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Clues to fostering a program culture of academic integrity: findings from a multidimensional regression model

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Abstract

Using multivariate regression, we identified situational, personal and contextual variables correlated with business students' self-reported rates of academic misconduct. The most influential predictors of increasing academic misconduct were: higher estimates of peers' academic misconduct, increasingly negative perceptions of the program's academic integrity culture, and rating questionable academic behaviours less seriously. Individual priorities, personal characteristics and social support were less influential. We then analyzed our quantitative results in light of our deep understanding of the broader context to derive richer insights from the interplay of our independent variables. Importantly, our results indicate that program-led proactive messaging designed to foster a culture of academic integrity can effectively buffer tendencies towards academic dishonesty. Absent ongoing messaging, however, increasing academic pressures may erode those initial benefits. Moreover, repercussions of major academic integrity breaches can be long lasting, suggesting an even greater need for fostering a culture of academic integrity a priori. Finally, we recommend a public health practice of identifying positive deviants – individuals who thrive in challenging environments – and then in an effort to change a peer support system that fosters academic misconduct into one that discourages it, engaging with those individuals to understand why and how they resist the status quo.

Keywords: Academic integrity, Academic misconduct, Cheating, Academic policy, Multivariate regression analysis, Academic integrity culture scale, Impostor phenomenon scale, Social support, Peer norms

Introduction

Academic misconduct, or more colloquially cheating, is not a new phenomenon. In what is typically cited as the initial major study of cheating across universities, Bowers (1964) surveyed more than 5400 students from 99 post-secondary institutions across the United States.[1] His report provided systematic estimates of cheating in post-secondary environments as well as identified relationships between cheating frequency

[1] This is not to say that he was the first to study academic integrity. Indeed, Bowers (1966) notes in his dissertation, which mirrors his 1964 report but also includes a theoretical grounding comparatively absent in the earlier report, that in 1965 the Russell B. Stearns Institute at Northeastern University published a *Bibliography on Academic Dishonesty* that listed more than 400 publications on the subject.

and individual characteristics such as value-orientation and academic performance, the influence of peer behaviours and attitudes, and characteristics of the institutions. In 1990, McCabe and colleagues picked up Bowers' research. Over nearly two decades they conducted a series of large-scale, multi-campus studies that identified changing rates of and attitudes toward academic dishonesty, as well as individual, peer and university factors (e.g. whether the university had an honour code) that correlated with higher levels of cheating (see McCabe 2005 and McCabe, Treviño, & Butterfield 2001 for summaries of their research program).

McCabe's and colleagues' studies, along with others, have been important for generating base rates among different types of institutions and populations. For example, multiple studies found that business majors engaged in higher levels of academic dishonesty than their peers in other majors (Baird 1980; Bowers 1964; McCabe 1997; McCabe, Butterfield, & Treviño, 2006) – a finding which extended to students who intended to have careers in business regardless of their major (McCabe & Treviño, 1995). With few exceptions (e.g. Antion & Michael 1983; Jackson, Levine, Furnham, & Burr 2002; McCabe et al. 2006; McCabe & Treviño, 1993; Michaels & Miethe 1989), however, we found that prior research mostly relied on percentages and bivariate analyses to analyze factors in isolation rather than use more sophisticated techniques to investigate the simultaneous influence of multiple factors on academic integrity. As such, one objective of our research was to use regression analysis to provide a deeper investigation of factors correlated with students' propensities to engage in academic misconduct. In doing so we shed light on why there has been considerable variation among prior findings, particularly with respect to the strength of the relationships between individual factors and academic dishonesty (Crown & Spiller 1998). Second, we uncovered important new dimensions of students' behaviours that were related to academic integrity – such as the extent to which students believed they were competent – that to our knowledge had rarely been linked to academic dishonesty. Third, we demonstrated the power of combining quantitative analysis with a rich knowledge of the broader context to reveal findings and implications that would not have been identified without the integration of both sources of knowledge (Jones & Bartunek 2021).

Literature review

Figure 1 provides an overview of the model that we developed based on prior literature. Our inclusion of variables was guided by the generally agreed upon finding that both situational and individual factors influence the extent to which 1) students engage in academic misconduct (Burton 1963; Crown & Spiller 1998), and 2) individuals make ethical decisions more generally (Ford & Richardson 1994). More specifically, we opted to include variables, such as personal priorities, for which there was relatively consistent support in the past; variables, such as those related to mental health and perceived institutional support, that were comparatively novel, but reflect increasingly important issues on university campuses (Cooke & Huntly 2015; Duffy 2019); and variables, such as gender, for which findings from prior research were inconsistent. For this last category, we referenced conflicting findings and wrote our associated hypotheses in the form of the dominant findings.

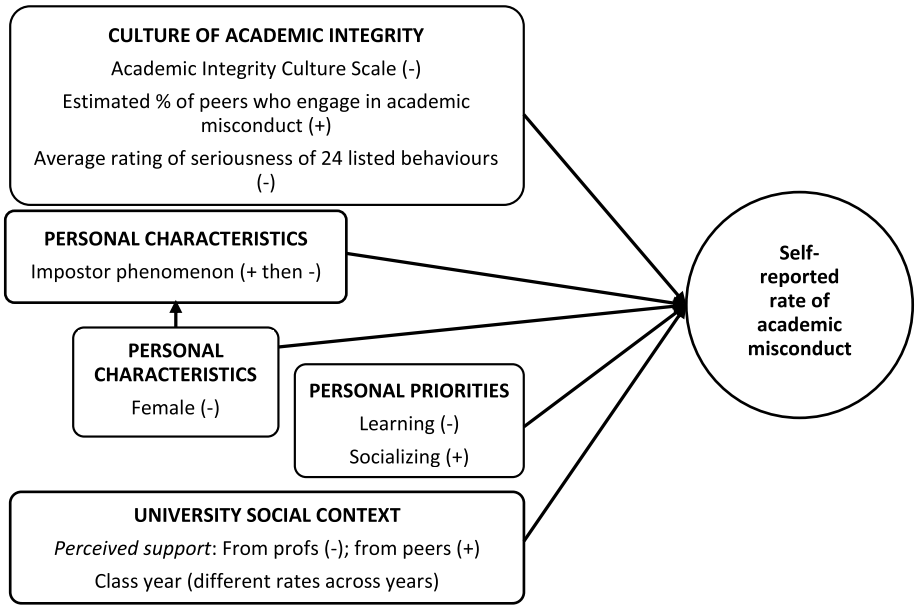

Fig. 1 Factors influencing academic misconduct. Source: Created by the authors

Culture of academic integrity

Many universities have academic integrity policies in place to educate students and faculty about academic integrity, lay out the process to be followed if academic misconduct is suspected, and inform the community of the range of possible sanctions. These policies are necessary, but by no means sufficient, to create a culture on campus in which academic integrity is fostered and respected. Importantly, students may not understand the legalese of the policy, dismiss the policy as something that is required, but not supported nor believed in, and/or be under the impression that the policy is not enforced. Building on prior research that found that the extent to which students felt that peers and faculty accepted, understood and enforced their policy negatively correlated with rates of cheating (Jackson, et al. 2002; McCabe, et al. 2006) we hypothesized,

> Hypothesis 1: The less students think that they, their peers and professors understand, believe in and support the school's academic integrity policy, the more academic misconduct in which they will self-report engaging.

Students claim that they cheat not because they want to cheat, but because they feel that it is necessary to remain competitive (McCabe & Treviño, 1993). More generally, prior researchers consistently found that students who thought that their peers disapproved of cheating, who witnessed fewer of their peers cheating and/or who believed fewer students engaged in academic misconduct, engaged in less academic misconduct themselves (Bunn, Caudill, & Gropper 1992; Chapman, Davis, Toy, & Wright 2004; McCabe et al. 2006; Michaels & Miethe 1989). We expected that these prior findings would continue to be relevant. Specifically,

> Hypothesis 2: The more students think their peers are engaging in academic misconduct, the more academic misconduct in which they will self-report engaging.

While certain behaviours, such as copying from peers' work during a final exam, are widely agreed upon as academic misconduct, there is less agreement about whether other common behaviours constitute academic misconduct (Bens 2022). For example, some students may consider sharing their assignment answers with a fellow classmate as helping a friend study, while others may label the same activity as helping that friend to cheat (Scrimpshire et al. 2017). Put differently, while the policy may say its academic misconduct, and faculty and administration may think the academic misconduct is serious, students may not. And this belief – about the perceived seriousness of cheating behaviours – was found to significantly correlate with both intentions to cheat (Allen, Fuller, & Luckett 1998), as well as levels of self-reported cheating (Jackson, et al. 2002; Michaels & Miethe 1989). Thus, echoing prior research we suggested,

> Hypothesis 3: The less seriously students view academic misconduct, the more academic misconduct in which they will self-report engaging.

Personal priorities

Comparing the study habits of those who cheated to those who did not, Bowers (1966) reported that a greater percentage of cheaters spent less time engaged in a number of specific study habits and spent fewer hours overall preparing for their courses. Bowers (1966) subsequently classified students based on the extent to which they valued social and/or intellectual characteristics among their peers. He found that those who placed a high value on social and low value on intellectual characteristics were the most likely to cheat during college, while those with the opposite values (low social, high intellectual) were the least likely to cheat. Bowers (1966) also showed that when the level of one of the values was held constant the other continued to influence the likelihood of cheating.

The students in Bowers' (1966) sample were also asked what they thought was the most important purpose of a college education. Echoing the relationship between what they valued in their peers and the likelihood of being a cheater, Bowers (1966) found that those who saw learning as being most important were least likely to cheat while those who ranked social aspects as most important were most likely to cheat. More recently Newstead, Franklyn-Stokes, and Armstead (1996) asked students in an open-ended question to indicate their main priority for being in school and then classified students into four groups: those who were using it as a stopgap (i.e. passing time), as a means-to-an-end (e.g. better job), for personal development (e.g. learning) and an "other" category. Consistent with earlier findings, there were significant differences in the level of cheating between students in each of these groups; those in the stopgap had the highest level of cheating and those in the personal development group displayed the lowest average levels of cheating. From these prior findings we hypothesized,

> Hypothesis 4: The lower students prioritize learning, the more academic misconduct in which they will self-report engaging.
> Hypothesis 5: The higher students prioritize socializing, the more academic misconduct in which they will self-report engaging.

Personal characteristics

Gender has long been considered a factor that influences how frequently students engage in academic misconduct. For example, in one study of 200 students from two universities, students believed nearly universally (97 and 96 percent respectively) that male students cheated more often than female students (Aiken 1991). Many prior studies confirm their beliefs. Male students reported cheating more often than female students in testing situations (Aiken 1991; Barnes 1975; Davis & Ludvigson 1995; Fakouri 1972), as well as more generally (Baird, Jr., 1980; Jackson, et al. 2002; Michaels & Miethe 1989; Newstead et al. 1996). Yet, as Bowers' (1966) early work hinted, the relationship may be more nuanced. He found that the modestly higher cheating levels among male students largely disappeared or even reversed slightly when other variables such as the characteristics of the schools that male students and female students attended were considered. Still, other studies reported no significant gender differences (Haines, Diekhoff, LaBeff, & Clark 1986; Perry, Kane, Bernesser, & Spicker 1990) and a few studies concluded that, at least in certain situations, female students were more likely to engage in academic misconduct (Jacobson, Berger, & Millham 1970; Leming 1980). Despite these exceptions, the most frequent finding based on our review of the literature was that male students demonstrated greater levels of academic dishonesty and as such we hypothesized,

> Hypothesis 6: Male students will self-report engaging in more academic misconduct than female students.

We were curious how personality traits or tendencies might influence cheating behaviour and were particularly interested in the impostor phenomenon, which refers to the tendency for one to discount positive feedback related to one's intelligence and overemphasize instances of failure (Clance & Imes 1978). In short, individuals, who by many objective measures are intelligent, do not believe themselves to be so and continually worry that their "true" unintelligent self will be discovered. Impostorism was shown to be a predictor of student mental health among minority populations (Cokley, McClain, Enciso, & Martinez 2013), and to be related to, but conceptually distinct from measures of depression, self-esteem, social anxiety, and self-monitoring (Chrisman, Pieper, Clance, Holland, & Glickauf-Hughes 1995). As such, we argued that impostorism does a good job of capturing many of the insecurities facing today's undergraduates and particularly female undergraduates in competitive and more traditionally male dominated disciplines (e.g. business, engineering), who, as Clance & Imes (1978: 244) summarize in their initial paper on the phenomenon, "maintain a strong belief that they are not intelligent; in fact, they are convinced that they have fooled anyone who thinks otherwise."

In our review of the literature we found one study that connected impostor phenomenon to cheating behaviours. In a small study, Ferrari (2005) compared the rates of self-reported cheating behaviours between those in the bottom and top quartiles of his sample based on their scores on the impostor phenomenon scale and found that non-impostors were significantly more likely to report that they cheated on tests and plagiarized on assignments. Unfortunately, because Ferrari (2005) chose to divide his sample into four groups and focus only on the extreme subsets of the sample we know neither where along the scale those in each quartile placed (i.e. if the population skewed toward impostor feelings than even those in the bottom quartile may have had considerable

feelings of being an impostor) nor how the relationship unfolded over the continuous scale. Therefore, to gain a better understanding of the possible nuances between impostorism and academic integrity we turned to findings that highlighted the relationship between similar concepts as clues to what we might expect for the relationship between academic integrity and impostorism.

In an early study of female undergraduates, Aronson and Mettee (1968) found that those who were randomly told they had low self-esteem were more likely to subsequently cheat in a game of cards than those who had not received any feedback or those who were told they had high self-esteem. The researchers noted that this occurred even though the behaviour of cheating was neither directly, nor specifically, related to self-esteem. In later work, Ward (1986) compared levels of cheating on a self-graded assignment and found that women who had low self-esteem cheated significantly more than women who had high self-esteem, but that there was no correlation between self-esteem and cheating among men. Researchers reported similar findings when grouping students based on self-satisfaction, which they measured as the degree to which their aspirations and expectations of success were congruent with one another (Jacobson, et al. 1970). Regardless of gender, students who were classified as Type-A personalities cheated more often on an experimental test than students who were classified as Type-B personalities in both competitive and non-competitive situations (Perry, et al. 1990). Similarly, male and female students who demonstrated both a large discrepancy between aspirations and expectations and a high need for approval were more likely to cheat on an experimental test than those who were not high on both dimensions (Jacobson, et al. 1970). The need for external validation (Clance & Imes 1978) and "self-inflicted excessive standards for achievement [that] lead to the creation of unrealistic goals that are ultimately unachievable" (Parkman 2016: 52) are two hallmarks of the impostor phenomenon.

In a different study, Millham (1974) found that both male and female students who altered their score on an experimental test scored significantly higher on a need for approval scale. Among those who cheated in Millham's (1974) study, however, only female students demonstrated a significant correlation between need for approval and level of cheating with higher levels of need for approval correlating with lower levels of cheating. Using their scores on subscales of the need for approval scale as evidence, Millham (1974) argued that these students changed their scores only to the extent that they would avoid censure but not so much that they would obtain approval for outstanding or even average work. Similarly, individuals high in impostorism sometimes engaged in self-handicapping activities meant to sabotage their success on a particular test because they believed they were not worthy (Clance & Imes 1978; Ferrari & Thompson 2006).

Extending Millham's (1974) finding between need for approval and rates of cheating to the impostor syndrome's influence on academic dishonesty suggested that the relationship may be curvilinear with an initially positive correlation between feelings of being an impostor and rates of academic misconduct turning to a negative correlation for those scoring at the highest levels of the scale.

> Hypothesis 7a: There will be a curvilinear relationship between students' average scores on the impostor phenomenon scale and the extent to which they self-report engaging in academic misconduct.

Although prior research suggested that both men and women were susceptible to feelings of impostorism (Kets de Vries, 1990), we suspected that – as with similar concepts of self-esteem or need for approval – the relationship between feelings of being an impostor and engaging in academic misconduct would be stronger for women.

> Hypothesis 7b: The relationship between average scores on the impostor phenomenon scale and the extent to which students self-report engaging in academic misconduct will be stronger for female students as compared to male students.

University social context

In the course of their undergraduate careers, students receive varying degrees of support in helping them navigate their academic, professional and personal lives from their professors and their peers. Drawing on prior research we argued that the extent to which students felt supported by these groups will influence the extent to which they are academically honest.

Students appreciated professors and instructors who had the students' best interests in mind and were available to help them to understand work with which they were struggling (Lawson, Kooiman, & Kuchta 2018). From another perspective, students were less likely to justify cheating when they viewed their professor as competent and trusting and the professor's evaluation methods to be fair tests of their knowledge (Steininger, Johnson, & Kirts 1964). In what could be viewed as a proxy for faculty support, Bowers (1996) found that the percent of students who self-reported cheating behaviours at a school steadily increased as the number of students per faculty member increased. By extension, schools with small numbers of students per faculty member may have fostered an environment where students felt a stronger connection to their professors (i.e. they did not feel anonymous), which in turn meant that they felt more supported in their studies.

> Hypothesis 8: The less students feel they are supported by their professors, the more academic misconduct in which they will self-report engaging.

While we expected that positive social support from faculty members would decrease academic misconduct, we expected that the extent to which students felt that they are supported by their classmates would have the opposite effect. Blum (2009: 5) writes,

> *"[today's] students have been raised to be sociable, and they like to work together, to be in groups…When young people spend time together living, studying, preparing, eating, partying, they are less concerned about tracing influence from one person to another. After all, haven't we told them since early childhood that one of the primary virtues is sharing?"*

In the case of academic integrity, sharing often takes on the form of helping peers to complete assignments, giving them a heads up on the contents of a test that their peer will write later in the day, or positioning themselves so that an exam paper is visible to their friends sitting around them (Barnes 1975; Chapman et al. 2004). Students may be influenced by peers to cheat on assignments (Baird Jr., 1980) and group loyalty and

being a dependable friend could lead to justifying and engaging in academic dishonesty (Pulfrey, Durussel, & Butera 2018).

> Hypothesis 9: The more students feel supported by their peers, the more academic misconduct in which they will self-report engaging.

Beyond support from specific individuals, the longer one is immersed in a social context the more one will learn about that context's culture and norms. In reflecting on their then decade-long research program, McCabe, et al. (2001: 230) mused that students may become increasingly jaded as the positive attitude towards academic integrity that was internalized during first year orientation erodes. Supporting this logic, both Michaels and Miethe (1989) and Allen, et al. (1998) found that students who were in their last year of university were more likely than others to admit to having cheated during university. The latter researchers suggested that perhaps the reason for this was that having been in school longer students may have been exposed to more ways in which they could cheat. In comparison, Haines, et al. (1986) found no relationship between length of time in school and self-reported cheating, but did find a strong inverse correlation between age and likelihood of cheating among a sample of both traditional and mature aged students. Antion and Michael (1983) found neither age nor class year to be related to cheating among community college students. In a more nuanced analysis Bowers (1966) found, not surprisingly, that senior students reported higher overall levels of cheating than lower level classes in response to a question about cheating at any point during their time in university, but when asked about cheating in the prior semester specifically, senior students reported the lowest – and first-year students the highest – levels of cheating. In contrast, Barnes (1975) found that the closer students were to graduation the higher the likelihood of them obtaining answers to a quiz from those who had written the same quiz at an earlier time. Finally, Baird, Jr. (1980) found a more nuanced pattern such that students from different years cheated with differing frequency and in diverse ways. Drawing on these varied findings we concluded,

> Hypothesis 10: Students in different years will self-report engaging in academic misconduct at different rates.

Research setting and context

Our sample consisted of students from a highly structured undergraduate business program in Canada. All courses in the first year were required and students were limited to one elective during their second year. During the third and fourth year of study students took a combination of electives both within the business school and the broader university of which the business school is a part. All required courses and the majority of their business electives were delivered in-person, while non-business, or breadth, electives were completed through a combination of in-class and online options. Through shared classroom, extracurricular, summer internships and living accommodations students spent the majority of their time with their classmates, tended to form close bonds with one another, and often spoke about their community using familial language.

Method

The analysis in this paper drew on variables gathered through an electronic survey that was administered during late March 2019 and was part of a larger study on academic integrity, all elements of which received ethics approval from our university research ethics board. Students who completed the survey received research pool credit for their involvement. There were three key benefits of using the research pool for our study. First, the research pool was made up of our target demographic. Second, participation rates were strong. Notably, all of our allocated slots, which equalled just over half of our student body, were filled. Finally, and perhaps most importantly, through our personal involvement in fostering academic integrity on campus we knew voluntary conversations about the culture of academic integrity tended to draw those who had strong opinions; in contrast, because students recruited through the research pool were often motivated by course credit, we obtained a sample that was likely more diverse and representative of the population as a whole (Sharp, Pelletier, & Lévesque 2006).

The electronic survey was divided into sections with each block of Fig. 1 roughly corresponding to a separate section. The order of the sections was held constant across all surveys, but the order in which students saw the items within scales or groups of questions was randomized (e.g. the list of behaviours students were asked to classify as academic misconduct). This randomization did not extend to questions that used different scales. In other words, groups of questions or scales that relied on different types of responses (e.g. Likert Scales where the scale represented different descriptions) were physically separated in the survey and the scale was repeated every five questions in the survey so that the options that the students were selecting among were always visible.

In order to encourage students to answer honestly, students were reminded that their responses were anonymous. Moreover, in the survey we did not gather data that would enable us to identify the students in any way and students could skip questions that they felt uncomfortable answering.

Sample

Of the 970 students who completed the survey, the responses from 852 students were included in the final analyses. Students were removed from the sample for the following reasons. First, we looked at time to completion. In line with our own test completion times, the median completion time was 26 minutes. Students accustomed to filling out surveys and who began to understand the patterns of the questions could have completed the survey more quickly, but we dropped the bottom 10 percent who finished in 13 minutes or less as we did not feel confident that during that time students would be able to read the questions closely enough to pick up the sometimes subtle but important differences between items. This resulted in dropping 97 students who had an average completion time of a little less than 10 minutes. Another way we identified students who did not meaningfully complete the survey was to look for students who "clicked through" the scales. Although it was possible that students would respond the same to all items in some scales (e.g. indicating that they did not engage

in any academic misconduct in the past academic year), a pattern where at least half of all scales had identical responses for all answers was a clear sign that they were "clicking through". This second screen resulted in an additional 14 students being dropped.

We compared these 111 students with the remaining 859 students on basic demographics and found that those who were marked for removal did not differ significantly by year, but that male students were twice as likely to be removed from our analysis (Pearson $\chi^2(1)=12.36$; $p<0.001$). We note with irony that approximately 11 percent of our sample could be classified as having engaged in academic misconduct while completing a survey about academic integrity!

The remaining seven students were removed for a variety of reasons unrelated to completion time and/or quality of responses and included typical reasons like not being part of the target demographic, not completing all measures included in the regression analysis, or selecting into a gender group with too few students to be able to analyze using statistical methods.

Variables

Table 1 provides the mean, standard deviation and range of responses for all variables for the overall sample. It also reports the means by gender and year in school, which are the two categorical variables in the study. Details of each variable are described below.

Dependent variable: level of engagement in academic misconduct

Students told us whether in the current academic year they had never engaged, engaged once or twice, or engaged more than twice in each of 24 questionable academic-related behaviours (see Appendix A for list).

To compute a self-reported rate of academic misconduct for each student we assigned one point for each behaviour they indicated they engaged in once or twice and two points for those that they indicated they engaged in more than twice. The range of possible scores therefore was from 0 to 48.[2]

Among respondents, 85 percent admitted to engaging in at least one or more of the questionable behaviours in the last year. Although this rate was high, our definition, which included an extensive list of behaviours of varying severity, lends itself to higher reported levels of dishonest behaviour than questions that ask about academic misconduct in either more limited and/or more abstract terms (Bowers 1966). Indeed, using a similar measure to our own Newstead, et al. (1996) reported that 88 percent of their sample of nearly 1000 British university students engaged in at least one of 21 questionable behaviours.

[2] Although our measure does a good job of enabling us to combine both diversity and frequency into a single measure its major shortcoming is that it does not adequately capture students who extensively engaged in one or two serious types of academic misconduct. For example, a student who paid someone to complete every single one of her assignments during the year, but engaged in no other listed behaviour would receive a score of 2; in contrast, someone who engaged once each in four comparably minor types of academic misconduct would receive a score of 4. Given our experience investigating academic misconduct cases, we suspect, however, that such a scenario would be very rare and therefore not have a meaningful impact on the analysis.

Table 1 Mean, standard deviation and range of variables for the full sample and mean by gender and year in school

		Full Sample (*n*=852)				Year in School							
						First (*n*=280)		Second (*n*=256)		Third (*n*=89)		Fourth (*n*=227)	
						Gender		Gender		Gender		Gender	
						M (*n*=152)	F (*n*=128)	M (*n*=120)	F (*n*=136)	M (*n*=36)	F (*n*=53)	M (*n*=92)	F (*n*=135)
Variables	**Type**	**Mean**	**SD**	**Min**	**Max**	**Mean**	**Mean**	**Mean**	**Mean**	**Mean**	**Mean**	**Mean**	**Mean**
Dependent Variable													
Self-Reported Rate of Academic Misconduct	Ordinal	7.05	6.50	0	45	5.76	5.99	7.99	8.26	4.58	5.47	8.02	8.05
Independent Variables													
Average Score on Culture of Academic Integrity Scale	Likert	3.46	.73	1.09	5	3.69	3.86	3.50	3.51	3.26	3.41	3.09	3.08
Estimated Percent of Peers Engaged in Academic Misconduct	Percent	77.97	21.93	0	100	71.70	71.88	76.56	79.40	79.14	80.02	82.34	86.52
Average Perceived Seriousness of Academic Misconduct Behaviours	Ordinal	1.56	.31	0	2	1.57	1.58	1.57	1.58	1.49	1.58	1.55	1.54
Priority of Spending Time Learning	Rank	3.96	2.38	1	11	3.50	3.28	4.58	3.71	3.92	3.45	4.72	4.49
Priority of Spending Time Socializing	Rank	4.34	2.19	1	11	4.53	4.52	4.75	4.35	5.17	4.13	3.37	4.10
Average Score on Impostor Phenomenon Scale	Likert	3.11	.69	1.05	5	2.91	3.29	3.16	2.21	2.94	3.01	2.79	3.21
Average Score on Social Support: Professors Scale	Likert	2.64	.62	1	4	2.72	2.56	2.63	2.42	2.83	2.54	2.84	2.66
Average Score on Social Support: Peers Scale	Likert	3.09	.69	1	4	3.18	3.04	3.08	3.01	2.93	2.86	3.32	3.11

Independent variables: culture of academic integrity

We used a set of five questions asked by McCabe, et al. (2006) as a starting point to create a 5-point Likert scale (strongly disagree (1) to strongly agree (5)) to measure students' perceived understanding, belief in and enforcement of academic integrity policy and culture in the school. To test whether the 16 questions that we asked students held together as a scale, we completed an exploratory factor analysis (EFA) to identify if the items loaded onto one or more factors.

First, using the *factortest* command (Azevado 2003) in *Stata 16* we performed the Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy (KMO=0.86) and the Bartlett's test of sphericity ($\chi^2(120)=4568.09$; $p<0.001$) on the chosen set of variables and concluded based on the results of both tests that the items were appropriate measures for EFA (see Reinard 2006 for guidelines). Next, following the most commonly employed methods in the literature, we analyzed the value of the eigenvalues of the resulting factors to identify which exceeded 1.0 (known as the Kaiser-Guttman rule (Guttman 1954; Kaiser 1960)) and we analyzed the scree plot to visually determine the "elbow" in the plot. Both of these methods recommended retaining two factors. Then, following the "best practice" advice in Osborne, Costello and Kellow (2008) we used the *paran* command (Dinno, 2009) in *Stata 16* to perform Horn's (1965) parallel analysis. Hoyle and Jamieson (2004) argued that factors with eigenvalues significantly greater than the randomly generated eigenvalues from repeated randomly generated samples with the same characteristics of the sample are those that should be retained. Based on this criterion four factors were retained. To facilitate the interpretation, we subsequently rotated the factors using direct oblimin oblique rotation as we expected the factors to have some degree of correlation. Analyzing the loadings on the two, three and four factor models, we concluded that the two-factor solution was most appropriate. Finally, of the sixteen questions included in the section post hoc analyses of both the factors loadings (pre- and post-rotation) and uniqueness score (pre-rotation) suggested that three questions should be dropped. The remaining 13 items were retained with 11 items forming the **Academic Integrity Culture Scale** used in this study and two items creating a scale about the openness with which students speak about academic integrity that was not used in this study. Appendix B includes the 11 questions that compose the Academic Integrity Culture Scale, which in our sample had a Cronbach's alpha of 0.86. Students' scores on the 11 items were averaged to provide a single value per student that ranged from 1 to 5. A higher average score indicated a greater understanding of the policy as well a belief in its acceptance, effectiveness and enforcement among peers and faculty.

To measure the perceived frequency of academic misconduct in the school, students were asked to provide an **estimate of the percent of their peers who violated academic integrity**.[3] Students' estimates ranged from believing that no peers violated academic integrity to thinking that everyone in the program violated academic integrity. On average students thought 78 percent of their peers violated academic integrity, which

[3] At our university we commonly refer to instances of academic misconduct as violations of academic integrity. As this is the language that is most familiar to our student body, it is what we used in the survey. We have found, however, that outside of our university this phrasing is not widely recognized. Therefore, we opted to use the term academic misconduct throughout this article except in instances where we described the specific survey questions to which students were asked to respond.

is lower than the 85 percent of our sample who self-reported engaging in academic misconduct.

As shown in Appendix A, in addition to asking students how frequently they engaged in each of 24 questionable behaviours, we also asked students to indicate if they thought the behaviours were violations of academic integrity and if they were, whether they thought them to trivial or non-trivial. We used their responses to create an average measure of **perceived seriousness of academic misconduct** by adding up their individual scores for each behaviour (0 for not a violation, 1 for trivial violation and 2 for non-trivial violation) and then dividing by 24. A higher average score indicated that students viewed more behaviours as being non-trivial violations.

Independent variables: personal priorities

As part of our larger research project on academic integrity, students were asked to select which of 10 possible competing demands were applicable to them in the past year. These included items like learning course material, attending class, spending time socializing with friends, a partner and/or family, getting good grades, working, and athletics. Among the priorities that students considered to be applicable, they were then asked to rank those priorities from most important (1) to least important (n=number of priorities selected as applicable).[4] For this study we were interested in students' ranking on two priorities – **learning course material** and **socializing**.

Independent variables: personal characteristics

Students selected among male, female, non-binary/third gender, prefer to self-describe [text entry option] and prefer not to specify for gender. One student identified as non-binary/third gender and two preferred not to specify. Their small numbers required dropping them from our analyses. Our remaining sample is composed of 452 **female students** (51% of the program's female students) and 400 **male students** (39% of the program's male students).

The **Impostor Phenomenon Scale** (Clance 1985) included 20 items scored on a five-point Likert scale (not true at all (1); rarely true (2); sometimes true (3); often true (4); very true (5)) and was designed to measures individuals' feelings that they were not as competent or successful as their accomplishments suggested and others believed them to be.[5] In our analysis we used the students' average score on the 20 questions. A higher average score indicated greater feelings of being an impostor.

Independent variables: university social context

We adapted the **Social Support Scale** (Caplan, Cobb, French, Van Harrison, & Pinneau 1980) from a work to academic environment to determine to what extent students felt their professors (in lieu of supervisors) and fellow classmates (in lieu of co-workers) provided emotional and instrumental support in their academic lives. Students responded to the same four questions in relation to their professors and classmates on a four point

[4] For the 32 (4%) and 15 (2%) students who did not select learning or socializing as a priority we assigned them a rank of 11 enabling us to keep these individuals in the study.

[5] As per scale copyright we have received permission from Dr. Clance to use the scale in our work.

Likert-scale (1 (not at all); 2 (a little); 3 (somewhat); 4 (very much)). The Cronbach alphas for the two subscales were 0.76 and 0.82 respectively. Each student received an average score ranging from 1 to 4 for each of the subscales. Higher scores indicated feelings of greater support.

Our sample included 281 **first-**, 256 **second-**, 89 **third-** and 229 **fourth-year students** representing 56, 56, 19 and 46 percent of the students in the first, second, third and fourth years of the program respectively.[6]

Regression analysis

Our dependent variable, **self-reported rate of academic misconduct** lends itself to zero-inflated negative binomial regression analysis as it is an over-dispersed count variable (mean=7.05; variance=42.21) with zero being the most frequent count (15% of the sample). Zero-inflated negative binominal regression combines 1) a logit regression (labeled inflate) to determine if there are differences between those who do not engage in academic misconduct (zero) and the rest of the group and, 2) a traditional negative binomial regression on the count of academic misconduct to simultaneously investigate which variables are significantly correlated with the self-reported rate of academic misconduct. Another feature of zero-inflated negative binomial regression is that the variables in the two parts of the equation may or may not be the same. To identify which variables should be included in the inflate portion we used the two-sample Wilcoxon rank-sum (aka Mann-Whitney) test (Wilcoxon 1945; Mann & Whitney 1947) to determine if those who reported no academic misconduct (n=129) and those who scored one or two on our academic misconduct measure (n=125) differed significantly on each of the continuous variables and Pearson $\chi^2(1)$ tests to investigate if there were differences between the two groups in terms of the categorical variables. Our results indicated those who had not engaged in academic misconduct in the past year perceived significantly fewer of their peers to engage in academic misconduct (z score=-2.17 p<0.05). As such, this variable was included in the inflate portion of the equation hypothesizing that this variable predicted whether students engaged in academic misconduct in addition to predicting the rate at which they engaged in academic misconduct. We hypothesized that the remaining independent variables were correlated with how frequently students engaged in academic misconduct, but not whether they did so.

After running the regression analysis on the full sample, we calculated DFBETAS following the instructions provided in Canette (2014). DFBETAS measure the impact that each student's response has on a particular predictor by calculating the difference between the regression coefficient when that student's response is and is not included in the sample. The larger – in absolute terms – the DFBETA, the more potential that that single student has to influence the coefficient and thus mask a significant finding, or vice versa, suggest a predictor significantly influences the dependent variable when it does not. Following Osborne (2015) we converted the DFBETAs to z-scores and then marked those cases that were ± four (n=67), ± five (n=35) and ± six (n=23) standard deviations from the mean on the constant and/or one or more predictors. We then

[6] Two hundred seventy-one third-year students were on exchange when we administered the survey. The percent of those on campus who participated is 47 percent, which is similar to participation rates among other years.

reran the regression three times, excluding successively more cases according to the aforementioned levels. Finally, we compared the results of the four regression models and concluded that dropping the 2.70 percent of individuals in the sample who were ± six standard deviations from the mean DFBETA on the constant and/or one or more predictors best improved the fit of the data. Notably, after an initial large improvement in model fit between the original model (LR $\chi^2(15)=182.00$) and that with the 23 cases removed (LR $\chi^2(15)=236.02$), the improvement in fit after the removal of additional cases was considerably more modest. Comparing the dropped cases ($n=23$) to the remaining sample ($n=829$), the cases dropped from the analysis had a higher mean self-reported rate of academic misconduct than those included in the analysis (mean=18.04 vs. 6.74; z=-5.95, $p<0.001$), they perceived socializing to be less important (mean=5.52 vs. 4.31; z=-1.99 $p<.05$) and were more likely to be male (4.25% of all male students in the sample vs. 1.33% of all female students in the sample were dropped; Pearson $\chi^2(1)=6.90$; $p<0.01$).

Results

Table 2 reports the correlation coefficients between all pairs of continuous variables. Coefficients that were significant at $p < .05$ are bolded. The two categorical variables, gender and year, are included at the bottom of the Table 2. In lieu of correlation coefficients for the categorical variables, we report the z score from the two-sample Wilcoxon rank-sum (aka Mann-Whitney) test (Wilcoxon 1945; Mann & Whitney 1947) to determine if male and female students differed on each of the continuous variables and the Kruskal-Wallis equality-of-population rank $\chi^2(3)$ with ties test (Kruskal & Wallis 1952, 1953) to determine if their responses differed among years. Z scores and $\chi^2(3)$ that were significant at $p < .05$ are bolded. We used these two tests, which considered the underlying distribution of the data for two sample (Wilcoxon rank-sum) or multi samples (Kruskal-Wallis), as many of our variables had unequal distributions and some, such as our dependent variable, were counts. The column labeled (1) in Table 2 provides preliminary support for all main effect hypotheses except gender. While the difference in the self-reported rate of academic misconduct is significant between the two groups, we had hypothesized that males would have higher rates of academic misconduct. In contrast, Table 1 highlights that across all years of school females had higher self-reported rates of academic misconduct.

Table 3 provides the zero-inflated negative binomial regression results for our cleaned final model. When interpreting the coefficients please keep in mind that unlike traditional logit regressions that predict ones, the inflate portion predicts zeros. For example, the negative coefficient on estimated percent of peer academic misconduct in the inflate portion tells us that those in the zero group (i.e. academic misconduct score=0) think that significantly fewer of their peers engaged in academic misconduct (H2 supported); the positive coefficient on the count portion tells us that as the estimated percent of their peers who engaged in academic misconduct increased so too did their self-reported academic misconduct score (H2 supported).

To understand the relative weight of each of the explanatory variables we used the post-estimation *mchange* command (Long & Freese 2014) in *Stata 16* to calculate the predicted increase in the self-reported rates of academic misconduct for a one standard deviation change in each continuous variable. The predicted increases in self-reported

Table 2 Bivariate tests of significance among all variables

Hypothesis	Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
		Pairwise Correlation Matrix								
	Dependent Variable									
	1. Self-Reported Rate of Academic Misconduct									
	Independent Variables									
H1: sup.	2. Average Score on Culture of Academic Integrity Scale	**-.32**								
H2: sup.	3. Estimated Percent of Peers Engaged in Academic Misconduct	**.30**	**-.47**							
H3: sup.	4. Average Perceived Seriousness of Academic Misconduct Behaviours	**-.21**	**.14**	-.02						
H4: sup.	5. Priority of Spending Time Learning	**.13**	**-.13**	.02	-.03					
H5: sup.	6. Priority of Spending Time Socializing	**-.14**	.02	**-.07**	.01	**-.07**				
H7a: main effect sup.	7. Average Score on Impostor Phenomenon Scale	**.11**	**-.11**	**.09**	-.06	.02	**.14**			
H8: sup.	8. Average Score on Social Support: Professors Scale	**-.13**	**.23**	**-.14**	.06	**-.07**	-.02	**-.22**		
H9: sup.	9. Average Score on Social Support: Peers Scale	**.07**	**.08**	-.03	-.01	.06	**-.10**	**-.19**	**.28**	
		Two-sample Wilcoxon rank-sum (Mann-Whitney) test: z score								
H6: not sup.	10. Gender	**-2.45**	-.29	-1.61	.22	**2.14**	.08	**-5.86**	**4.13**	**2.45**
		Kruskal-Wallis equality-of-population rank test: χ^2(3) with ties								
H10: sup.	11. Year in school	**32.09**	**101.96**	**46.74**	3.65	**39.55**	**19.88**	**14.00**	**14.53**	**15.28**

Bolded values indicate that the value is significant at $p<.05$ (two-tailed). The column labeled (1) reports the pairwise correlation between the dependent variable and continuous independent variables and the nonparametric tests between the dependent variable and the categorical independent variables

sup. Supported

Table 3 Zero-inflated negative binomial regression of self-reported rates of academic misconduct

Hypothesis		Coef.	S.E.	95% C.I.	
	Count (Self-reported rate of academic misconduct)				
H1: sup.	Avg. culture of academic integrity scale	-.22***	.04	-.31	-.14
H2: sup.	Est. % peers engaged in academic misconduct	.01***	.00	.01	.01
H3: sup.	Avg. seriousness of violations	-.58***	.10	-.78	-.39
H4: sup.	Learning priority	.02*	.01	.00	.05
H5: sup.	Socializing priority	-.04***	.01	-.08	-.03
H7a: sup.	Avg. impostor phenomenon scale	1.07**	.44	.20	1.93
	Avg. impostor phenomenon scale squared	-.15**	.07	-.29	-.01
H6: not sup.	*Gender*[a]				
	Female	-.04	.96	-1.93	1.84
H7b: not sup.	Female x Avg. impostor phenomenon scale	.12	.62	-1.10	1.34
	Female x Avg. impostor phenomenon scale squared	-.02	.10	-.22	.17
H8: not sup.	Avg. social support from professors scale	-.06	.05	-.15	.04
H9: sup.	Avg. social support from peers scale	.15***	.04	.07	.24
H10: sup.	*Year in school*[b]				
	Second year	.12*	.07	-.01	.25
	Third year	-.37***	.10	-.57	-.17
	Fourth year	-.04	.08	-.19	.11
	Constant	.74	.75	-.73	2.22
	Inflate (predict self-reported rate of academic misconduct=0)				
H2: sup.	Est. % peers engaged in academic misconduct	-.03***	.01	-.04	-.02
	Constant	.30	.37	-.43	1.02
	/lnalpha	-1.16***	.09	-1.34	-.98
Model statistics					
LR $\chi^2(15)$	236.02***				
McFadden R^2	0.06				
Overall N	829				
N with dependent variable=0	129				

coef. coefficient, *avg.* average, *est.* estimated, *S.E.* standard error, *C.I.* confidence interval, *sup.* supported

[a] Male omitted category from gender

[b] First year omitted category from year

* =$p<.05$, ** =$p<.01$, *** =$p<.001$. One-tailed tests for predictors; two-tailed test for model

academic misconduct for the three most influential continuous variables were as follows: 2.14 for each standard deviation change in estimated percent of peers who engage in academic misconduct, 1.11 for each standard deviation decrease in the perceived seriousness of violations, and 1.02 for each standard deviation decrease in the average on the academic integrity culture scale.

To understand the complexities of hypotheses 7a and 7b which posited that there would both be a curvilinear relationship between one's score on the impostor phenomenon scale as well as interaction with gender, the predicted values of self-reported academic misconduct for male and female students at each point along the impostor phenomenon scale were plotted in Fig. 2.

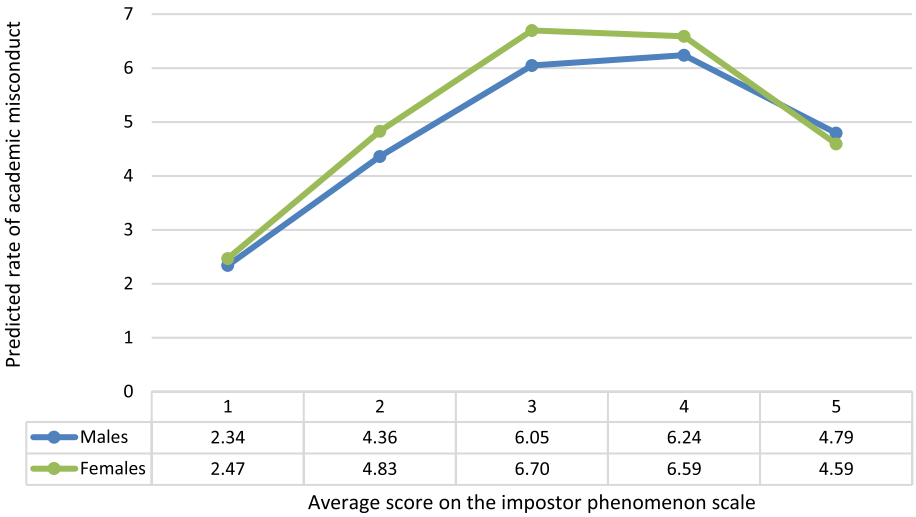

Fig. 2 Predicted self-reported rate of academic misconduct by average score on the impostor phenomenon scale. Note: All other variables in the regression equation held constant at sample mean. See the column labeled mean under full sample in Table 1 for values

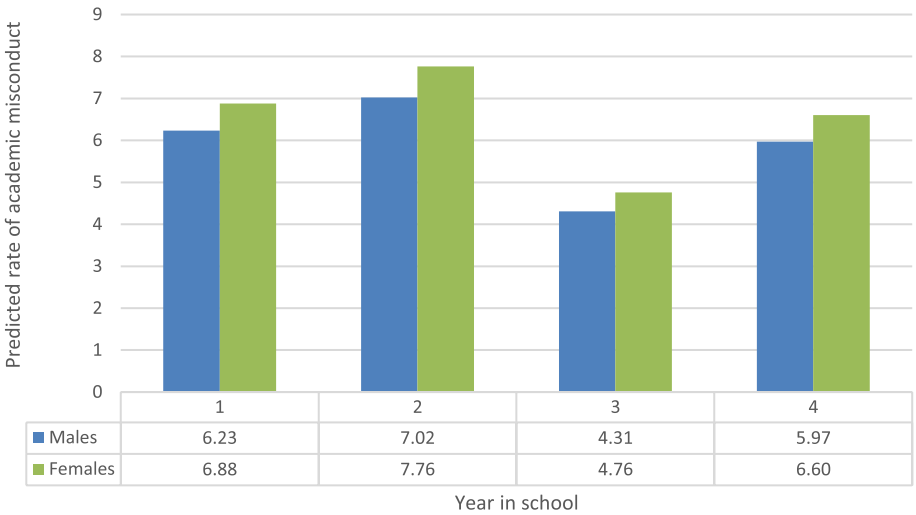

Fig. 3 Predicted self-reported rate of academic misconduct by year. Note: All other variables in the regression equation held constant at sample mean. See the column labeled mean under full sample in Table 1 for values

Figure 3 contains a graph of the predicted self-reported rate of academic misconduct by gender (hypothesis 6) and year (hypothesis 10). Although the female self-reported rates are slightly higher in Fig. 3, the differences are not significant (hypothesis 6 not supported). To determine if hypothesis 10 was supported, we needed to employ post estimation analyses as the regression output in Table 3 only provides information on the relationship between the included categories and the omitted category (e.g. between second- and first-year students), but not between the included categories (e.g. second- and third-year students). The results of these analyses provided support for hypothesis 10 as all pairwise comparisons between years were significant with the exception of the comparison between first- and fourth-year students.

Discussion

In her original conception of the impostor phenomenon scale, Clance (1985) divided individuals into four categories based on their total score on the scale. At the bottom were those who experienced few impostor feelings, followed by those with moderate, frequent and finally intense impostor feelings. In our sample, both men and women were represented in each level of the scale and while men were significantly over-represented in the lower levels (Pearson $\chi^2(1)=12.40$; $p<0.001$ for few; Pearson $\chi^2(1)=17.67$; $p<0.001$ for moderate) and female students over-represented in those with frequent impostor feelings (Pearson $\chi^2(1)=19.53$; $p<0.001$), somewhat surprisingly neither group was over- nor under-represented in the intense feelings of being an impostor group. Our results demonstrated that in addition to feelings of impostorism being gender neutral, both male and female students experienced similar relationships between levels of impostorism and self-reported rates of academic misconduct. More broadly, as some universities begin to incorporate programming on impostor phenomenon into their orientations and student wellness activities (Parkman 2016), our results suggest the need for programming that is gender neutral and fosters a culture of academic integrity.

Both Figs. 2 and 3 show that female students had higher (albeit not significantly so) predicted rates of academic misconduct then male students except for at the upper end of the impostor phenomenon scale in Fig. 2. One explanation for this finding put forward by others is a convergence in gender roles. For example, McCabe et al. (2001: 228) noted women in historically male-dominated majors such as engineering self-reported higher levels of academic dishonesty than female students in other majors and comparable levels to male engineering majors. These individuals spoke of needing "to compete by the 'men's' rules to be successful in this major." Our data, however, provided clues to another possibility, albeit one that we were unable to test directly. Specifically, it may be that female students were more honest in self-reporting their behaviours. In the instances where we could detect actual cheating ("clicking through" the survey) and potential cheating (cases that had DFBETAs that were six absolute standard deviations from the mean on the constant and/or one or more predictors), male students were significantly more likely to be dropped from our sample.

Comparing rates of cheating behaviours across universities, Bowers (1966) and subsequently McCabe and his colleagues (e.g. McCabe 2005), found that the culture around academic integrity at a given university had a profound impact on the prevalence of academic dishonesty at that institution. Thus, one of the shortcomings of this analysis was that it was a deep dive into a single institution and an institution, which given the levels of self-reported academic misconduct, estimated percent of peer academic misconduct, and general attitude towards the culture of academic integrity in the program, did not have particularly positive culture of academic integrity. As McCabe and colleagues (2001: 224) concluded in their review of their own prior work on honor codes, "honor codes must be more than mere 'window dressing'" in order to be effective in reducing campus rates of academic misconduct.

Our results also demonstrated, however, that context matters not just for comparisons between universities, but for cohorts as well. Regression analyses tell you what, but they do not explain why – the latter requiring a depth of knowledge that moves beyond the numbers analyzed. Our knowledge came from open-ended comments at the end of the

students' surveys as well as that gained working in this space as educators, advocates of academic integrity and investigators of academic misconduct in our own classrooms and university more broadly. It is for this reason that we knew that the predicted rates of academic misconduct in Fig. 3, while mathematically correct, were misleading. What the rates told us was that *all else being equal* different years had a different propensity for behaving in academically dishonest ways. But, what we also knew from the data, is that *all else was not equal*. Importantly, the results of the Kruskal-Wallis equality-of-population rank tests in Table 2 show that there were significant differences across years on all of the independent variables except the perceived seriousness of academic misconduct and gender. Put differently, as can be seen in the group means reported in Table 1, each cohort had a unique profile that shaped its experiences, particularly around some of the most influential independent variables. Thus, Fig. 4 shows the predicted academic misconduct per year and gender based on each group's (i.e. first year male students, third year female students) average values on the remaining independent variables. The resulting predicted rates of academic misconduct not only more closely aligned with the reported average rates of academic misconduct for each cohort (see the cohort specific means for self-reported rates of academic misconduct in Table 1), they also provided us with important clues about proactive measures that we can take as educators to help change the culture around academic integrity on campus.

When the students who were in their fourth year in our survey were in their second year of their undergraduate program a major breach of academic integrity occurred that impacted the entire cohort. The details of the breach, which involved the widespread sharing of the content of a midterm, are outside the scope of this paper, but two outcomes of that breach are relevant. First, it provided a wake-up call for faculty and administration, the result of which was a number of course- and program-based initiatives designed to foster a better culture of academic integrity in the program. While some of the messaging was directed at everyone, the bulk of the programming was targeted

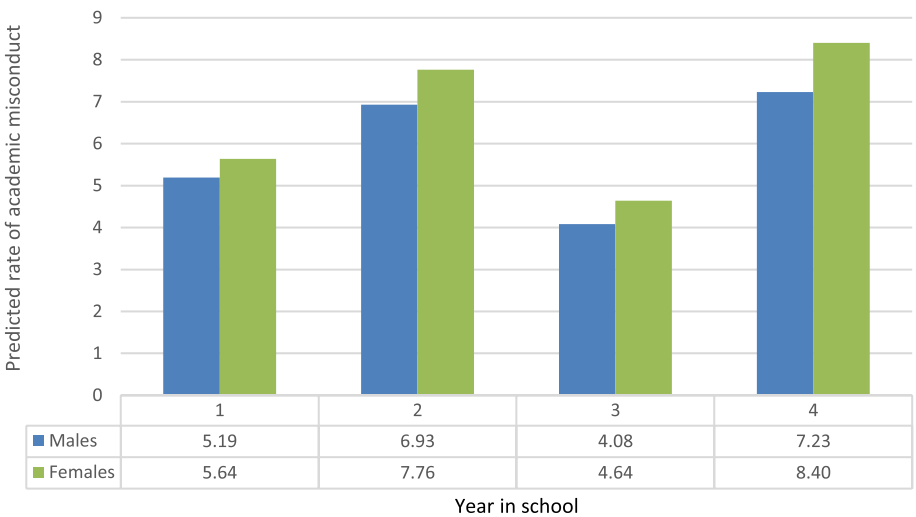

Fig. 4 Predicted Self-Reported Rate of Academic Misconduct by Year. Note: All other variables in the regression equation held at group's mean (e.g. first year male students). See Table 1 for the specific values used for each group

to first-year students, meaning that the first cohort to receive this programming consists of the second-year students in our survey. Second, the vast majority of the then second-year students – now fourth-year students in our survey – placed the blame for the incident fully on the professor who had reused an older midterm that he was unaware was in circulation. Moreover, administration's attempt to explain the students' role in the breach backfired and created a culture of us versus them. Two years later, lingering effects from that incident were evident in our survey results. Fourth-year students had the highest self-reported rates of academic misconduct, provided the highest estimate of peer academic misconduct and had the least favourable views of the culture of academic integrity in the program. They also felt most supported by their peers and on average prioritized socializing over learning.

At the other end of the spectrum were the first-year students in our sample. According to Fig. 3, all else being equal, first-year students were just as susceptible to academic dishonesty as fourth-year students, but looking at their observed values in Table 1 and more realistic predicted values in Fig. 4, they have significantly lower academic misconduct than fourth-year students (Dunn's z=-4.30; Bonferroni adjusted $p<.001$). Our results suggested that the proactive programming was working and that – together with their focus on learning and lower estimates of peers cheating – provided a buffer to their otherwise higher tendencies towards academically dishonest behaviour.

The second-year students in our sample also received the deeper orientation in academic integrity at the start of university, but, compared to those in first year, their attitude towards the culture of academic integrity had decreased (Dunn's z=3.87; Bonferroni adjusted $p<.001$), the percent of peers they perceived to engage in academic misconduct increased (Dunn's z=-2.82; Bonferroni adjusted $p<.05$) and the priority placed on learning decreased (Dunn's z=-3.78; Bonferroni adjusted $p<.001$). It would appear, therefore that the aforementioned buffer preventing first-year students from cheating had been eroded as proactive programming around the culture of academic integrity decreased during second year and students faced the increasing pressure of what is often considered to be the most challenging year of the program. Second year is filled with assignment-heavy required courses as well as the stress to earn the grades and engage in the extra-curricular activities perceived to be required to secure the coveted second-year summer internships and third-year international exchange spots.

The third-year students in our sample appeared to display characteristics of positive deviance (Marsh, Schroeder, Dearden, Sternin, & Sternin 2004). On the surface it looked like this group of students should have rates of academic misconduct that were similar to second- and fourth-year students. Their attitude towards the culture of academic integrity continued to decrease and their estimates of peer academic misconduct to increase, although neither of these differed significantly from second-year students. In addition, during their first year they did not receive the proactive academic integrity culture programming that later cohorts received, but did receive a message similar to the one that backfired with the fourth-year students. Nevertheless, they had the lowest average rates of academic misconduct.

The theory of positive deviance, which has its origins in public health (Brown & Wyatt 2010), argues that identifying and then carefully studying those who are excelling in a hostile environment (e.g. in areas of high malnutrition those families whose children

are not malnourished) can provide important clues to effective interventions. While a full ethnographic review of our third-year students was outside of the scope of this paper, both the data and what we know of the group more broadly provided some clues to fruitful areas of future research. The students who remained on campus during the second semester of their third year either did not go on exchange or did so during the less popular fall semester, signalling that they may be comfortable making uncommon choices. They had relatively low (albeit not significantly different) scores on the impostor phenomenon scale suggesting that they were on average sure of themselves. They also appeared to value learning more than socializing and overall were less connected into the social fabric of the university. This is not to say that administrators should discourage friendships or nurturing social support among classmates. There is ample evidence that from a mental health perspective having a strong support network is very important to overall mental health wellbeing (Lakey & Orehek 2011). Rather, it both highlighted one of the boundary conditions of our study and a possible avenue for program policy. Coming full circle to the opening statement of our discussion, context matters and strong social support in an environment accepting of academic dishonesty likely fosters more dishonesty. In contrast, Bowers (1966) showed that in environments where students felt their peers disapproved of cheating, friendship had the opposite effect and reduced rates of academic dishonesty. Thus, identifying model students who are respected by their peers and getting them involved in peer-centered programming designed to foster a culture of academic integrity may have profound effects on changing base rate assumptions about the prevalence of cheating among classmates. It may also start to reverse the relationship between perceived peer social support and cheating such that scoring highly on the social support scale question: "How much do your classmates go out of their way to do things to make your academic life easier for you?" (modified from Caplan et al. 1980) means providing encouragement, support and/or academically honest tutoring rather than sharing completed assignments and/or answers on tests.

Limitations

A running theme throughout our discussion is that context matters. In this study we have focused on context at a micro-level, namely, the differences between cohorts in a single university program. As we did not survey students in other departments we do not consider context at the meso-level. In addition, because we gathered data at a single point in time we are precluded from analyzing how changes in the macro environment may impact our findings. Importantly, our data was gathered in March 2019, exactly one year before Covid-19 was declared a pandemic and three-and-a-half years prior to the launch of ChatGPT in November 2022.

The transition to remote education as a result of the Covid-19 pandemic impacted university life broadly (Birmingham, Wadsworth, Lassetter, Graff, Lauren & Hung 2023) and both macro-level events impacted teaching, learning and academic integrity more specifically (e.g. Koh & Daniel 2022, Jochim & Lenz-Kesekamp 2024). At the same time, however, we do not anticipate these events would fundamentally change the results of our study. For example, prior research has suggested that both events may have increased the base rate of academic misconduct (e.g. Gruenhagen, Sinclair, Carroll, Baker, Wilson & Demant 2024; Walsh, Lichti, Zambrano-Varghese, Borgaonkar,

Sodhi, Moon, Wester & Callis-Duehl 2021) and that students view cheating behaviours that occur in an online environment to be less serious than similar behaviours when carried out in an in-person environment (Blau, Goldberg, Friedman & Eshet-Alkalai 2021). There is no reason to posit, however, that the relationship between these variables, or the relative weight of perceived seriousness compared to the other variables in the study, would have been meaningfully altered as a result of the pandemic and/or introduction of generative artificial intelligence tools.

Another possible consequence of the Covid-19 pandemic is that following an extended period of isolation, students may continue to be less accustomed to interacting with their peers and/or relying on them for support particularly if there has been a permanent shift away from in person attendance at their institutions. In these situations, the relationships we found between peer support and self-reported rates of academic misconduct may be weakened, which in turn could reduce the effectiveness of our suggestions regarding peer role models. Thus, we encourage educators and administrators to consider the cohesiveness of the student body in their institutions before investing resources into peer education initiatives.

Contributions and conclusions

In a symposium in the *Academy of Management Perspectives*, Jones and Bartunek (2021: 335) concluded that "when navigated effectively, personal connections to one's research reinforce its trustworthiness and may enhance rather than detract from its quality and impact." We agree with this conclusion. Our multivariate regression (see Table 3) revealed important predictors that were not visible in the bivariate analyses (see Table 2) and post regression analyses enabled us to determine the relative strength of multiple factors thereby identifying where administrators' and educators' time and funding would be best directed in working to create a culture of academic integrity. Our rich knowledge of the broader context provided us with the information needed to interpret our sometimes surprising results. Together, the quantitative results combined with our contextual knowledge enabled us to gain deeper insights into both the interplay between our chosen variables and the resulting implications for administrators and educators.

Specifically, our analysis suggests that proactive messaging designed to foster a culture of academic integrity could effectively buffer tendencies towards academic dishonesty, but the absence of follow-on messaging, coupled with increasing academic and extracurricular pressures, may erode the initial benefits. Furthermore, repercussions of major academic integrity breaches can be long lasting, suggesting an even greater need for fostering a culture of academic integrity. Doing so, however, requires ongoing effort from professors and administrators to ensure that meaningful cultural change can both occur and be maintained. Finally, we recognized the possibility of positive deviance related to academic integrity and were encouraged by students who were able to resist the status quo. Identifying these students and involving them in the development of policy and peer education may uncover important programming and policy initiatives that are not obvious to administration and educators, but are particularly effective in shifting student norms around, and attitudes toward, academic integrity.

Appendix 1

List of Questionable Behaviours Students were Asked to Evaluate

List adapted from: Christensen Hughes JM, McCabe, DL (2006) Academic misconduct in higher education in Canada. Can J High Educ 36(2):1-21

Format from: Chapman KJ, Davis R, Toy D, Wright L (2004) Academic integrity in the business school environment: I'll get by with a little help from my friend. J Mark Educ 26(3):236-249

Instructions: This question asks you about specific behaviours that some students might consider to be violations of academic integrity. We encourage you to answer honestly as your responses are completely anonymous.

Violation scale: 0 (no); 1 (trivial); 2 (non-trivial). Engaged scale: 0 (never); 1 (once or twice); 2 (more than twice).

Behaviour	Is this a violation?	Have you engaged in this behaviour this academic year?
1. Not completing an assignment individually when the instructor asked for individual work		
2. Not completing an assignment among group members only when the instructor asked for work to be completed within groups		
3. Searching assignment (e.g. case, essay) questions online and using findings as inspiration for own work.		
4. Searching assignment (e.g. case, essay) questions online and copying part or all of found answers		
5. Turning in an assignment done by someone else		
6. Turning in an assignment that was purchased online or from another student		
7. Providing a previously graded assignment to someone else to submit as their own		
8. Completing an assignment for another student		
9. Using a brief absence form when you don't have a valid extenuating circumstance		
10. Using a false excuse to obtain an extension on a due date		
11. Completing an online quiz in groups		
12. Getting Qs &As from someone who has previously written the quiz or midterm		
13. Providing Qs & As from a quiz or midterm to others		
14. Using unauthorized crib notes during an in-class quiz or midterm		
15. Using unauthorized crib notes during a final exam		
16. Copying from someone on an in-class quiz or midterm		
17. Copying from someone on a final exam		
18. Helping someone cheat during an in-class quiz or midterm		
19. Helping someone cheat during a final exam		
20. Copying a few sentences from a written source (online or otherwise) without citation		
21. Copying material almost word for word from a written source (online or otherwise) and turning it in as your own		
22. Signing another student's name card when they are absent		
23. Asking someone else to sign your name card when you are absent		
24. Using material (e.g. problem sets, quizzes, case write-ups, midterms) which upper years have provided to you to help complete your own assignments		

Appendix 2

Academic Integrity Culture Scale

Questions 1 to 5 from McCabe DL, Butterfield KD, Treviño, L (2006) Academic dishonesty in graduate business programs: Prevalence, causes and actions. AAcad Manage

Learn 5(3):294-305. Remaining questions created by the authors. Questions marked with an R are reverse coded.

Instructions: Please indicate the extent to which you disagree or agree with the following statements

Scale: 1 (strongly disagree); 2 (somewhat disagree); 3 (neither agree nor disagree); 4 (somewhat agree); 5 (strongly agree).

1. Students in my program have a clear understanding of the school's academic integrity policy.
2. Instructors in my program have a clear understanding of the school's academic integrity policy.
3. Students in my program believe in the school's academic integrity policy.
4. Instructors in my program believe in the school's academic integrity policy.
5. The school's academic integrity policy is effective.
6. Faculty members are good about recognizing violations of academic integrity.
7. Faculty members are good about investigating suspected violations of academic integrity.
8. It is easy to get away with violating academic integrity in my program (R).
9. Students in my program violate academic integrity on a regular basis (R).
10. It is necessary to violate academic integrity to remain competitive in my program (R).
11. Students in my program should resist the urge to violate academic integrity even in circumstances where it is easy to do so and the likelihood of being caught is minimal.

Abbreviations

EFA Exploratory Factor Analysis
KMO Kaiser-Meyer-Olkin

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Authors' contributions

CRediT author statement **–** Kelley A. Packalen: conceptualization, funding acquisition, project administration, writing – original draft, methodology, formal analysis, visualization, writing – review & editing. Kate Rowbotham: conceptualization, writing – reviewing & editing.

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Competing interests
The authors have no competing interests to declare.

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