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Students' Perceptions of Self and Peers Predict Self-Reports of Cheating

ABSTRACT

Academic dishonesty and how to address it are common concerns across higher education disciplines, but engineering students admit to higher rates of academic dishonesty than other students. However, first-year students may be particularly receptive to prevention efforts. Considering self-perception, social norming, and behavioral choice theories, we hypothesized that 1.) Students who perceived themself as ethical and more knowledgeable of the consequences for misconduct would be less likely to self-report cheating and 2.) Students who perceived cheating and plagiarism to be common would be more likely to self-report cheating. For this study, freshmen engineering students (*N*=703) reported their self-perception, perception of cheating and plagiarism among peers, their knowledge of the consequences for cheating, and if they had cheated. A backward elimination logistic regression model determined significant predictors of having cheated. Participants were more likely to report their cheating when they perceived cheating as common. There were significant interactions between self-ethics and perceived plagiarism, and between knowledge of consequences and perceived plagiarism interactions. Results are discussed within the context of social norming and future efforts to reduce misconduct.

KEYWORDS

ethics, academic dishonesty, perceptions, consequences, predictors

INTRODUCTION

The occurrence of academic dishonesty, specifically cheating and plagiarism, is a concern across academic disciplines, including engineering and other STEM fields (Passow et al. 2006; Skyles and Jennings 2020), and in many countries, including the United States, Norway, Russia, and Taiwan (Chirikov, Shmeleva, and Loyalka 2020; Chirumamilla, Sindre, and Nguyen-Duc 2020; Yang 2012). However, prevalence rates can be difficult to ascertain, as they can vary by type of misconduct (e.g., cheating vs plagiarism, cheating on exams vs cheating on homework, cheating in online vs in-person classes) (Allen and Kizilec 2024; Chirumamilla, Sindre, and Nguyen-Duc 2020; Grebing 2015; Whitley 1998). Furthermore, prevalence can vary by academic discipline, with engineering students reporting more academic integrity infractions than students in other academic disciplines (Harding et al. 2007; McCabe 1997; Newstead, Franklyn-Stokes, and Armstead 1996; Yeo 2007). Specifically, Yang, Huang, and Chen (2013) found that engineering students attributed their academic dishonesty to self-interests concerning scholarships and future job offers. Additionally, complicated scientific or mathematical phrases and the students' inability to paraphrase properly may account for higher rates of academic dishonesty in science and math courses (Yeo 2007).

The literature surrounding academic integrity dates back decades (see Bowers 1964) and ranges across disciplines and cultures (Aljurf, Kemp, and Williams 2020; Allen and Kizilec 2024; Lang 2013; Liu and Alias 2023). Many studies focus on the relationship between academic dishonesty and educational interventions, more so than on predictors of self-reported cheating. A review of the literature suggests that these correlates include, but are not limited to, ethical issues, perceptions of peer behavior (e.g., social norms), and one's knowledge of the consequences for committing misconduct (Ashworth, Bannister, and Thorne 1997; Beasley 2014; Kisamore, Stone, and Jawahar 2007; McCabe 1997; Miles, Campbell, and Ruxton 2022; Whitley 1998). Furthermore, earlier studies (Bowers 1964; McCabe and Trevino 1993) did not specifically survey freshmen, presumably to help differentiate between reports of cheating in college versus high school. In this study, we chose to investigate identified variables of interest (specifically, one's self-perception, peer perception, and one's knowledge of the consequences) as potential predictors of self-reported cheating and intentionally surveyed a less represented sample in the literature (freshmen engineering students).

Self-perception

Students who display prudence tend to participate less frequently in unethical academic behaviors and are more likely to report others' cheating than those who are less prudent (Kisamore, Stone, and Jawahar 2007). Generally, rates of cheating are lower at institutions with honor codes (McCabe 1997; McCabe, Trevino, and Butterfield 2001; Whitley 1998). Dix, Emery, and Le (2014) examined students' integrity based on their commitment to the university's honor code. Higher self-reported satisfaction with the honor code and investment in the honor code (i.e., effort put into upholding the code) predicted commitment (Dix, Emery, and Le 2014). While the mere existence of an honor code itself does not directly cause a reduction in academic honesty infractions, a code can be the cornerstone upon which institutional culture is established (Malesky et al. 2022). A culture of honesty and integrity is associated with lower rates of student academic misconduct (Dix, Emery, and Le 2014; McCabe 1997). However, the mechanisms by which individual behavior is affected by institutional culture are not clearly understood (Dix, Emery, and Le 2014). Therefore, in addition to understanding ethical behavior within the context of a system or culture, we can also look at the individual student's characteristics.

Machiavellianism

The concept of Machiavellianism is often studied in relation to personal ethics. Machiavellianism refers to an individual trait in which one is cynical about human nature, manipulates others, and does not uphold conventional standards of morality (Bloodgood, Turnley, and Mudrack 2010). Multiple studies suggest that individuals high in Machiavellianism act more unethically, are opportunistic, and are less opposed to cheating than those low in Machiavellianism; however, the research is equivocal (see Bloodgood, Turnley, and Mudrack 2010). Although Machiavellianism per se was not assessed, Yang, Huang, and Chen (2013) found that engineering students attributed the motivating factor behind their academic dishonesty to their own self-interests more so than social science students. Perhaps engineering students feel more pressure to excel academically, which in turn contributes to a Machiavellian attitude. Harding et al. (2007) found that although engineering students had significantly greater rates of cheating in college than humanities students, there was no statistically significant difference between the groups for rates of cheating in high school. The researchers further suggest that academic dishonesty is influenced by discipline. Additionally, in a survey of first year engineering students' attitudes about cheating, VanDeGrift, Dillon, and Camp (2017) quoted a student's comment which belies such an opportunistic attitude and lack of regard for ethics: "People are going to cut

corners no matter what. Those who do not cut corners fall behind" (1168). Although this quote was from a single student, the authors' noted that the sentiment was common among engineering students they observed. Indeed, in a survey of over 4,000 students across 31 campuses, McCabe (1997) noted that engineering students justified their higher rates of cheating due to their extreme workload: therefore, cheating was the only perceived option to survive academically. Similarly, Whitley (1998) found that as students reported feeling an increased pressure to succeed academically, the likelihood of cheating increased, while Lang (2013) noted that an emphasis on performance within a high stakes situation can contribute to cheating, and Ayton et al. (2023) also noted one contributing factor to dishonesty was a competitive drive to outperform peers.

Behavioral economics

Researchers have long used behavioral theory to understand cheating (Lang 2013). Within the context of behavioral economics specifically, academic dishonesty is a time-saving technique (Collins, Judge, and Rickman 2007). Behavioral choice theory suggests that behavior occurs within the context of available reinforcers (Vuchinich and Tucker 1996). With alcohol use, for example, behavioral choice theory conceptualizes drinking as a function of the availability and utilization of competing reinforcers and environmental constraints (Vuchinich and Tucker 1996), such that high rates of alcohol use are associated with fewer substance-free reinforcers (Little and Correia 2006). To apply behavioral choice theory to academically dishonest behavior, infractions of academic integrity are a function of the availability and utilization of competing reinforcers (i.e., reinforcers to act with integrity) and environmental constraints (i.e., negative consequences if caught). Therefore, if a student felt pressure to succeed academically (Ayton et al. 2023; Lang 2013, Whitley 1998), the decision to engage in dishonest behavior is suggestive more of a utilitarian action (Collins, Judge, and Rickman 2007) and less of Machiavellian characteristics. In other words, students may perceive themselves as ethical individuals but simultaneously engage in academically dishonest behavior.

Knowledge and perception of penalties for dishonesty also play an important role. Non-cheaters reported a greater understanding of the honor code than cheaters (Jordan 2001) even though there was no difference between groups in their exposure to the honor code. From a behavioral choice theory perspective, this suggests that the mere presence of an honor code at an institution is not a sufficient environmental constraint. Rather, it is the students' perception of the penalties for misconduct (McCabe and Trevino 1997). For example, students who identified as female were more likely to cite lack of penalties as a motivating factor to cheat (Yang, Huang, and Chen 2013) and students were more likely to cheat when they thought the chance of getting caught was low (Whitley 1998). Whitley also noted that cheating decreased when students feared punishment if caught. Undergraduate students reported being less likely to plagiarize online than offline specifically because they were aware of their university's policy and feared being caught by the use of software such as Turnitin (Selwyn 2008). In a survey of mandated students, they were asked "What, if anything, would have stopped you from committing your act of academic dishonesty?" (Beasley 2014, 232). The most common reason given for cheating was ignorance of consequences followed by ignorance of rules. Beasley (2014) stated that students considered such consequences to include both disciplinary (e.g., a failing grade) and personal (e.g., feeling guilty, having a tarnished reputation). Moreover, Beasley posited that students who underestimate how frequently academic misconduct is punished may be more likely to engage in dishonest behaviors. Thus, in the context of behavioral choice theory, it is important for students to not only be aware of the institutional policies, but knowledgeable of the consequences if they violate them.

Given this context, one's self perceptions (e.g., how ethical you think you are) and knowledge of the consequences for misconduct were assessed in the current study. The word "self-ethics" (or "ethics" for short) is used in this paper because participants were asked "how ethical do you think you are" (refer to the Methods section below) and while the term may seem awkward, ethical is not synonymous with integrity, according to Merriam Webster dictionary, which is the word included in the phrase "academic integrity." Thus, to be consistent with how participants were asked to evaluate themselves, self-ethics is referenced throughout the paper.

Peer perception and social norms

Social norms affect students' behaviors as well. The relation between perceived norms and one's behavior has been extensively studied in higher education literature (Dix, Emery, and Le 2014; Jordan 2001; McCabe and Trevino 1993), and perceived peer behavior is one of the strongest predictors of cheating (Ives and Giukin 2020; McCabe, Trevino, and Butterfield 2001; Zhao et al. 2022). There are two types of social norms: descriptive and injunctive. Descriptive norms (or popular norms) refer to the perception of others' behaviors or what one thinks their peers are doing, and injunctive norms (or prescriptive norms) refer to how one believes they ought to behave based upon the perception of others' approval/disapproval or the moral rules of their peer group (Borsari and Carey 2001; Cialdini, Reno, and Kallgren 1990). Students' behavior is influenced by both types of norms. Cheaters estimated that their peers cheat more frequently (31.2%) than the estimation given by non-cheaters (20.6%) (Jordan 2001). Additionally, the presence of unethical behaviors within a group is likely to influence other group members to behave unethically (Ives and Giukin 2020), even despite one's past history (Gino, Ayal, and Ariely 2009). Both examples illustrate descriptive norms. Injunctive norms also influence students' behavior (Dix, Emery, and Le 2014). Academic dishonesty decreased as students felt at risk of being reported by peers (McCabe, Feghali, and Abdallah 2008). In a survey across five universities, perceived acceptability was one of the strongest predictors of dishonest behaviors (Ives and Giukin 2020). Cech's (2014) study of engineering students from first year to senior year suggests that over the course of their engineering education, students' beliefs in the importance of professional and social ethics declined over the course of their engineering education. Cech attributed the change in beliefs to the broader profession of engineering as well as to students' engineering education. From a social norms perspective, Cech's work and that of McCabe and colleagues are examples of injunctive norms.

Norms influence behavior, yet students often have inaccurate perceptions of the social norms about cheating. Remarkably, almost half (48.8%) of Taiwanese students believed that their peers falsified research results and/or concealed data when only 28.3% reported actually doing so (Yang 2012). Generally, students perceived the likelihood of their peers acting dishonestly to be greater than their own (Yang, Huang, and Chen 2013). Given that peer perception influences one's behavior, and that students may overestimate the frequency of dishonest behaviors among their peers, cheating may seem normative and thus a more acceptable behavior to students. Therefore, peer perception was assessed as a possible predictor of self-reported cheating in the current study.

THE CURRENT STUDY

One's perceived self-ethics, knowledge of the consequences for misconduct, and peer perceptions about cheating are important factors related to academic honesty. But can these variables predict students' self-report of cheating? The current study analyzed freshman engineering students' ethics, their perception of academic dishonesty among peers, and their knowledge of the consequences for committing misconduct as possible predictors of self-reported cheating.

Given the aforementioned literature surrounding perceived self-ethics, knowledge of the consequences of dishonesty, and perception of peer's dishonesty, the authors hypothesized that students with stronger self-ethics and more knowledge of the consequences would be less likely to self-report cheating, and students who perceived cheating and plagiarism to be common among their peers would be more likely to self-report cheating.

METHOD

Participants

Participants were undergraduate students (*N* = 703, 77% male, 85% Caucasian) enrolled in multiple sections of a one credit hour introductory freshman (i.e., first-year) engineering course at a Midwest science and technology university located in a rural area. Approximately 1,200 students in their first semester of a four-year, eight semester undergraduate program were recruited for the study; 747 students responded and after data cleaning, 703 responses were used in the analyses (refer to the Data Analytic Strategy section). Participant recruitment occurred via classroom announcements and notifications within the learning management system. The authors were not instructors of the engineering courses from which participants were recruited. Students were given the option to participate in the research study, which resulted in class credit; those who chose not to participate were not penalized in any way and were given an alternative to earn course credit. Informed consent was obtained from all participants and the Institutional Review Board approved the project.

Procedure

Participants completed an online survey administered via a secure server (i.e., Qualtrics) and the university's learning management system (i.e., Blackboard). The survey was administered roughly three weeks into the semester, prior to the presentation of academic integrity material in the course and reasonably before other courses in the freshman engineering curriculum would have covered academic integrity material. Participants were informed that all responses were confidential and that their course instructors would not be aware of their responses or have access to the data.

Measures

Participants completed a demographic questionnaire including items of biological sex, race/ethnicity, and previous training or education about academic integrity. See Table 1.

Statistical tests (Fisher's Exact Test with response and ANOVA with predictors) were conducted to determine if the demographic variables of biological sex or race should be included as covariates. These tests suggested neither of the demographic variables were needed.

The survey asked participants to report if they had ever cheated *(1 = never cheated, 2 = have cheated, 3 = prefer not to answer)* and then to rate themselves on the following items using a sliding scale:

1. How ethical (E) do you think you are? *(0 = not at all; 7 = extremely)*
2. How common do you think cheating (CC) is at a university like Missouri University of Science and Technology? *(0 = not common, never happens; 100 = extremely common, everyone cheats)*
3. How common do you think plagiarism (CP) is at a university like Missouri University of Science and Technology? *(0 = not common, never happens; 100 = extremely common, everyone plagiarizes)*
4. How much do you know about academic integrity and the related consequences (KC)? *(0 = I know nothing about academic integrity; 100 = I know a whole lot about academic integrity)*

5. How much do you care about academic integrity and the related consequences? (0 = *I do not care about academic integrity*; 100 = *I care a whole lot about academic integrity*)

Variables included are participants' self-perceived ethicalness (E), how common they thought cheating was (CC), how common they thought plagiarism was (CP), their knowledge of consequences (KC), how much they cared about the consequences (C), and if they reported having cheated (NC). These variables, their possible values, and associated summary statistics are displayed in Table 2.

Table 1. Demographic variables of participants

Variable	Values	Percentages
Biological sex	Male	77.4%
	Female	21.9%
	Prefer not to answer	0.71%
Race	Caucasian	85.5%
	African-American	2.13%
	Latino/a	2.56%
	Asian	4.69%
	Native Hawaiian or Pacific Islander	0.71%
	American Indian or Alaskan Native	0.57%
	Arabian or Arabic	0.85%
	Other	1.28%
	Prefer not to answer	1.71%
Previous training/education about academic integrity	Yes	7.40%
	No	92.6%

Table 2. Summary of variables used in modeling

Variable	**Range**	**Mean**	**SD**	**Percent true**
Self-ethics (E)	0–7	5.66	1.17	-
Common cheating (CC)	0–100	36.2	21.6	-
Common plagiarism (CP)	0–100	25.3	18.2	-
Knowledge of Consequences (KC)	0–100	69.3	23.6	-
Care (C)	0–100	83.6	19.7	-
Never cheated (NC)	True, false	-	-	80.1%

DATA ANALYTIC STRATEGY

Since our aim was to predict whether a student would report cheating, observations where participants preferred not to answer the corresponding question (n = 43, less than 6%) were removed. Nonresponse can introduce bias if individuals that did not respond to one or more questions offer systematically different answers to other questions compared to those who completed the entire survey. Evaluation of nonresponse bias in surveys is recommended only when the item nonresponse rate is over 20% (Madans et al. 2023). Thus, with the small percentage of missingness in this study, we assume that the remaining individuals are representative of our population of interest. From that reduced dataset, one participant answered that cheating and plagiarism were ubiquitous, rated themselves as being completely unethical, but at the same time reported having never cheated. This respondent was deemed as not answering the survey in earnest and was removed in the final step in the data cleaning process. In total, responses from 703 students were considered for model building.

A logistic regression model was utilized to predict the probability of a student saying they have cheated from the five quantitative perception measures described in Table 2 (self-ethics, common cheating, common plagiarism, knowledge of consequences, and caring about consequences). A binary predictor variable "training," indicating whether or not the student had received previous training or education about academic integrity (Table 1), was also included as a possible predictor. Neither biological sex nor race/ethnicity were not included in the mode since both were deemed unnecessary as covariates based on prior statistical testing. The goal was to obtain a fitted binary logistic regression model that involves only important predictors.

A backward elimination (Vogt and Johnson 2011) procedure was performed to select the important variables to include in the logistic regression model. This approach starts with the full model and removes variables one at a time until the final model is attained. The full model included: standardized versions of the five quantitative predictors (self-ethics, peer cheating, peer plagiarism, knowledge of consequences, and caring about consequences), the binary predictor (training), all possible two-way interactions, and all possible three-way interactions (all higher order interactions were not included because of the theory of sparsity of effects and the inability to interpret them clearly). There were six linear main effect predictors, 15 two-way interaction terms, and 20 three-way interactions, resulting in 41 considered predictors in total. In light of the sparsity of effects principle, interactions of order higher than three were assumed to be of negligible importance. Before any modeling was carried out, the quantitative predictors were standardized to avoid inducing multicollinearity with the inclusion of interaction terms and to give consistent interpretations of odds ratios from the fitted model.

In order to determine which of the 41 predictors were important, we employed the backward elimination model selection method in SAS 9.4. The primary advantage of this method is that successive F tests are not biased, because the model at the current step is never under-defined, assuming all important predictors are considered in the full model. The final model from backward elimination involved the linear terms self-ethics (E), common cheating (CC), common plagiarism (CP), and knowledge of consequences (KC) along with the two-way interactions E × CP and CP × KC. Hence, none of the three-way interactions had coefficients significantly different from zero. Hierarchy was enforced (i.e., the linear terms of all components of significant interactions were included even if their coefficient estimate was not significantly different from zero).

The predictor variables training and caring about consequences (C) were not retained in the final model. The coefficient estimate, standard error of the coefficient estimate, corresponding p-value, odds ratio estimate, and odds ratio confidence interval for each predictor in the final model are

reported in Table 3. Odds ratios can be interpreted as the multiplicative change in the odds of a student saying they have cheated for a one unit increase in the predictor variable, holding all other predictors constant. Thus, odds ratios for significant predictors that are greater than 1 indicate a positive relationship between the predictor and the odds of a student saying they have cheated, while odds ratios less than 1 indicate a negative relationship. The *p*-value for the Hosmer and Lemeshow Goodness-of-Fit test was 0.61, thus the model does not exhibit a significant lack-of-fit.

Table 3. Fitted binary logistic regression model of academic dishonesty predictors summary

Predictor [a]	**Coefficient estimate**	**Standard error**	***p*-value**	**Odds ratio estimate (95% Wald CI)**
Intercept	-1.51	0.10	<.001	0.22
Self-ethics (E)	-0.34	0.10	<.001	0.71 (0.59, 0.86)
Common cheating (CC)	0.54	0.12	<.001	1.71 (1.36, 2.15)
Common plagiarism (CP)	-0.35	0.13	.006	0.70 (0.54, 0.90)
Knowledge of consequences (KC)	0.01	0.10	.886	1.01 (0.83, 1.24)
E x CP	-0.38	0.11	<.001	0.69 (0.55, 0.85)
CP x KC	0.27	0.11	.014	1.32 (1.06, 1.65)

[a] Participants rate themselves on quantitative measures of self-perceived ethicalness (E), how common they thought cheating was (CC), how common they thought plagiarism was (CP), and their knowledge of consequences (KC).

RESULTS

For the following interpretations, the units of the standardized predictors are standard deviations from the mean. There was a significant main effect of how common peer cheating was perceived (p-value <0.001 for CC, Table 3). This main effect can be interpreted without conditioning on specific values of the other predictors, because it is not a component in either two-way interaction. The more common a student thought cheating was, the more likely the student self-reported cheating, as demonstrated in Figure 1.

Figure 1. The predicted probability of having self-reported cheating

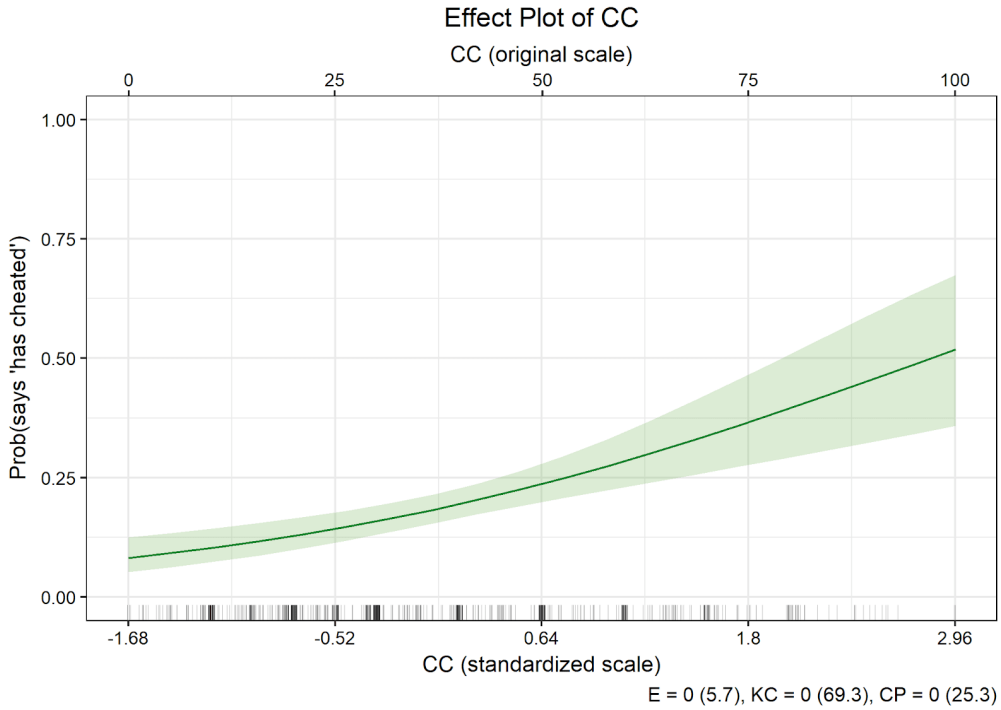

Figure 1. The predicted probability of self-reported cheating, with 95% confidence bands, is displayed versus the student's rating of how common cheating is (CC). The higher CC, the higher the probability. A rug plot representing the observed values of CC in the collected data set is included. The values of the fixed variables are in the lower right portion of the plot, and the original scale values are within parentheses. Created in R 3.4.3 using package ggplot2 2.2.1.

More specifically, for fixed values of self-ethics, common plagiarism, and knowledge of consequences, a one unit increase in the rating of common cheating resulted in a 71% increase in the odds that a student self-reported cheating (derived from the odds ratio estimate of 1.71 for common cheating; see Table 3).

There were significant main effects of self-ethics (p-value <0.001 for E, Table 3) and common plagiarism (p-value=0.006 for CP, Table 3). However, these main effects cannot be interpreted without considering the significant two-way interactions between self-ethics and common plagiarism (p-value<0.001 for E x CP, Table 3) and between common plagiarism and knowledge of consequences (p-value=0.014 for CP x KC, Table 3). There are many equivalent ways to describe the meaning of these interactions, so for the sake of succinctness, an interpretation from a single perspective is presented here. Specifically, these analyses examine how the common plagiarism rating impacted the effect of self-ethics and knowledge of consequences in survey responses. Moreover, this is done via assessment of the impact on the log odds of saying one had cheated.

First, suppose the values of common cheating, knowledge of consequences, and common plagiarism (CP) are fixed. Then, the log odds of saying one had cheated changes by -0.34 + (-0.38)*CP for a unit increase in the student's rating of their ethics. This relationship is derived from the coefficient estimate of self-ethics (E) and the coefficient estimate of the interaction between self-ethics and common plagiarism (E x CP) in Table 3. When common plagiarism is fixed above -0.90 (or above -0.8986 to be more precise), the quantity -0.34 + (-0.38)*CP will be negative. An increase in one's rating of their ethics results in one being less likely to say they did cheat; that increase has the opposite effect when common plagiarism is fixed below -0.90. Figure 2 (left panel) provides a

visualization of this approach for interpreting the E x CP interaction. The predicted probability of having cheated is provided on the y-axis and the common plagiarism value is reported on the x-axis, with different panels that represent increasing values of self-ethics from bottom to top. The vertical gray line represents the value -0.90. It can be observed that the effect of increasing self-ethics (going from bottom to top) decreases the predicted probability of having cheated for values of common plagiarism above the line, whereas the self-ethics effect is the opposite for values of common plagiarism below the line. The coefficient estimate and odds ratio for the linear term of self-ethics in Table 3 is a special case where CP = 0. There, a unit increase in the rating of one's ethics results in about a 29% decrease in the odds of saying one cheated.

For the second interaction term (common plagiarism × knowledge of consequences) in the final model, suppose the values of self-ethics, common cheating, and common plagiarism are fixed. Then, the log odds of saying one has cheated change by 0.01 + (0.27)*CP for a unit increase in the student's rating of their knowledge of consequences. This relationship is derived from the coefficient estimate of knowledge of consequences (KC) and the coefficient estimate of the interaction between common plagiarism and knowledge of consequences (CP x KC) in Table 3. Therefore, when common plagiarism is fixed above -0.05, or -0.0528 to be more precise (i.e., the rating is essentially above average) increases in reported knowledge of consequences was associated with being more likely to report having cheated; that increase has the opposite effect when common plagiarism is fixed below the average. Figure 2 (right panel) provides a visualization of this approach for interpreting the CP x KC interaction. The x and y axes are the same as described earlier for E x CP, but now the different panels represent increasing values of knowledge of consequences from bottom to top. The vertical gray line represents the value -0.05. It can be observed that the effect of increasing knowledge of consequences (going from bottom to top) increases the predicted probability of having cheated for values of common plagiarism above the line, whereas the knowledge of consequences effect is the opposite for values of common plagiarism below the line. The coefficient estimate and odds ratio for the linear term of knowledge of consequences is a special case when CP = 0. In that scenario, knowledge of consequences does not have a significant impact on the probability of a student saying they cheated (*p*-value=0.886 for KC in Table 3).

Figure 2. Effect plots for the interaction terms

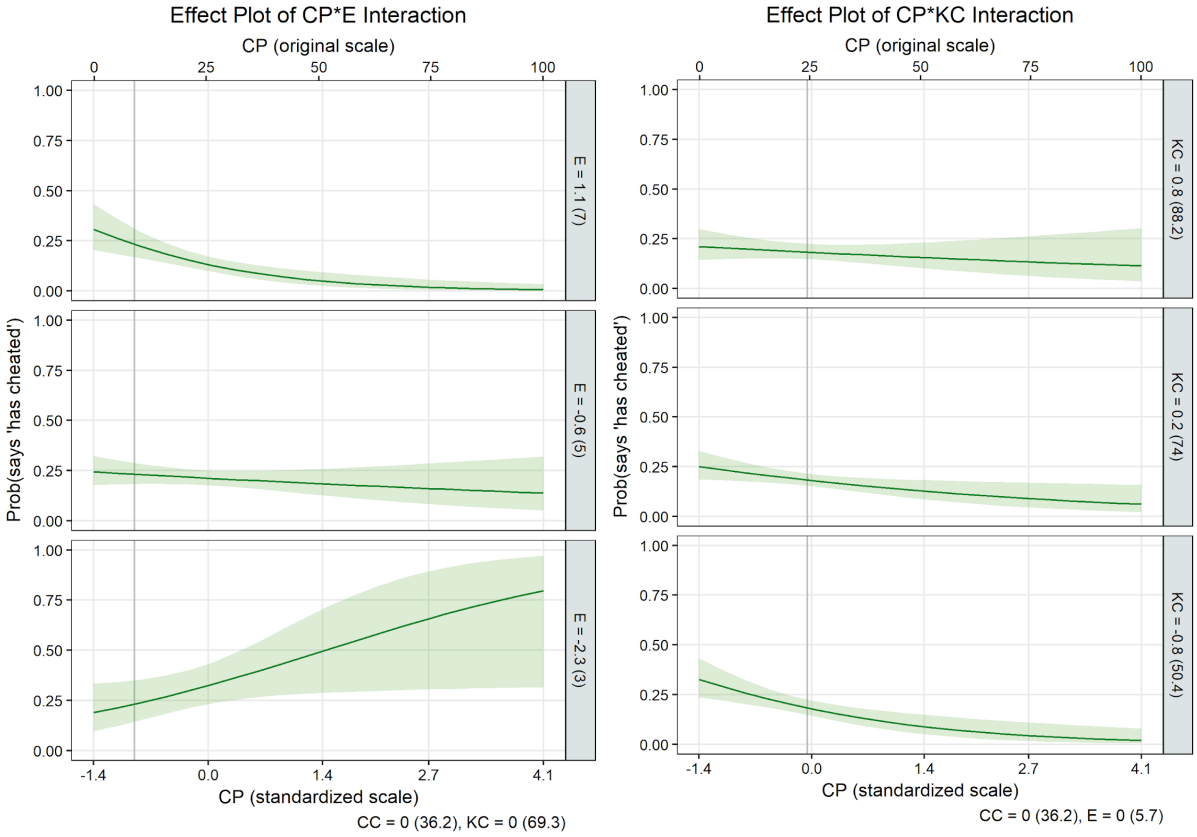

Figure 2. The predicted probability of reporting cheating, with 95% confidence bands, is displayed versus the student's rating of how common plagiarism is (CP). The nature of the CP × E and CP × KC interactions are illustrated in the plots on the left and right, respectively. The vertical gray line identifies the value of CP at which the impact of the other variable involved in the interaction changes directions. The values of the fixed variables on the original scale are within parentheses and were chosen based on the nature and distribution of the responses. Created in R 3.4.3 using package ggplot2 2.2.1.

DISCUSSION

The purpose of this study was to examine if self-perception of one's ethics, knowing the consequences for academic dishonesty, and perceived social norms predict the probability of having cheated. Some of these results are more straightforward and easier to conceptualize than others.

One of the more straightforward results pertains to the perception of cheating among peers and self-reported cheating. The more common one perceived cheating to be among their peers, the more likely they were to report cheating themselves. Our analyses do not allow for causal conclusions to be drawn, only to comment on the increased probability. However, this result is consistent with Jordan (2001)—the more one cheated, the more one perceived their peers to be cheating.

The two-way interactions between common plagiarism and self-ethics and between common plagiarism and knowledge of consequences are more difficult to put into context. On one hand, it seems intuitive that as one's perceived self-ethics increases, the probability of reporting cheating would decrease. Individuals who view themselves as ethical people would be less likely to report cheating or acting unethically. This result seems in line with the finding that prudent students participate in unethical behaviors less frequently (Kisamore, Stone, and Jawahar 2007). Yet, the

common plagiarism and self-ethics interaction suggests that this holds only for a certain range of common plagiarism ratings (about one standard deviation below the mean). The common plagiarism and self-ethics interaction suggests that when self-ethics is low, and the more common students perceive plagiarism to be among their peers, the higher the probability of reporting cheating. Yet when self-ethics is high and plagiarism is perceived to be more common, the probability of reporting cheating decreases. Thus, if one's self-perception is not particularly ethical and one also perceives plagiarism among their peers as commonplace, they are more likely to have cheated. But for those who report they are ethical people, even when they perceive plagiarism as common among their peers, they are less likely to report having cheated. Perhaps these students' sense of ethics may override the influence of peer perception, meaning they are less likely to report having committed academically dishonest behavior even when they perceive it as common among their peers. This finding is interesting to note, especially given the extant literature suggesting the strong influence of peer perception.

The interaction between common plagiarism and knowledge of consequences suggests that the more one knows about the consequences of academic dishonesty, combined with a perception of plagiarism as less common, the lower the probability of self-reported cheating. When plagiarism is perceived as more common among one's peers, the probability of self-reporting cheating slightly increases. Perhaps even if one is aware of the potential consequences, this knowledge holds less influence upon one's own reported behavior if one believes dishonesty is common.

This study is not without limitations. First, students were assessed about three weeks into their first semester. When reporting cheating, it is possible they were referencing misconduct committed during high school. However, as previously mentioned, early research often intentionally did not survey freshmen for this very concern, and we were aware of this limitation when selecting our sample. Additionally, cheating, plagiarism, and other unethical behaviors don't usually occur in isolation. Self-reported previous acts of dishonesty predict unethical behavior and academic dishonesty throughout college (Harding et al. 2007). Furthermore, this study asked an open-ended question ("have you ever cheated"); thus, we are unable to parse between types of dishonest behaviors (e.g., using paper mills or ghost writers). Second, when asked about their peers at "a university like this one," perhaps freshmen had not had enough time to formulate or solidify a perception of their college peers that early in the semester. This lack of acculturation to the university may account for the common plagiarism and self-ethics interaction in which one's report of cheating differed with high and low self-perceived ethics even when plagiarism was perceived as common. When a group's identity is not salient, individuals rely less on the group beliefs and more on their personal identities (Binning et al. 2014). When group norms are salient, individuals become more easily influenced by the group. If freshmen had not yet established a salient peer group, they may have relied more upon their personal sense of ethics than perceived peer behaviors. Indeed, Pulfrey, Durussel, and Butera (2018) studied third-year students and suggest that group loyalty can lead to justification of collective cheating behaviors. If we accept the data that 80% of freshmen have not cheated when surveyed early in their first semester, perhaps the development of group loyalty throughout the college experience can help us conceptualize this discrepancy with the extant literature reporting high rates of dishonest behavior among college students. Third, one of the methodological issues surrounding behavioral research is the effect of social desirability reporting (SDR) (Macfarlane, Zhang, and Pun 2014). SDR is the tendency for participants to report the behaviors and/or attitudes they believe the researcher and/or others to find socially acceptable. For this reason, reports of cheating may be underrepresented. However, the data were collected online via a self-administered questionnaire, rather than an in-person interview, as is recommended to reduce SDR

effects (Macfarlane, Zhang, and Pun 2014). Fourth, our survey consisted of single-item measures, which limits our ability to assess the survey validity and reliability. While a brief survey has advantages as a research tool (ease of administration, less participant fatigue), it can be disadvantaged by the lack of psychometrics for its application within a cross-sectional design. Fifth, generalizability is limited by the demographic information collected; without additional participant data (e.g., nationality), caution should be taken when generalizing these results. Additionally, this study was conducted prior to the most recent developments in artificial intelligence as it applies to higher education, meaning the results should be considered within this perspective.

One strength of the study is the large, representative sample of freshmen engineering students. This sample of predominantly white, male engineering students represents the university at large. Secondly, this study targeted first-semester freshmen. Harding et al. (2004) found a positive relationship between self-reported academic dishonesty in high school and self-reported current academic dishonesty in college—the more frequently one reported cheating in high school, the more frequently one reported cheating in college. Bratton and Strittmatter (2013) observed that previous academic dishonesty among business students positively correlated with future attitudes toward ethics in the workplace. Indeed, past behavior is one of the strongest predictors of future behavior (Ouellette and Wood 1998). While not causal, our results appear congruent with this literature.

Given that engineering students have one of the highest rates of unethical academic behavior among disciplines (Harding et al. 2007; McCabe 1997; Newstead, Franklyn-Stokes, and Armstead 1996; Yeo 2007), which could result in potentially disastrous effects in the workplaces, assessing prior dishonest behavior among freshmen engineering students is important. Should assessment indicate a need for preventative efforts, freshmen are poised to receive early intervention aimed at decreasing integrity infractions. Indeed, Passow and colleagues (2006) assert that preventative efforts that encourage students not to cheat align with overarching institutional goals, such as preparing students for professional roles post-graduation. Additionally, Peculea and Peculea (2020) strongly encourage extensive conversations between faculty and students as well as educational opportunities (i.e., seminars) to address academic dishonesty and the associated consequences.

Indeed, there are many ways students can be informed of academic integrity policies (e.g., policies can be included in the course syllabus, discussed on the first day of class, instructors can remind students prior to exams/assignments). Given the discrepancy between what students and faculty may consider cheating (McCabe 1992), instructors should clearly state what they consider dishonest behavior at the start of every assignment and assessment. Moreover, it is integral for instructors to clearly state how they will respond to any infractions so students are aware of the consequences for dishonesty. Keith-Spiegel et al. (1998) maintain that consistently confronting infractions of academic honesty is incumbent upon instructors as it is integral to helping students develop moral character.

Additionally, instilling the importance of ethical behavior can begin at an institutional level before classes start. A culture of ethics is associated with fewer incidents of misconduct (Dix, Emery, and Le 2014; McCabe 1997). One approach could be to discuss the honor code and inform students of the consequences of misconduct during orientation week or at convocation. It is important that all faculty, but especially new instructors, are also informed of any institutional-wide procedures for handling misconduct. After instructors confront misconduct, the student may be referred to an office of higher administration for intervention or sanctions (Beasley 2014) and faculty need to be aware of this process and the rationale behind adhering to it. A central office allows to track repeat offenders across courses, departments, and years. More importantly, as instructors implement their own policy, they should also report the incident in order to establish a larger culture of ethics.

Within the context of behavioral choice theory, if students are engaging in misconduct as a function of a lack of alternative reinforcers to act with integrity and a lack of environmental constraints (i.e., consequences), even if they perceive themself to be ethical, this suggests utilitarian action (Collins, Judge, and Rickman 2007) more than a personal character deficit. Even if students view themselves as ethical individuals, students may make the choice to cheat, of they feel as if they are steeped in a culture of dog-eat-dog competitiveness (or perhaps pressure to maintain a certain level of performance to retain scholarships/financial aid) (Peculea and Peculea 2020). Therefore, there's even more reason to cultivate a system-wide culture of ethics—and to reinforce it in each classroom.

More than being punitive, interventions should address the student's emotional response to being caught. According to Graupmann and Streicher (2013), emotions are formed in response to events relevant to the individual. An event resulting in a positive emotion is likely to be repeated, whereas an event resulting in negative emotion is likely to be altered in the future or not repeated at all. Unethical behaviors are more likely to be repeated unless they are followed by negative emotion (e.g., guilt) or consequences (e.g., a failing grade). In light of these trends, students mandated to an intervention for their misconduct may benefit not only from a tangible consequence but also a discussion addressing their emotional reaction as it relates to their self-ethics. Another benefit of intervention is that it provides an opportunity to identify other reasons students may act dishonestly (e.g., lack of study time due to other obligations, need to improve language skills, lack of interest or understanding of the relevance of course content) and assist the student accessing the appropriate resources.

However, preventative measures to combat academic dishonesty may be more helpful than trying to punish students for infractions. The results of the current study can inform such prevention efforts. Given that past behavior predicts future behavior, assessing whether freshmen students have previously cheated can inform prevention efforts. As demonstrated by this project, such assessment is relatively simple to implement through introductory courses without significant additional burden to instructors. Departments could add an ethics component to such courses, tailored to reflect the honor code, policies and procedures for infractions, and discipline-specific expectations while institutional data management or other administrative offices track the data. If an institution has an established central office to respond to misconduct, and has been collecting data in an effort to track incidents among their student population, this data could be utilized in social norming campaigns. Specifically, aggregated data can be posted on the university's homepage, in social media, and other forms of distribution to more accurately represent the student attitudes and behaviors. For example, brief messages such as "Most students say they drink about 2½ drinks on a typical night" have been used to correct misperception of peer behavior and reduce risky drinking (Partners in Prevention 2016). We can apply how social norming has been used to target alcohol use among college students to preventative efforts aimed at reducing academic misconduct and correcting misperceptions of peer behaviors (based on these data: "80% of our freshmen haven't cheated"). Of course, any university-wide message would want to be constructed on a large, representative sample of their student body rather than a single survey, but we offer the example to illustrate the point. Assessing students' perceived ethics and their perception of peers can be beneficial to establishing positive social norms and a step toward a culture of ethics.

CONCLUSION

Students' perception of cheating among their peers plays an important role in understanding academic dishonesty, as does their knowledge of the consequences for such behaviors. One's self-

perception of how ethical they are is also an important factor to consider. Understanding these person-centered variables within the larger system-centered focus on academic honesty is integral, and perhaps even more relevant for first-year university students who are embarking upon their higher education pursuits. Given our understanding of social norms and behavioral choice theory, we encourage preventive and educational efforts within higher education institutions.

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The authors have no disclosures.

ETHICS

Research was approved through the Missouri University of Science and Technology ethical review process.

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