent cheating	.65	

suggested that the assumptions of normality, linearity, and homogeneity were met. Two variables were recoded for use in the regression model: year in college (dummy coded with first-year serving as the reference group) and means for financing education (dummy coded with "paying own way" serving as the reference group). In addition, due to the different bases for the grade point averages at each institution, we transformed the grade point average variable for each student using the mean and standard deviation for that student's institution and then combined these transformations into a single variable for grade point average.

A structured, blocking approach was used to add variables to the respective models. This procedure yielded an eight-construct solution for each model. Tables 5 and 6 contain a complete description of the standardized regression coefficients for each variable used in each model. In addition, we present the parameter estimates for the final models for both dependent variables in Table 7 for ease of comparison.

RESULTS

Model 1: Frequency of Cheating on Exams

The final model significantly predicts 36% of the variance in the dependent variable *frequency of cheating on exams*, $F(25, 585) = 14.35$, $p < .0001$. Five of the eight blocks of variables (i.e., pre-college cheating behavior, co-curricular participation, moral obligation not to cheat, attitudes about cheating, and evaluation of the costs and benefits of cheating) contributed significantly to this dependent variable.

Demographics

The first block of variables, demographics, explains 2% of the variance in the dependent variable, frequency of cheating on exams. The only variable that reaches statistical significance is year in college: students in their "fifth year (or more)" are more likely to report cheating on exams than first-year students ($\beta = .14$, $p < .01$).

Pre-college Cheating Behavior

The second block, which contains a single-item indicator that measures frequency of cheating in high school, contributes a significant 10% of the variance in the dependent variable beyond the variance explained by demographics. Students who report cheating more often in high

school also are more likely to report cheating on exams in college ($\beta = .32$, $p < .001$).

Effects for year in college remained significant after adding the second block of variables. In addition to significant differences between students in their fifth year (or more) and first-year students, fourth-year students are also more likely to report cheating on exams than first-year students ($\beta = .10$, $p < .05$) after adding pre-college cheating behavior to the model.

Co-curricular Participation

Controlling for demographics and pre-college cheating behavior, the block of variables that included measures of the students' co-curricular participation significantly explained an additional 2% of the variance in the dependent variable. Students who participated in fraternities and sororities were more likely to report cheating on exams than unaffiliated students ($\beta = .11$, $p < .01$).

Effects for year in college (comparing students in their "fifth year (or more)" to first-year students and fourth-year students to first-year students) and pre-college cheating behavior remained statistically significant.

Moral Obligation Not to Cheat

Students' moral obligation not to cheat significantly explained an additional 16% of the variance in the dependent variable beyond the variance explained by demographics, pre-college cheating behavior, and co-curricular participation. On average, students who believed that cheating was wrong were significantly less likely to report cheating on exams ($\beta = -.42$, $p < .001$). After adding this block, year in college differences, pre-college cheating behavior, and membership in a fraternity or sorority remained statistically significant.

Attitudes About Cheating

Controlling for demographics, pre-college cheating behavior, co-curricular participation, and moral obligation not to cheat, variables comprising the "attitudes about cheating" block significantly explained an additional 2% of the variance in the dependent variable. Specifically, students who felt personally responsible for preventing cheating were significantly less likely to cheat on exams ($\beta = -.13$, $p < .001$). After adding this block, year in college differences, pre-college cheating behavior,

TABLE 5. Regression Block Entry: Frequency of Cheating on Exams ($n = 586$)

	Block 1	Block 2	Block 3	Block 4	Block 5	Block 6	Block 7	Block 8
1. Demographics								
Age	−.07	−.04	−.04	−.03	−.04	.02	.03	.03
Gender (Male)	−.00	−.03	−.04	−.05	−.05	−.05	−.05	−.05
Socioeconomic status	−.02	−.01	−.02	−.03	−.03	−.01	−.01	−.01
Year in college								
Second year (First year)	.04	.03	.04	.05	.04	.02	.02	.02
Third year (First year)	.02	.06	.06	.08	.08	.08	.09	.09
Fourth year (First year)	.08	.10*	.11*	.13**	.13**	.12**	.13**	.13**
Fifth year or more (First year)	.14**	.17***	.17***	.19***	.18***	.18***	.18***	.18***
Grade point average	−.06	−.04	−.04	−.01	−.00	−.00	−.00	−.00
2. Pre-college cheating behavior								
Frequency of high school cheating		.32***	.32***	.23***	.22***	.15***	.15***	.15***
3. Co-curricular participation								
Fraternity/sorority membership (No)			.11**	.09**	.09**	.09**	.07*	.07*
Club participation (No)			.05	.05	.06	.05	.05	.05
4. Moral obligation not to cheat								
It is wrong...[Factor]				−.42***	−.37***	−.23***	−.23***	−.22***
5. Attitudes about cheating								
Diffusion of responsibility [Factor]					−.01	−.00	−.00	.01
Personal responsibility [Factor]					−.13***	−.10**	−.08*	−.08*

6. Evaluation of the costs and benefits of cheating								
Personal pressures								
Course load						.05	.05	.05
Heavy family responsibility (No)						.02	.03	.03
Hours/week spent working						.00	−.01	−.01
Means for financing education								
Scholarship (Pay own way)						.13***	.13***	.12**
Parents (Pay own way)						.04	.04	.04
Situational cheating [Factor]						.31***	.29***	.29***
7. Perceived social pressures to cheat or not to cheat								
Prediction of consequence-embarrassment							−.08	−.08
Deterrent effect-embarrassment							.02	.02
8. Perceived effectiveness of academic dishonesty policies								
Students and faculty understand policies								−.00
Faculty support of policies								−.03
Academic dishonesty policies deter cheating								−.00
Model statistics								
Adjusted R^2	.01	.11	.12	.28	.30	.36	.36	.36
Change in R^2	.02	.10***	.02**	.16***	.02**	.07***	.00	.00

Parentheses indicate reference group for comparison. *$p < .05$, **$p < .01$, ***$p < .001$.

TABLE 6. Regression Block Entry: Frequency of Cheating on Homework ($n = 590$)

	Block 1	Block 2	Block 3	Block 4	Block 5	Block 6	Block 7	Block 8
1. Demographics								
Age	.07	.08	.08	.08	.08	.08	.08	.07
Gender (Male)	.08	.07	.07	.06	.06	.05	.05	.05
Socioeconomic status	−.06	−.06	−.06	−.07	−.07	−.05	−.05	−.05
Year in college								
Second year (First year)	.09	.09	.09	.10*	.10*	.08	.09	.09*
Third year (First year)	.05	.06	.06	.07	.07	.07	.08	.09
Fourth year (First year)	−.01	−.01	.00	.01	.01	.01	.02	.03
Fifth year or more (First year)	−.02	−.02	−.02	−.00	−.00	−.01	−.00	−.00
Grade point average	−.09*	−.08*	−.08*	−.06	−.05	−.05	−.05	−.05
2. Pre-college cheating behavior								
Frequency of high school cheating		.07	.07	.00	−.00	−.03	−.04	−.05
3. Co-curricular participation								
Fraternity/sorority membership (No)			.05	.04	.04	.04	.03	.02
Club participation (No)			.01	.02	.02	.02	.02	.02
4. Moral obligation not to cheat								
It is wrong...[Factor]				−.31***	−.30***	−.24***	−.23***	−.22***
5. Attitudes about cheating								
Diffusion of responsibility [Factor]					−.02	−.02	−.02	−.02
Personal responsibility [Factor]					−.04	.01	.00	−.01

6. Evaluation of the costs and benefits of cheating								
Personal pressures								
Course load						−.01	−.02	−.02
Heavy family responsibility (No)						−.01	.00	−.00
Hours/week spent working						.07	.06	.07
Means for financing education								
Scholarship (Pay own way)						.00	.02	.02
Parents (Pay own way)						−.02	−.00	−.01
Situational cheating [Factor]						.14**	.13**	.13**
7. Perceived social pressures to cheat or not to cheat								
Prediction of consequence-embarrassment							−.06	.07
Deterrent effect-embarrassment							−.04	−.05
8. Perceived effectiveness of academic dishonesty policies								
Students and faculty understand policies								−.06
Faculty support of policies								−.08
Academic dishonesty policies deter cheating								.11**
Model statistics								
Adjusted R^2	.02	.03	.03	.12	.12	.12	.13	.14
Change in R^2	.04**	.01	.00	.09***	.00	.02	.01	.02*

Parentheses indicate reference group for comparison. *$p < .05$, **$p < .01$, ***$p < .001$.

membership in a fraternity or sorority, and moral obligation not to cheat remained statistically significant.

Evaluation of the Costs and Benefits of Cheating

Controlling for demographics, pre-college cheating behavior, co-curricular participation, moral obligation not to cheat, and attitudes about cheating, items comprising the "evaluation of the costs and benefits of cheating" block significantly explained an additional 7% of the variance in the dependent variable. Specifically, students on scholarship were more likely to report cheating on exams than students who paid for college on their own ($\beta = .13$, $p < .001$). Similarly, student who agreed that "I would cheat...[to alleviate a stressful situation]" such as to maintain financial assistance, to avoid failing, to avoid letting their family down, and to go along with the crowd were significantly more likely to cheat on exams ($\beta = .31$, $p < .001$).

All of the aforementioned variables making up year in college, pre-college cheating behavior, moral obligation not to cheat, and attitudes about cheating remained statistically significant.

Perceived Social Pressures and Perceived Effectiveness of Academic Dishonesty Policies

Variables making up the remaining blocks, "perceived social pressures to cheat or not to cheat" and "perceived effectiveness of academic dishonesty policies" explained 0% of additional variance in the dependent variable beyond the variance explained by the first six blocks of variables in the model. Consistent with our other findings, effects of the aforementioned variables making up year in college, pre-college cheating behavior, moral obligation not to cheat, attitudes about cheating, and evaluation of the costs and benefits of cheating remained statistically significant.

Model 2: Frequency of Cheating on Homework

The final model significantly predicts 14% of the variance in the dependent variable, *frequency of cheating on homework*, $F(25, 589) = 4.80$, $p < .0001$. Three of the eight blocks of variables (i.e., demographics, moral obligation not to cheat, and perceived effectiveness of academic dishonesty policies) contributed significantly to explaining the variance in this dependent variable.

Demographics

The first block of variables measuring demographics explains a significant 4% of the variance in the dependent variable, frequency of cheating on homework. Students with higher grade point averages are less likely to report cheating on homework ($\beta = -.09$, $p < .05$).

Pre-college Cheating Behavior

The second block containing a single-item indicator that measures frequency of cheating in high school contributes only 1% of the variance in the dependent variable beyond the variance explained by demographics. Effects for self-reported grade point average remained significant after adding the second block of variables.

Co-curricular Participation

Controlling for demographics and pre-college cheating behavior, the block of variables that included measures of co-curricular participation did not explain any additional variance in the dependent variable. Effects for grade point average stayed the same.

Moral Obligation Not to Cheat

Students' moral obligation not to cheat significantly explained an additional 9% of the variance in the dependent variable beyond the variance explained by demographics, pre-college cheating behavior, and co-curricular participation. On average, students who reported that cheating was "wrong" were significantly less likely to report cheating on homework ($\beta = -.31$, $p < .001$). Effects for year in college (second-year students compared to first-year students) became statistically significant after adding this block ($\beta = .10$, $p < .05$), meaning that when compared with first-year students, second-year students are significantly more likely to report cheating on homework. However, grade point average was driven out of statistical significance.

Attitudes About Cheating

Controlling for demographics, pre-college cheating behavior, co-curricular participation, and moral obligation not to cheat, variables comprising attitudes about cheating significantly explained an additional 0% of the variance in the dependent variable. Effects for both year in college (second-year students compared to first-year students) and moral

obligation not to cheat remained statistically significant predictors of the dependent variable, even after adding this new block of variables.

Evaluation of the Costs and Benefits of Cheating

Controlling for demographics, pre-college cheating behavior, co-curricular participation, moral obligation not to cheat, and attitudes about cheating, items comprising the "evaluation of the costs and benefits of cheating" block explained an additional 2% of the variance in the dependent variable. Specifically, students who agreed that "I would cheat...[to alleviate a stressful situation]" (i.e., in situations when the respondent deemed the benefits of cheating outweighed the costs) were more likely to report cheating on homework ($\beta = .14$, $p < .01$).

After adding this additional set of variables into the model, the effects of students' moral obligation not to cheat remained statistically significant. However, the difference in cheating on homework between second-year students and first-year students fell out of significance.

Perceived Social Pressures to Cheat or Not to Cheat

Variables making up the block "perceived social pressures to cheat or not to cheat" explained an additional 1% of the variance in the dependent variable beyond the variance explained by the first six blocks of variables in the model. Consistent with our other findings, effects of students' moral obligation not to cheat and evaluation of the costs and benefits of cheating remained statistically significant.

Perceived Effectiveness of Academic Dishonesty Policies

Controlling for all other variables in the model, the remaining block, "perceived effectiveness of academic integrity policies," significantly explained 2% of additional variance in homework cheating beyond the variance explained by the first seven blocks of variables in the model. Students who believed that the academic policies at the institution deterred cheating were more likely to report cheating on homework ($\beta = .11$, $p < .01$).

After adding this block of variables to the model, one effect of year in college became statistically significant: second-year students are more likely to report cheating than first-year students. Consistent with our other findings, students' moral obligation not to cheat and the aforementioned significant variable from the student's evaluation of the costs and benefits of cheating remained statistically significant.

DISCUSSION

Correlates of Cheating Vary by Type of Assessment

The differences in the regression models for exam cheating and homework cheating (Table 7) clearly demonstrate that correlates of cheating vary by type of assessment. Evidence that correlates of cheating vary by type of assessment is the statistically significant differences in the six independent variables that predict either frequency of cheating behavior for exams and for homework but do not predict both (i.e., year in college, pre-college cheating behavior, fraternity/sorority membership, personal responsibility for cheating, means for financing college, and academic dishonesty policies deter cheating). Further evidence is the difference in the percentage of the variance explained by the parallel models (36% for exam cheating and 14% for homework cheating). This dramatic difference indicates that the factors selected for this model predict exam cheating well but that other factors not included in the model must also contribute to predictions of homework cheating; in other words, the difference in how well the model fits each variable demonstrates that frequency of exam cheating is a different construct than frequency of homework cheating.

Cheating patterns vary by year in college. First-year students reported the least frequent cheating on both exams and homework. Although 4th year and 5th year undergraduates cheat significantly more than first year students on exams, second year undergraduates cheat significantly more than first year students on homework. Perhaps cheaters are dishonest on a type of assessment with a lower risk of detection (such as homework) in their early years at college and progress to cheating on higher-benefit, but higher-risk assessments (such as exams) in their later years at college as they develop skill at cheating without detection. This is consistent with the TPB (Ajzen, 1991) because in typical engineering courses, exam scores make up the majority of the course grade while homework is worth a small percentage of the course grade. However, the wording of the survey item complicates this explanation because if respondents carefully interpreted our survey question (“if you have ever engaged in any of these actions as a college student please indicate how many times you have engaged in [it]”) as a cumulative total of all their cheating during college, a student who cheats at a steady annual rate would report an increased number of engagements with each passing year. Alternately, if many respondents misinterpreted this question as pertaining to a shorter period, such as an academic year or a semester,

TABLE 7. Comparison of Unstandardized B-Weights between Dependent Variable in the Two Models (for Block 8), Exam and Homework

	Exam	Homework
1. Demographics		
Age	.01	.02
Gender (Male)	−.11	.12
Socioeconomic status	−.01	−.04
Year in college		
Second year (First year)	.05	.27*
Third year (First year)	.20*	.20
Fourth year (First year)	.31**	.08
Fifth year or more (First year)	.46***	−.00
Grade point average	−.00	−.05
2. Pre-college cheating behavior		
Frequency of high school cheating	.16***	−.05
3. Co-curricular participation		
Fraternity/sorority membership (No)	.18*	.06
Club participation (No)	.10	.04
4. Moral obligation not to cheat		
It is wrong...[Factor]	−.22***	−.21***
5. Attitudes about cheating		
Diffusion of responsibility [Factor]	.01	−.02
Personal responsibility [Factor]	−.14*	−.01
6. Evaluation of the costs and benefits of cheating		
Personal pressures		
Course load	.09	−.03
Heavy family responsibility (No)	.06	−.00
Hours/week spent working	−.00	.04
Means for financing education		
Scholarship (Pay own way)	.27**	.05
Parents (Pay own way)	.09	−.01
Situational cheating [Factor]	.29***	.13**
7. Perceived social pressures to cheat or not to cheat		
Prediction of consequence-embarrassment	−.10	−.09
Deterrent effect—embarrassment	.02	−.06
8. Perceived effectiveness of academic dishonesty policies		
Students and faculty understand policies	−.01	−.11
Faculty support of policies	−.04	−.12
Academic dishonesty policies deter cheating	−.00	.16**
Model statistics		
Adjusted R^2	.36	.14

Parentheses indicate reference group for comparison. *$p < .05$, **$p < .01$, ***$p < .001$.

as suggested by McCabe (personal communication, April 1, 2002), the results would strongly support our explanation.

The frequency of high school cheating strongly predicted exam cheating but not homework cheating. We propose that frequent high school cheating changes a college student's evaluation of the costs and benefits of cheating by developing skill at cheating without detection (which would both demonstrate the benefit of cheating and reduce the actual risk of detection). Because the benefits of cheating on exams are typically greater than the benefits of cheating on homework in engineering courses, an experienced cheater would be more likely to engage directly in the type of cheating with the highest benefit, cheating on exams. This is consistent with the TPB (Ajzen, 1991).

Similarly, fraternity/sorority membership predicted exam cheating but not homework cheating. We propose that fraternity/sorority membership might allow a group of students to pool their cheating experience in a manner that allows inexperienced cheaters to observe the benefits of cheating and to reduce the actual risk of detection, much like personal cheating experience would, which is consistent with the TPB (Ajzen, 1991).

Students who reported feeling personal responsibility to report and prevent cheating were significantly less likely to report cheating on exams. This seems natural because students who assume more personal responsibility to prevent cheating might well begin their efforts with themselves and be less likely to cheat. By this reasoning we would expect to see a similar relationship for cheating on homework, however, no such relationship was found. We speculate that the wording of questions about personal responsibility focused students' thoughts on the public nature of exam performance versus the private nature of homework activity. For example, two of the questions were worded in the form "If I saw another student cheating, I would ...". It would be unlikely to "see" a cheater in action outside of an exam situation. Thus, these questions may have evoked students' definitions of exam cheating. Multiple researchers have shown that students' definitions of what behaviors constitute cheating vary widely (e.g., Stern and Havlicek, 1986), and our survey respondents classified "cheating" behaviors during exams much more crisply than "cheating" behaviors on homework (Table 1). This may explain why students' personal responsibility for cheating did not have a relationship with homework cheating.

Scholarship students were more likely to cheat on exams than were students who reported paying their own way, but this distinction was not observed for homework cheating. We propose that scholarship students are often under financial pressure to maintain a minimum grade

point average and that the benefit of achieving a higher grade on an exam is much greater than the benefit of achieving a higher grade on a homework assignment in typical engineering classes. Thus, scholarship students would not be likely to see a benefit to cheating on homework when they evaluate the costs and benefits of cheating, which is consistent with the TPB (Ajzen, 1991).

The deterrent effect of academic dishonesty policies differentially predicted cheating on exams and homework. Counterintuitively, students who agreed that "academic dishonesty policies at your institution deter cheating" were more likely to report cheating on homework. We speculate that students feel that *enforced* academic dishonesty policies would deter their cheating; however, in the absence of enforced policies, they do cheat on types of assessments for which policies are least defined and enforced, such as homework. Responses to a question on the survey that was not included in our models indicate that students feel that academic dishonesty policies are not enforced at their institutions (In this sample, when answering the question "Do faculty support the academic dishonesty policies of your institution?", 48.8% answered either "not at all" or "somewhat"). Implicit policies on exam cheating, and their occasional enforcement, may explain why this effect is seen for homework cheating but not exam cheating.

Unilateral Deterrents to Cheating: Moral Obligation and Situational Cheating

Two factors showed a strong deterrent effect to cheating in both types of assessment: moral obligation not to cheat and situational cheating. The moral obligation not to cheat had the most explanatory power of any block of variables in the regression models, significantly explaining 16% of the variance in cheating on exams and 9% of the variance in cheating on homework. (Note that these percentages are much larger than the 3% of the variance in Beck and Ajzen's (1991) regression model for cheating.) The percentages of the variance explained by moral obligation in our models strongly support Beck and Ajzen's proposal that moral obligation plays an important role in the TPB for dishonest acts. Specifically, a student's agreement that "It is wrong to cheat even if [difficult circumstance]..." is strongly negatively correlated with *both* the "frequency of cheating on exams" and "the frequency of cheating on homework". Looking at this result conversely, students who *disagreed* with these statements "recognize and accept cheating as an undesirable behavior; however, its occurrence can be excused in certain instances" (Haines, Diekhoff, LaBeff, and Clark, 1986, p. 353). This

attitude, called *neutralization*, has been found to be an important influence on college students' cheating behavior (e.g., Haines et al., 1986; Liska, 1978). Our results also support this finding.

Student agreement with statements that "I would cheat...[if it helped me alleviate a stressful situation]" is positively correlated with the frequency of cheating on *both* types of assessment. This is a logical result because stressful situations that might be alleviated by (undetected) cheating could be alleviated by cheating on any type of assessment.

Summary

Our major finding is that correlates of cheating vary by type of assessment. This finding is consistent with several aspects of previous work, notably: (1) the TPB (Ajzen, 1991) which implies that each construct that contributes to actual behavior will vary by situation; (2) differences in prevalence of cheating by type of assessment (e.g., Baird, 1980; Bowers, 1964; Brown, 1996; Diekhoff et al., 1996; Hanson, 1990; Jensen et al., 2002; McCabe, 1997; Michaels and Miethe, 1989; Stearns, 2001; Storch and Storch, 2002; data from McCabe's 1993 study reported in Whitley and Keith-Spiegel, 2002); (3) differences identified in the relationships in four different path models for four different cheating situations (Pratt and McLaughlin, 1989); (4) concerns about the common practice in cheating research of combining cheating behaviors for different types of assessments (Crown and Spiller, 1998; Thorpe et al., 1999; Whitley, 1998); (5) published difficulties in creating general definitions for cheating and academic dishonesty without specifying situations and behaviors (e.g., Ratner, 1996), and (6) published classifications of cheating behaviors by type of assessment for practical applications of cheating research, such as prevention and detection, policy, working definitions, and strategies for teachers who must deal with academic dishonesty (Cizek, 1999; Lipson and McGavern, 1993; Whitley and Keith-Spiegel, 2002). Future research on cheating should carefully distinguish between behaviors on different types of assessment.

Our secondary findings are that a student's conviction that cheating is wrong no matter what the circumstances is a strong deterrent to cheating across types of assessment and that a student who agrees that he or she would cheat in order to alleviate stressful situations is more likely to cheat on exams and on homework. Future research on cheating should explore students' moral obligation not to cheat and their moral development.

LIMITATIONS

The sample of convenience is not necessarily representative of the engineering students on any single campus or of the types of institutions involved. The sample of convenience also created a situation in which records that would enable the calculation of response rates were not kept. If our survey had been designed based on the TPB, a fuller complement of variables would have addressed the TPB constructs of subjective norms and perceived behavioral control.

CONCLUSIONS AND IMPLICATIONS

Since the 1960's, upwards of 80% of U.S. undergraduates report that they have cheated during college, although rates vary by college major. Yet the severity of the cheating is increasing: "for example, students admitting to copying from another student on an examination doubled from 26% to 52% between 1963 and 1993" (McCabe, 1997, p. 435). The prevalence and increasing severity of cheating should be distressing to educators because of their implications for: (1) undermining institutional missions that include preparation for citizenship and service to society, each of which has a moral dimension (King and Mayhew, 2002; Whitley and Keith-Spiegel, 2002); (2) invalidating measures of student learning and grading equity (Whitley and Keith-Spiegel, 2002); (3) damaging student and faculty morale, the reputation of the institution, and public confidence in higher education (Whitley and Keith-Spiegel, 2002); and (4) increasing the likelihood of engagement in dishonest acts both outside the classroom and after graduation (e.g., Baldwin et al., 1996; Beck and Ajzen, 1991; Nonis and Swift, 2001). These four implications of the prevalence and severity of cheating have inspired a substantial body of research on cheating among college students, including eleven review articles published since 1977 (Brown and Emmett, 2001; Bushway and Nash, 1977; Cizek, 1999; Cole and McCabe, 1996; Crown and Spiller, 1998; Dowd, 1992; Kibler, 1993; McCabe et al., 2001; Whitley, 1998; Whitley and Keith-Spiegel, 2002; Whitley et al., 1999).

Our study fills several gaps in the existing literature on student cheating. Separate models for cheating behavior are made for two types of assessment, exams and homework. Both the careful distinction between the types of assessment and also the distinct study of homework are rare contributions to research on cheating. Also, our sample of engineering undergraduates is an important contribution because engineering students self-report higher frequencies of cheating than all other majors except for business majors (e.g., McCabe, 1997), yet only two multi-institutional

studies of cheating other than our own have specifically identified engineering students (Bowers, 1964; McCabe, 1997). The importance of studying cheating among engineering undergraduates is heightened by nationwide emphases among engineering faculty on assessing student learning outcomes and explicitly teaching professional ethics. Both of these emphases were codified in changes to the nationwide accreditation requirements for engineering programs (Moore, 1996).

In this study, we found that students don't see cheating as a single construct and their *decisions to cheat or not to cheat are influenced differently depending on the type of assessment*. Therefore, faculty and administrators should carefully define for students what does and does not constitute cheating for each type of assessment, such as exams, homework, term papers, projects, laboratory reports, and oral presentations. Explicit definitions of "cheating" seem especially appropriate because of the recent emphasis on collaborative learning, which communicates to students that working together is often encouraged by faculty.

In addition, we found that a student's conviction that cheating is wrong no matter what the circumstances is a *deterrent to cheating across types of assessment* and that a student who agrees that they would cheat in order to alleviate stressful situations is more likely to cheat on exams and on homework. Thus, interventions that develop student understanding that cheating is wrong could deter all forms of cheating, if clear definitions of cheating are communicated to students.

Our findings have two implications for future research on cheating. First, future research on cheating should carefully word each behavior as specifically for one type of assessment. Second, future research should explore students' moral obligation not to cheat and their moral development.

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END NOTES

1. We recognize that some cheating may not be *planned*. For example situations in which cheating might not be planned (such as a student observing, during an exam, that a neighbor's paper is available) see Hetherington and Feldman (1964).
2. Note that "Ajzen" recently changed his name to "Aizen". Armitage and Conner (2001) describe this in a footnoted personal communication dated November 8, 1999.

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