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Utilizing professional accounting concepts to understand and respond to academic dishonesty in accounting programs

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ABSTRACT

We apply professional accounting concepts to academic fraud in accounting education. First, we use the fraud triangle to understand professors' perceptions of academic dishonesty and find two components to each fraud triangle corner. Specifically, the attitude and pressure corners have elements of faculty and student agency, while the opportunity corner is within a professor's control. Second, risk mapping reveals plagiarism and exam cheating as more impactful than assessment protocols. We also find that faculty efforts to control academic dishonesty are mostly well-directed; however, there are opportunities to employ both preventive and detective controls more frequently.

1. Introduction

Fraud results in losses of approximately five percent of revenues annually for a typical company (ACFE, 2014), and can also threaten the existence of businesses (e.g., Enron and WorldCom). As a result, directors, managers and auditors have been increasingly incorporating fraud risks assessments (Murphy & Dacin, 2011) and risk management techniques (Jordan, Jorgensen, & Mitterhofer, 2013) into their processes. The fraud triangle (FT) was originally developed by Donald Cressey (1973) and posits three conditions are necessary for fraud to take place: motive/pressure, opportunity, and attitude/rationalization.[1] The FT has been widely adopted by business professionals as a model to predict and explain the extent of fraud (Murphy & Dacin, 2011). For example, International Auditing Standards make use of the FT to describe the risk of material misstatement related to financial statement fraud. Specifically, IAS 240.A1 states "Fraud, whether fraudulent financial reporting or misappropriation of assets, involves incentive or pressure to commit fraud, a perceived opportunity to do so and some rationalization of the act." United States Statement on Auditing Standards (SAS) No. 99, Consideration of Fraud in a Financial Statement Audit also refers to the FT (Hogan, Rezaee, Riley, & Velury, 2008). SAS No. 99.07 (emphasis in the original) states:

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[1] A 'fraud diamond' model has been proposed by Wolfe and Hermanson (2004) which adds a capability dimension to the fraud triangle. We do not employ the fraud diamond model as it has not gained widespread acceptance in accounting professional guidance and our interest is in how professional accounting concepts can inform our understanding of, and response to, academic fraud.

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Three conditions generally are present when fraud occurs. First, management or other employees have an *incentive* or are under *pressure*, which provides a reason to commit fraud. Second, circumstances exist – for example, the absence of controls, ineffective controls, or the ability of management to override controls – that provide an *opportunity* for fraud to be perpetrated. Third, those involved are able to *rationalize* committing a fraudulent act.

Academic fraud[2] or misconduct refers to actions, behaviors or, in some cases, omissions that may give rise to an inappropriate assessment of an individual's academic performance or which give an unfair advantage to some individuals in their educational endeavors. Academic fraud includes a range of activities, including: plagiarism, submitting a work that is not your own, falsifying research data, attributing a statement or fact to a made-up source, submitting the same work in more than one course, cheating in an examination through the use of unauthorized materials, communication with another person during the examination, impersonation of another person, etc. (Becker, Connolly, Lentz, & Morrison, 2006). The consequences of academic fraud can be as harmful as those of any business fraud. Academic fraud can compromise the integrity of an academic institution, diminish the value of students' degrees, and damage the public's trust in academe. The prevalence of academic fraud and the recent emergence of innovative types of academic fraud are a concern in many academic institutions. Since one component of the FT is rationalization, it may be that students from different backgrounds hold different norms and expectations with respect to academic fraud, which may make it easier for some students to rationalize dishonest activities. In addition, opportunities for academic fraud may be on the rise due to social media and online sites that facilitate students' search for instructor resource materials such as teaching notes or solutions manuals or that connect students seeking to purchase assignments or essays with individuals or organizations willing to sell pre-existing or special-order assignments. These trends mean understanding academic fraud and its determinants is more important now than previously.

As academics struggle with increased incidences of academic dishonesty (Dawkins, 2004; McCabe & Trevino, 1997), the FT and other risk management techniques have begun to make their way into the academic dishonesty literature (Scott, 2017). For example, Malgwi and Rakovski (2008) developed an academic fraud risk model based on student responses from a single institution, and found pressure ranked as the most important element in explaining fraud. They theorized that responsibility for academic dishonesty lies with both the student and faculty with respect to the opportunity and rationalization elements (Malgwi & Rakovski, 2009). Tinkelman (2009) applied the Committee of Sponsoring Organizations of the Treadway Commission (COSO, 1992) framework and other auditing concepts to academic dishonesty to understand the nature of academic dishonesty and how academic dishonesty can be controlled. Becker et al. (2006) empirically tested a model of student cheating based on the FT and demonstrated each element of the FT is statistically related to a student's likelihood of cheating.

We extend current research on academic fraud in two ways. First, we employ Principal Component Analysis to evaluate empirically whether the FT is a useful framework for understanding academic dishonesty. Unlike Becker et al. (2006) and Malgwi and Rakovski (2009), who evaluated reasons for academic dishonesty from the perspective of students, we examine the perspective of accounting faculty members from the United States in terms of their perceptions of both incidences of, and controls for, academic dishonesty. Second, we apply risk mapping techniques (Colletaz, Hurlin, & Perignon, 2013; Jordan et al., 2013) to empirical data related to faculty members' perceptions of various incidences of, and controls for, academic dishonesty to develop further insights into key risk areas, controls, and strategies for mitigating risks of academic fraud.

Our study makes three significant contributions to the literature. First, our empirical analysis suggests faculty members' perceptions of the reasons for, and controls over, academic dishonesty align with the FT framework. We also find each of the three FT corners exhibits two further components. We find the attitude and pressure corners can be faculty or student oriented, while the opportunity corner (which has both preventive and detective components) is mostly within the domain of faculty. We expand on a prior study by Malgwi and Rakovski (2009) and find the pressures that result in incidences of academic dishonesty emanate from both students and faculty, rather than just the student. Student driven pressure, which is well established (see a review by Tinkelman, 2009), is based around the pressure to get good grades; however, faculty driven pressure can also arise from factors such as assessments being too difficult or time consuming, having assessment dates too close to each other, or teaching in a manner that does not accommodate the student's learning style. This is an important insight as it allows faculty members to reflect on their own practices, as well as student behaviors, when considering methods for dealing with the pressure element of the FT. Malgwi and Rakovski (2008) found the most important factor contributing to academic dishonesty was danger of failing the course. Our results suggest similar findings where pressure to get good grades contributes significantly toward incidences of academic dishonesty (Tinkelman, 2009). The overall results also indicate some convergence on student and faculty perspectives.

Our second contribution is our academic dishonesty risk map and related analyses. The risk map and analyses reveal that the incidences of academic dishonesty with the highest perceived impact on the integrity of a student's grade are those related to plagiarism and exam cheating. Specifically, academic dishonesty around assignment plagiarism is perceived to occur more frequently than exam cheating; however, both are perceived to significantly impact the integrity of the classroom. Although frequent, continuing to write after the exam time has expired, is seen to be a low impact incidence of academic dishonesty. Our results suggest faculty members perceive incidences of academic dishonesty related to assignment plagiarism as a frequent and significant issue. We conclude faculty members should be provided with additional time, supports and professional development opportunities to assist them in addressing this type of academic dishonesty.

[2] The terms 'academic fraud' and 'academic dishonesty' are used interchangeably in the paper.

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Our third contribution arises from our academic dishonesty control map and related analyses. These reveal a generally positive association between a faculty member's perception of the effectiveness of a control and their usage of the control.[3] This suggests that faculty efforts are mostly well-directed. For example, preventive controls tend to be used most often and are also perceived to be most effective. However, we find examples of sub-optimal control implementation. First, we find that there are some types of detective controls (e.g., using online resources, search engines or other plagiarism software to detect plagiarism) and preventive controls (e.g., creating assessment such that the question responses are unique to a student and cannot be copied) that are perceived to be effective, but are used relatively less frequently. This could be due to cost-benefit trade-off assessments being undertaken by faculty members whereby certain effective controls are not implemented due to the required time commitment (Scott, 2017). Second, consistent with Malgwi and Rakovski (2009), we note the most frequently implemented control (i.e., include or refer to the University's policy on academic dishonesty in the syllabus) is perceived to be among the least effective. This could be due to faculty members being mandated to include and/or refer to the University's policy on academic dishonesty.

The remainder of this paper is organized as follows. Section 2 provides the background and research questions. Section 3 discusses the methodology and data. Section 4 presents results and insights arising from our principle component analysis, risk, and control mapping. Section 5 summarizes and addresses limitations and directions for future research.

2. Background and research questions

2.1. The fraud triangle in assurance services

Although initially auditors disclaimed any responsibility for detecting fraud in the audits of financial statements, readers of audit reports often believed that a primary reason for completing an audit was to detect fraud. This expectations gap (Macdonald, 1988) led to frustration, allegations of negligence when fraud was subsequently found in financial statements, and lawsuits against the auditors. Ultimately, the auditing standards were changed to recognize that audits are intended to provide "reasonable assurance about whether the financial statements are free from material misstatement, whether caused by error or fraud or error" (SAS No. 1.02). In accepting this responsibility, the auditing profession also prepared professional standards and guidance for auditors on how to fulfil this responsibility with respect to the detection of fraud (c.f. SAS No. 12). A similar expectations gap may exist with respect to academic fraud, such that the public expects faculty members to ensure student's grades reflect their competence and are not an outcome of academic fraud, and yet faculty members perceive their responsibilities differently. Exploring the conceptual parallels between financial statement fraud and academic fraud may provide additional information about the existence of such an expectations gap and how it may be reduced if it does exist.

The auditing profession has used the fraud triangle for many years to understand and assess the risk of fraud impacting financial statements under audit. The three vertices or corners of the fraud triangle are incentive or pressure, opportunity, and rationalization. According to SAS 99 A.2, incentives or pressures to commit fraudulent financial reporting may arise when pressure exists for management to meet the requirements or expectations of third parties, for example "measures used by external parties, such as analysts and rating agencies, to review the company's performance". Opportunity to commit fraud is generally related to the ability to exploit weaknesses in internal control. SAS No. 99 A.2 indicates an opportunity to commit fraud may exist when an individual believes "internal control components are deficient" and therefore can be overridden. Finally, rationalization refers to an individual's ability to be able to explain to themselves or others that their actions are justified or logical. This helps to make their actions seem acceptable or tolerable. SAS No. 99.07 (emphasis in the original) states, "Some individuals possess an *attitude*, character, or set of ethical values that allow them to knowingly and intentionally commit a dishonest act. However, even otherwise honest individuals can commit fraud in an environment that imposes sufficient pressure on them".

The likelihood of financial statement fraud can be significantly reduced and a particular instance of fraud can be detected more readily if auditors are aware of the fraud triangle (Boyle, DeZoort, & Hermanson, 2015; Wilks & Zimbelman, 2004). In terms of incentives or pressure, auditors consider the incentives built into management compensation contracts and those that arise from public forecasts management has made about the company's future performance. For individuals, personal financial stresses may encourage fraud. Organizations strive to minimize incentives or pressures that might lead to fraud primarily through their human resource practices. For example, careful crafting of management compensation plans can help minimize incentives to fraudulently 'achieve' performance targets. Human resource screening processes are designed to ensure individuals with past indicators of dishonest behavior are not offered employment. Organizations exercise most control over opportunities for fraudulent activities. The controls that an organization puts in place can significantly reduce opportunities for individuals to engage in fraudulent activities. Controls, such as adequate segregation of incompatible duties, proper authorization of transactions and activities, adequate documents and records, physical and logical control over assets and records, and independent checks of performance and data (SAS No. 78) help to prevent and detect errors and fraud. Of course, the benefits of such controls are expected to justify the resources assigned to control fraudulent activities. The third aspect of the fraud triangle is rationalization. Organizations have comparatively less influence over rationalization, as this is largely a psychological process by which an individual makes excuses for, or justifies, their behavior (Murphy &

[3] Pearson correlation = 0.476, Significant at 0.01 level (2 tailed).

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Dacin, 2011). Organisations frequently promote core values and/or may require each member to sign a written code of conduct which serves as part of an organization's overall control environment. To the extent the control environment makes clear what behaviors are unacceptable, it will be less likely for individuals to rationalize their fraudulent actions. Reducing or eliminating any one of incentives or pressure, opportunity, and rationalization will make fraud less likely.

2.2. The fraud triangle in accounting education

As is the case for financial statement fraud, the concept of the fraud triangle can be used to understand factors that contribute to academic fraud. Tinkelman (2009) summarizes prior research on various causes for academic fraud, organized by the elements of the fraud triangle. Incentive or pressures to engage in academic fraud may include the pressure to get good grades and wanting to help a friend. Opportunity to commit academic fraud may be available if students perceive the likelihood of getting caught and/or punished is low. Rationalizations for academic fraud may include arguments or excuses such as the perception that academic fraud is victimless, that the assignment was too time consuming or too difficult, that the time available to complete the assignment was too limited or the due date was too close to the due dates of other deliverables. Other students may rationalize that the teaching method in the course was not appropriate for their personal learning style, and therefore that their actions did not constitute fraud or that the fraud was justified. While many believe that students who are struggling academically and are at risk of failing are the most likely to engage in academic fraud (Malgwi & Rakovski, 2009), top students may also have incentives or pressures that encourage such activities (Tinkelman, 2009). Just as management compensation contracts may provide an incentive for financial statement fraud, targets embedded in scholarship agreements, cut-off grades to access co-op education opportunities, or entry-level requirements for graduate studies may provide strong incentives for even the most academically capable students to engage in academic fraud.

Prior research (Davis, Grover, Becker, & rr McGregor, 1992; McCabe, Trevino, & Butterfield, 2001; Tinkelman, 2009) has identified a number of different activities that strive to reduce opportunities students have to engage in academic fraud. Examples of control activities targeted at preventing academic fraud include: using multiple versions of examinations, changing assignments and exams each year, creating assessments such that responses are necessarily unique to each student and cannot be copied, checking washrooms before an exam for unauthorized materials, sign in and out procedures to restrict student movements during examinations, and photo identification requirements for formal examinations (c.f. Davis et al., 1992; McCabe et al., 2001). Other control activities are targeted at detecting academic fraud. These include using online resources, search engines or other software to detect plagiarism and keeping records of who was sitting next to each other in an exam setting so that their answers can be compared subsequently if academic fraud is suspected.

In terms of rationalizations, universities and individual professors engage in a number of activities to educate students about inappropriate behaviors that constitute academic fraud. These activities can help create a control environment in which students are less able to rationalize their activities as legitimate. Activities of this type include: leading a discussion in class about academic fraud, including references or extracts from the university policy on academic fraud in course outlines, having students sign statements that the work they are submitting is their own, and increasing the certainty of punishment if academic fraud it detected (Davis et al., 1992; McCabe et al., 2001). These discussions ensure expectations of students' behavior are clear, signal the importance of the issue of academic fraud, and remove certain rationalizations from those that might otherwise be invoked by students. Instructors also use case resources, such as McKnight, Manly, and Carr (2008), to not only to expose students to the concept of fraud and the fraud triangle, but also to highlight possible consequences of academic misconduct.

Just as for financial statement fraud, where management needs to decide what are the relative costs and benefits of implementing internal controls to reduce the likelihood of fraud, universities and university faculty members need to decide on the relative costs and benefits of implementing internal controls to prevent and detect academic fraud. In terms of costs, the costs of implementing education-based controls targeted at rationalizations are comparatively low. These costs are usually incurred at the institutional level, in terms of the development of policies and codes of conduct. The costs of controls to prevent and detect academic fraud are significantly greater and are ongoing in nature. These costs are generally incurred at the level of the individual faculty member and are especially incurred in terms of individual faculty members' time and energy (Leonard & LeBrasseur, 2008; Scott, 2017; Staats, Hupp, & Gresley, 2009). As institutional expectations from faculty members, in terms of research productivity increase (Bujaki & McConomy, 2017; Menzies & Newson, 2007; Wills, Ridley, & Mitev, 2013), faculty member may choose to be less engaged in control activities which require greater time commitment and be less willing to pursue allegations of academic fraud once fraud has been detected. Thus, a strong understanding of academic fraud may be particularly important in encouraging faculty members to be vigilant in identifying and following up on indicators of potential fraud. This is particularly important as faculty members who pursue allegations of academic dishonesty generally face time-consuming bureaucratic processes within their institutions to address the allegations. This may discourage faculty members' diligence in either seeking, or following up on, instances of academic dishonesty. As many accounting faculty are also professional accountants, we believe exploring the usefulness of professional accounting concepts for understanding and responding to academic fraud may be beneficial in encouraging faculty members in their vigilance.

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2.3. Risk mapping technique

Risk maps have been an important governance and internal control technology since the mid-1990s (Jordan et al., 2013). Risk maps were initially popularized as a way of depicting Enterprise Risk Management activities and priorities. Formal guidance related to risk maps has been incorporated into professional accounting guidance and risk management and risk mapping concepts are now well known within the professional accounting community (c.f. COSO's Enterprise Risk Management Framework or CPA Canada's Risk Oversight and Governance Collection). According to IFAC (2018), "Professional accountants play a leading role in ensuring that risk management and internal control form an integral part of an organization's governance system. . ..professional accountants can also encourage treating risks in a more holistic, comprehensive way." We believe risk management concepts, particularly risk maps (sometimes call risk heat maps) can inform our understanding of risks of academic fraud.

Risk maps serve as visual representations of the probability of occurrence and severity of consequences or impact of future events (Jordan et al., 2013). Jordan et al. (2013) note that risk maps allow risks to be categorized qualitatively as tolerable or intolerable and prioritized in terms of the need for intervention or remediation. Risk maps are also useful tools to "communicate, and plan and structure activities" related to the underlying risks (Jordan et al., 2013, p.170), in particular to foster discussions related to "attention, responsibility and resource allocation" (Jordan et al., 2013, p.171).

2.4. Research questions

Based upon our experiences in both professional accounting practice and as accounting faculty members, we anticipate professional accounting guidance related to fraud, risk management and control will be beneficial in understanding the antecedents for academic fraud, how risks can be managed in an academic environment, and what controls are most appropriate in preventing and detecting academic fraud. Thus, we examine the following three research questions:

1. Does the Fraud Triangle provide a useful framework for understanding risks related to academic fraud in accounting programs?
2. Does risk mapping yield valuable insights into which incidences of academic fraud merit the most attention and/or intervention?
3. Does control mapping lead to valuable insights into which types of controls over academic fraud are over- versus under-utilized?

3. Method

3.1. Target population and sample analyzed

A database of accounting professors from post-secondary institutions across the United States was compiled based upon email addresses available in the public domain (e.g., faculty directories and university websites). The database included professors from all functional areas in accounting (financial, managerial, auditing, taxation and information systems), year levels (introductory to advanced courses), education backgrounds and experiences. The sample group was emailed a cover letter, consent form, and link to the survey instrument. The cover letter included a brief description of the research, a statement regarding the appropriate research ethics board approval, and a request for informed consent prior to participation. The sample group was sent reminder emails one and two months following the initial request for participation. Overall, 5420 accounting professors were emailed a request to participate in the research. A total of 327 usable responses were received, resulting in a response rate of approximately 6.1%. The sample size (Comfrey & Lee, 1992; Tabachnick & Fidell, 1996) and response rates (Baruch, 1999) were considered adequate for the analysis undertaken in this study. For example, Comfrey and Lee (1992) indicate a sample size of 300 is 'good' for principal components analysis (PCA), or a ratio of 5 subjects to each item in a factor analysis is recommended by Hatcher (1994), which for our PCA analysis would suggest we need a sample size of 180. We note response rates are not seen as reliable indicators of nonresponse bias (Davern, 2013; Groves, 2006). According to Davern (2013, p. 906), "many studies have demonstrated that achieving a higher response rate for a survey does not result in significantly different estimates than the same survey using a less aggressive [survey] protocol and achieving a lower response rate. . .". In contrast to response rates, "nonresponse bias is a systematic difference between those who respond and those who do not respond on a substantive construct measured by a survey" (Halbesleben & Whitman, 2013, p. 914). Halbesleben and Whitman (2013) suggest five alternative approaches for assessing nonresponse bias. We use what they term 'wave analysis', in which respondents who complete the survey early are compared to those who complete the survey in response to a reminder. According to wave analysis the last people to respond are used as proxies for nonrespondents. "Thus, we can compare the last group to respond with the others in the survey to examine potential differences that might approximate nonresponse bias" (Halbesleben & Whitman, 2013, p. 923). We report the results of our wave analysis below, after first profiling our respondents. The profile of the sample is generally consistent with the overall characteristics of accounting faculty members across the United States. Table 1 presents a demographic profile of the survey respondents.

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Table 1
Demographic profile of survey respondents.

Gender	
Male	54.4%
Female	45.6%
Highest degree earned	
PhD or Equivalent	82.5%
Master's	9.0%
Professional designation only, or other	8.5%
Professional certification	
Holds a Professional Designation	34.8%
Does not hold a Professional Designation	65.2%
Years of experience	
1 to 5 years	4.0%
6 to 10 years	14.3%
11 to 15 years	12.5%
More than 15 years	68.4%
No response	0.8%
Course level taught	
Introductory level courses	22.6%
Intermediate level courses	37.0%
Advanced level courses	39.7%
No response	0.7%

Our sample shares many similar characteristics with those of the general population of accounting academics in the U.S. Direct comparison with the prior literature is difficult as our respondent profile is more current, and there are many major trends shaping the demographic profile of accounting academics in the U.S. However, we do offer some insights into how our respondent profile compares to the prior literature.

First, our gender mix is 54.4% male and 45.6% female. Prior studies, such as Kamath, Meier, and Thomas (2011) and the American Accounting Association (2008), have suggested that approximately 65% to 69% of accounting academics are male. As a result, our sample may have slightly higher representation of female academics. However, it is important to note that our data is more recent than both Kamath et al. (2011) and the Association (2008), and is more consistent with the trend of more females pursuing doctoral degrees in accounting (Association, 2008; Gibson & Schroeder, 1998). Second, the percentage of our survey respondents that hold doctoral degrees is consistent with prior studies (Kamath et al., 2011). Third, the percentage of our respondents with professional designations is below the most recent 2012 estimate of approximately 60%; however, as discussed in Fogarty and Black (2014), there is a declining trend in the number of academics that hold professional designations. Approximately 35% of our respondents hold professional designations. Table 1 also reveals that our respondents are generally more experienced academics (i.e., fifteen years or more of teaching experience) that teach mostly intermediate and advance level accounting courses.

We analysed the data across these various demographic characteristics and found significant differences across only the gender demographic characteristic. We did not find any other significant differences across the other demographic characteristics. We do not discuss the gender differences in this paper as these have already been well documented in the prior literature (e.g., McCabe, Butterfield, and Trevino (2006); Luthar and Karri (2005); Borkowski and Ugras (1998)).

We also provide insights into the possible implications of a non-response bias using wave analysis (Halbesleben & Whitman, 2013) by comparing the demographic profile of the earliest respondents with the profiles of those who responded later (Moore & Tarnai, 2002). Specifically, we performed an independent sample, two-tailed, *t*-test between early respondents (i.e., first quartile of respondents, n = 83) and late respondents (fourth quartile of respondents, n = 83). Untabulated results do not reveal any significant differences between gender (p = .414), experience (p = .108) and course levels taught (p = .934). We performed similar independent two sample t-tests to compare responses to our questions about academic dishonesty between early and late respondents. Our untabulated results, in this case also, did not indicate any significant differences between scores assigned by early and late respondents in response to our questions. Thus, we conclude there is limited concern of a non-response bias.

3.2. Survey instrument

The survey questions were developed based on prior literature in the domain of academic dishonesty (e.g., Brimble & Stevenson-Clarke, 2005; Simon et al., 2003; McCabe et al., 2001; and Davis et al., 1992). A small group of accounting professors participated in a pilot test of the survey. Participants provided comments on the clarity of the questions and the scales, along with the time required to complete the questions. Any ambiguities in the wording of the questions and scales resulted in modifications to the survey prior to its being administered to the target population.

The survey instrument employed 5-point Likert scales to assess various aspects of academic dishonesty (Dawes, 2008; Preston & Coleman, 2000). The survey captured data on three main aspects of academic dishonesty: i) scenarios of academic dishonesty (“Academic Dishonesty Questions” – twelve items); ii) motivations for engaging in academic dishonesty (“Moti-

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vation Questions" – eight items); and iii) controls for mitigating academic dishonesty ("Control Questions" – ten items). Appendix 1 outlines all of the questions asked in each of these three categories. Respondents were asked to indicate: their perceptions of the significance and frequency of the twelve different incidences of academic dishonesty, how strong a motivator of academic dishonesty each of the listed motivators was perceived to be, and how frequently the respondent uses each of the ten controls in their classroom, as well as how effective they perceive each of these controls to be at mitigating the impacts of academic dishonesty.

3.3. Data analysis methods

Principal Component Analysis ("PCA") is employed as a dimension reduction technique to identify the principal components of responses to questions regarding the significance of eight motivators of academic dishonesty and frequency of controls. PCA starts with an initial set of variables, such as X_i $(i = 1,\ldots,n)$, and eliminates existing collinearities in determining a series of new variables (i.e., components). The m number of components, C_j, replace the initial variables, whereby $m \leq n$. Consistent with Kaiser (1960), we only retain components with an eigenvalue of 1.0 or above.

We map these results onto the Fraud Triangle. We subsequently develop a risk map that incorporates the average responses to questions regarding the perceived frequency and significance of instances of academic dishonesty. Finally, we develop a control map for controls used to mitigate instances of academic dishonesty based upon average responses regarding the perceived frequency and effectiveness of ten different controls.

4. Results and interpretations

To answer the research questions, this study is structured in three distinct sections. Section 4.1 addresses our findings regarding the usefulness of the fraud triangle as a framework for understanding academic fraud. In Section 4.2 survey responses are used to develop and present a risk map linking perceptions of both the frequency and significance of academic fraud. Finally, Section 4.3 presents our findings related to the frequency of use and perceived effectiveness of various controls over academic fraud. These results are presented in a control map.

4.1. The fraud triangle and academic dishonesty in accounting programs

The first research question explores whether, as Tinkelman (2009) and Scott (2017) found, the fraud triangle provides a useful framework for understanding risks related to academic fraud in accounting programs. Unlike prior studies, we approach this question empirically using PCA. Specifically, we run the PCA separately on two sets of questions in the survey: i) the eight questions included in Section 2 - Motivation Questions; and ii) the ten questions included in Section 3 - Control Questions. Prior to running the PCA, we first review the (un-tabulated) correlation matrix for each set of questions to assess whether any individual questions are highly correlated with each other. No significant correlations were identified among the individual questions employed in the PCA, and therefore, we adopt the Varimax Rotation Method with Kaiser Normalization.

The results of the PCA are presented in Table 2. Panel A presents the results from the analysis with the Motivation Questions, while Panel B presents the results from the analysis with the Control Questions.

The PCA on the Motivation Questions (Panel A) converged after four iterations. After retaining only components with an eigenvalue of 1.0 or above, three components emerge that explain approximately 60% of the variation. The Kaiser-Meyer-Olkin ("KMO") Measure of Sampling Adequacy is 0.727 and the null hypothesis under Bartlett's Test of Sphericity is rejected at the 1% level, which suggest the components resulting from the PCA are appropriate and efficient in reducing the number of dimensions from the original eight Motivation Questions. The PCA on the Control Questions (Panel B) converged after six iterations. The three components with an eigenvalue of 1.0 or greater explain approximately 50% of the variation. The KMO Measure of Sampling Adequacy and Bartlett's Test of Sphericity suggests the three components that emerged from the PCA are appropriate and efficient in reducing the number of dimensions from the original ten Control Questions down to three components.

Next, we interpret the loadings for the six components with eigenvalues of 1 or greater (i.e., three components for the Motivation Questions and three components for the Control Questions) through the lens of the fraud triangle framework. The labelling of the component loadings is largely a theoretical and qualitative exercise (Thompson, 2004). We focus on component loadings with the highest values.

4.1.1. The pressure corner

4.1.1.1. Faculty driven pressure. The Motivation Question PCA Component 1 (Table 2 – Panel A) is highly correlated with faculty members' beliefs that strong motivators of academic dishonesty include the following: i) making assessments too difficult; ii) assessment was too time consuming; iii) having tests and assignments too close together; and iv) teaching method did not accommodate student's learning style. This component has the highest eigenvalue (i.e., is associated with the most variance of the original questions). These four motivators of academic dishonesty can all result in pressure being placed upon the student based upon decisions made by the professor. Specifically, the professor develops the assessment and therefore

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Table 2
Fraud triangle rotated principle component matrix.[a]

Panel A – Rotated principal component analysis on motivation questions.				
PCA component (**bold** numbers indicate items loading on particular components) Fraud triangle interpretation		**1** **Faculty driven pressure**	**2** **Student driven attitude**	**3** **Student driven pressure**
Why do you think students engage in academic dishonesty?				
	1. Wanting to help a friend	0.211	**0.496**	0.163
	2. Not likely to get caught	−0.019	**0.779**	0.264
	3. Assessment is too difficult	**0.565**	0.188	0.495
	4. Pressure to get good grades	0.055	0.073	**0.865**
	5. Cheating is victimless	0.130	**0.725**	−0.329
	6. Assessment was too time consuming	**0.789**	0.203	−0.013
	7. Test date or due date was too close to other test/assignments	**0.807**	0.063	0.024
	8. Teaching method did not accommodate student's learning style	**0.686**	0.041	0.103
Eigenvalue		2.13	1.47	1.21
Variance explained by component		26.59%	18.34%	15.12%
Cumulative variance explained		26.59%	44.93%	60.05%
Kaiser-Meyer-Olkin Measure of Sampling Adequacy	0.727			
Bartlett's Test of Sphericity p-value	0.000***			

Panel B – Rotated principal component analysis on control questions.				
PCA component (**bold** numbers indicate items loading on particular components) Fraud triangle interpretation		**1** **Detective controls**	**2** **Faculty driven attitude**	**3** **Preventive controls**
How frequently do you implement the following control activity?				
	1. Lead a discussion in class about academic dishonesty with specific examples and consequences.	0.208	**0.735**	−0.019
	2. Include or refer to the University's policy on academic dishonesty in the syllabus.	−0.243	**0.678**	0.244
	3. Have students sign a statement that their work is their own.	0.010	**0.531**	0.322
	4. Using multiple examination versions (e.g., scrambling the order of questions).	0.080	0.027	**0.818**
	5. Changing assignments and exams each year in order to limit student's access to past materials.	0.227	0.200	**0.589**
	6. Checking the washrooms before an exam for unauthorized materials.	**0.538**	0.072	0.089
	7. Creating assessment such that the question responses are unique to a student.	**0.611**	0.035	0.331
	8. Using online resources, search engines or other plagiarism software to detect plagiarism.	**0.616**	0.261	−0.108
	9. Requiring students to turn in research materials, with incorporated sections highlighted.	**0.747**	−0.087	0.182
	10. Increase the certainty of punishment if detected.	0.376	**0.626**	-0.076
Eigenvalue		1.90	1.80	1.35
Variance explained by component		19.02%	17.96%	13.48%
Cumulative variance explained		19.02%	36.98%	50.46%
Kaiser-Meyer-Olkin Measure of Sampling Adequacy	0.724			
Bartlett's Test of Sphericity p-value	0.000***			

[a] Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization. Panel A (Panel B) rotation converged in four (six) iterations.

has agency over the assessment's difficulty level, time commitment, and due date. Making assessments very difficult, long or close to other assessments may pressure students into engaging in academically dishonest behaviors. We interpret this component to be associated with the pressure corner of the fraud triangle. Furthermore, this type of pressure arises predominantly from decisions within a professor's locus of control. Therefore, we label this component "*Faculty Driven Pressure*".

4.1.1.2. Student driven pressure. The Motivation Question PCA Component 3 (Table 2 – Panel A) is highly correlated with faculty members' beliefs that pressure on students to get good grades is a very strong determinant of academic dishonesty. Our results confirm earlier studies and indicate the continued importance of this factor (Baird, 1980; Drake, 1941; Keller, 1976). Pressure to get good grades is most clearly associated with the pressure corner of the fraud triangle. Common causes of this pressure include students in danger of failing the course, loss of financial aid, fear of parents cutting financial and other

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support, competition with others, etc. (Malgwi & Rakovski, 2009). Overall, the pressure to get good grades arises predominantly from circumstances that are within the agency of a student's individual circumstances. Therefore, we label this component as "*Student Driven Pressure.*"

It is important to note that the component loading value for the "assessment being too difficult" and "assessment was too time consuming" motivators are highest for the *Faculty Driven Pressure* component; however, "assessment being too difficult" has a fairly strong loading (0.495) with the *Student Driven Pressure* component as well. Unlike "assessment was too time consuming," this motivator seems to load on both pressure components, meaning that the assessment being too difficult can be the result of a student not being fully prepared for the course (pressure that arises from a student's decision), as well as the assignment's design. Based on the weight of the loading factors it has been included in *Faculty Driven Pressure,* while we note that it has some element of *Student Driven Pressure.*

4.1.2. The attitude/rationalization corner

4.1.2.1. Student driven attitude. The Motivation Question PCA Component 2 (Table 2 – Panel A) is highly correlated with the following motivators: (i) wanting to help a friend; (ii) not likely to get caught; and (iii) a belief that cheating is victimless. These three perceived motivators of academic dishonesty are based on a student's attitude toward engaging in academic dishonesty. Specifically, engaging in academic dishonesty to help a friend or because it is perceived to be victimless is based mostly upon an individual student's moral compass and ethical values and perceptions about the frequency of academic misconduct (Hard, Conway, & Moran, 2006). It is also likely faculty members' perception of "likelihood of being caught" as a reason for academic dishonesty has less to do with controls and more with a student's capabilities or attitude; capability to commit fraud is distinct from opportunities to commit fraud, and is often included as a fourth corner in the Fraud Diamond (Wolfe & Hermanson, 2004) framework. We interpret this component to be associated with the attitude / rationalization corner of the fraud triangle. More specifically, we interpret these attitudes as being predominantly within a student's locus of control. Therefore, we label this component as "*Student Driven Attitude.*"

4.1.2.2. Faculty driven attitude. The Control Question PCA Component 2 (Table 2 – Panel B) is highly correlated with the following controls implemented by faculty members: (i) lead a discussion in class about academic dishonesty with specific examples and consequences; (ii) include or refer to the University's policy on academic dishonesty in the syllabus; (iii) have students sign a statement that their work is their own; and (iv) increase the certainty of punishment if detected. These four controls for academic dishonesty are based on a professor's actions to shape a student's attitude toward engaging in academic dishonesty. Increasing the certainty of punishment may be important in shaping student attitudes as a lack of action against cases of academic dishonesty may result in weak attitudes among the student body (i.e., it is okay to cheat as there are no consequences) (Davis et al., 1992; Heckler, Rice, & Bryan, 2013). We interpret this component to be associated with the attitude/rationalization corner of the fraud triangle. More specifically, we interpret this attitude component to be predominantly within a professor's locus of control. Therefore, we label this component as "*Faculty Driven Attitude.*"

4.1.3. The opportunity corner

The United States Public Company Accountability Standards Board's (PCAOB) Auditing Standard No. 5 (Appendix A8) states that an effective internal control system over financial reporting will often include a combination of preventive and detective controls. PCAOB No.5.A8 defines preventive controls as having, "*the objective of preventing errors or fraud that could result in a misstatement of the financial statements from occurring*', and detective controls having, "*the objective of detecting errors or fraud that has already occurred that could result in a misstatement of the financial statements.*" We adopt the detective and preventive control framework used in practice to aid in our interpretation of the PCA results for the academic dishonesty control questions. In an academic setting, preventive controls are those which prevent academic dishonesty from taking place and detective controls are those which are used to detect academic fraud after it has already occurred. We acknowledge that the difference between the two is not always clear and some controls display both preventive and detective attributes. Any effort to label them as one or the other is subject to interpretation and debate.

4.1.3.1. Detective controls. The Control Question PCA Component 1 (Table 2 – Panel B) is highly correlated with a professor's use of the following controls: i) checking the washrooms before an exam for unauthorized materials; ii) using online resources, search engines or other plagiarism software to detect plagiarism; iii) requiring students to turn in research materials, with incorporated sections highlighted; and iv) creating assessment such that the questions are unique to a student. For example, using plagiarism software and having students turn in their research materials would allow a professor to identify instances of academic dishonesty that have already taken place. Furthermore, checking the washrooms or reviewing source materials would also allow a professor to identify instances of academic dishonesty. We interpret this component to be associated with the opportunities corner of the fraud triangle. More specifically, we interpret this opportunity component as predominantly being associated with a professor's attempt to *detect* or *prove* the existence of academic dishonesty. Therefore, we label this component as "*Detective Controls.*"

4.1.3.2. Preventive controls. The Control Question PCA Component 3 (Table 2 – Panel B) is highly correlated with a professor's use of the following controls: i) using multiple examination versions (e.g., scrambling the order of questions) and ii) changing assignments and exams each year to limit student's access to past materials. These controls can be interpreted to be predom-

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inantly based upon a professor's attempt to *prevent* academic dishonesty. For example, using multiple exam versions helps dissuade students from attempting to copy from each other, while changing assignments/exams will ensure that students cannot obtain the solutions from prior year students (Scott, 2017). Again, we interpret this component to be associated with the opportunities corner of the fraud triangle. Specifically, we interpret this opportunity component as predominantly being associated with a professor's use of preventive measures. Therefore, we label this component as "*Preventive Controls.*"

There are two other controls that have noticeable component loading values with the *Preventive Controls* component. First, having students sign a statement that their work is their own is most strongly correlated with the *Faculty Driven Attitude* component, but also exhibits component loading (0.322) with the *Preventive Controls* component. Intuitively, this control may have a preventive aspect. For example, having students sign a statement that the work is their own may result in students being more conscious of academic dishonesty and less likely to engage in dishonesty behavior. It is unclear whether having students' sign a statement that a work is their own is more clearly designed to mold student attitudes or prevent academic dishonesty. We leave this control with the component it is most strongly associated with, *Faculty Driven Attitude,* but acknowledge that it may have some preventive control elements.

Second, the use of the control related to creating assessment such that the question responses are unique to a student has the strongest component loading with the *Detective Controls* component, but, also has a component loading (0.331) with the *Preventive Controls* component. Intuitively, this control has some preventive aspects. For example, creating assessments such that the question responses are unique to a student may prevent the student from obtaining previous year solutions or dissuade them from plagiarizing. As a result, creating assessment such that the question responses are unique to a student can be considered a dual perspective control. Based on our own classroom experience, however, we believe this control is implemented more to prevent academic dishonesty than to detect academic dishonesty, and as a result, we group this control with the *Preventive Control* component.

Another control that loads on more than one component is increasing the certainty of punishment if academic dishonesty is detected. This control is most strongly correlated with the *Faculty Driven Attitude* component, but also has a component loading (0.376) with the *Detective Controls* component. This control may fit into the detective control category as it is related to implications arising from academic dishonesty after it has been detected; however, it does not fit nicely into the detective controls category as it does not aid the professor in initially identifying instances of academic dishonesty. As a result, we group this control with the component it is strongly associated with (i.e., *Faculty Driven Attitude*).

Overall, certain controls displaying cross loadings with the Detective Control and Preventive Control components is consistent with the nature of internal controls in practice, which often have both a preventive and detective element. For example, a surveillance camera is a detective control in providing video evidence of fraudulent activities, but, can also prevent fraud due to the watchdog effect. Furthermore, cross loadings between the control components and the Faculty Driven Attitude component are also consistent with the association witnessed in practice between various policies and procedures spanning across both the control environment and physical control system.

4.1.4. A graphical representation of the fraud triangle interpretation

Fig. 1 presents a graphical represents of our interpretation of the PCA analyses through the lens of the fraud triangle framework.

Based on our interpretations, we conclude the results of the PCA analyses suggest the pressure corner and attitude / rationalization corner are a function of both professor and student agency. The opportunity corner is mostly within the domain of the faculty.[4]

4.2. Risk mapping and academic dishonesty in accounting programs

The second research question explores whether the development of a risk map (Colletaz et al., 2013; Jordan et al., 2013) for individual incidences of academic dishonesty can provide faculty members with insights into significant risk areas of academic dishonesty.

4.2.1. Developing the risk map for academic dishonesty

We develop the risk map ("RM") based on the twelve survey questions related to individual incidences of academic dishonesty ("Incident Questions") in order to explore the second research question. The twelve questions are listed in Section 1 of the Survey Instrument (Appendix 1). First, we calculate the average response score across all respondents for each of the twelve Incident Questions with respect to their *frequency* and *significance*. To assess the *frequency* of an incident, we asked respondents "how often does this type of academic dishonesty occur in your classroom?" and to assess the *significance* of an incident, we asked respondents "how significant would this type of academic dishonesty be to the overall integrity of a stu-

[4] As a robustness test, we ran the PCA on all 18 questions combined (i.e., the Motivation Questions and Control Questions in a single PCA). Both the KMO Measure (0.723) and Bartlett's test (798.8) reveal efficient factorization from the PCA based on the 18 questions. The (un-tabulated) results reveal a total of six components with eigenvalues of 1.0 or greater that explain 56.2% of the variation. The factor loading of the six components result in the same conclusions outlined in Table 2. Therefore, we can conclude that the results of the PCA is not sensitive to whether the analysis is run on the Motivation Questions and Control Questions individually or in aggregate.

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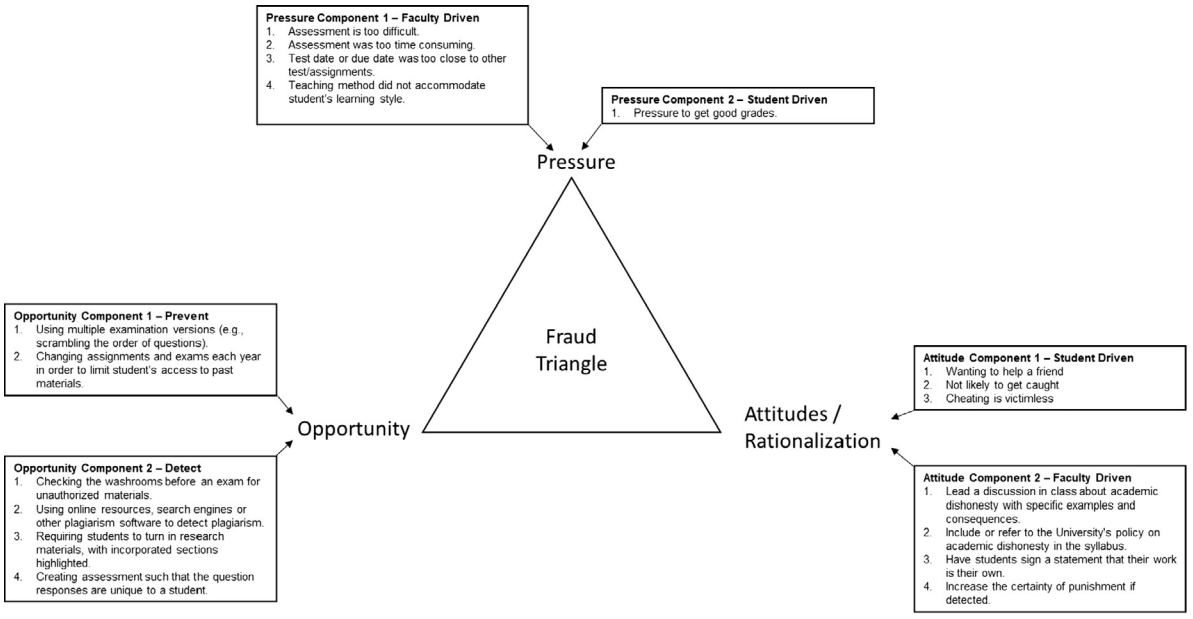

Fig. 1. The fraud triangle interpretation based on PCA factor loadings.

dent's grade in your course?" Next, we plotted the average response scores onto a risk map by defining the x-axis as average *frequency* and the y-axis as average *significance*.

Then we created quadrants on the risk map by dividing both axes based upon the mid-point of the range of responses (i.e., highest and lowest observed values). For example, the x-axis is divided by taking the mid-point between highest frequency value (i.e., incident #9 has an average frequency of 2.81) and lowest frequency value (i.e., incident #6 has an average frequency of 1.15). Consistent with Cartesian coordinate system taxonomy, the quadrants are numbered counter clockwise from one to four, beginning with the upper right quadrant. Furthermore, we provide a label for each of the quadrants based upon the risk management literature related to risk mapping. The resulting quadrants are labelled as follows:

- *RM Quadrant 1 – Immediate Action - Extensive Controls Essential*: these are incidences of academic dishonesty that are perceived to occur relatively more frequently and to have a relatively more significant impact on the integrity of a student's grade.
- *RM Quadrant 2 – Manage and Monitor, Consider Contingency Planning*: these are incidences of academic dishonesty that are perceived to occur relatively less frequently, but are seen as relatively more significant to the integrity of a student's grade.
- *RM Quadrant 3 – Accept, but Monitor*: these are incidences of academic dishonesty that are perceived to occur relatively less frequently, and are also seen as relatively less significant to the integrity of a student's grade.
- *RM Quadrant #4 – Control Effort Worthwhile*: these are incidences of academic dishonesty that are perceived to occur relatively more frequently, but are not perceived as having a relatively major impact on the integrity of a student's grade.

The resulting risk map is presented in Fig. 2.

4.2.2. Insights from the academic dishonesty risk map

RM Quadrant #1 identifies what can be thought of as the most, risky incidences of academic dishonesty (those with the greatest impact), and includes: i) having another person complete an assignment or using another student's assignment from a previous semester; and ii) using information without proper referencing (from a book, journal or website). Both incidences mapping into RM Quadrant #1 are related to plagiarism on assignments, and are perceived to have a significant impact on the integrity of a student's grade and occur frequently. As a result, it is recommended that professors employ extensive controls to mitigate these two types of academic dishonesty.

RM Quadrant #2 includes the highest number of incidences of academic dishonesty (i.e., seven of the twelve incidences), which include: i) copying from another student on a test; ii) using unauthorised material during a test; iii) communicating by signals during a test; iv) gaining unauthorised access to test material before writing; v) getting someone else to pretend they are the student (impersonation) during a test; vi) using washroom breaks to access unauthorized materials; and vii) falsifying the results of one's research. These seven incidences are perceived to have a significant impact, but occur relatively infrequently. The majority (i.e., six of the seven) of the incidences mapping into RM Quadrant #2 are related to cheating on

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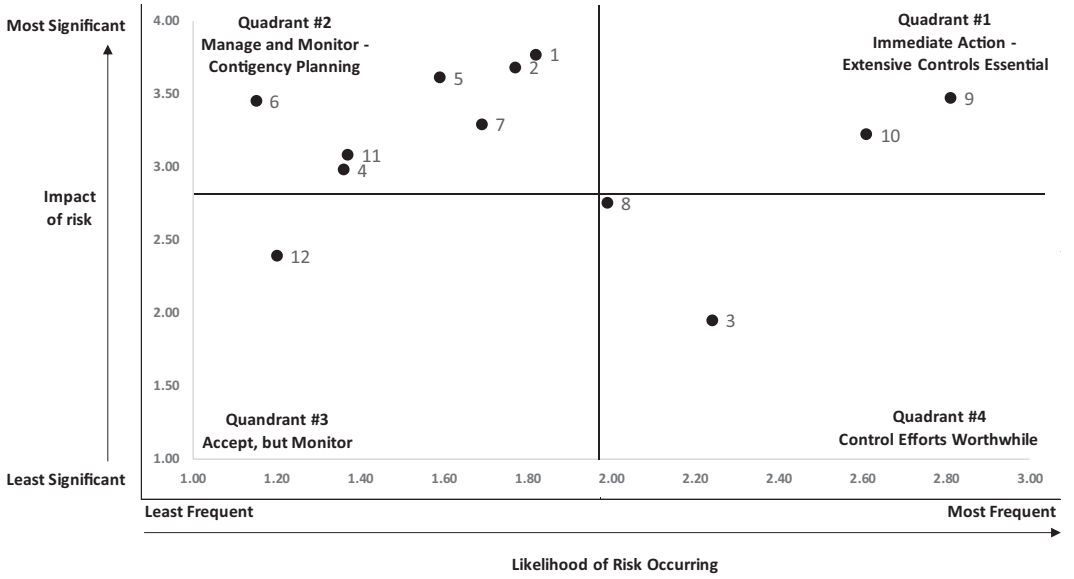

Notes

a – The legend for the incidences of academic dishonesty is as follows:

1 - Copying from another student on a test.
2 - Using unauthorised material during a test (e.g., phone, notes, pre-programmed calculator, etc.)
3 - Continuing to write after the test time has expired.
4 - Communicating by signals during a test.
5 - Gaining unauthorised access to test material before writing.
6 - Getting someone else to pretend they are the student (impersonation) during a test.
7 - Using washroom breaks to access unauthorized materials (e.g., hidden notes, phone access, etc.)
8 - Requesting special consideration/deferred exam (e.g., for illness) assuming that the conditions are not genuinely met.
9 - Having another person complete an assignment or using another student's assignment from a previous semester.
10 - Using information without proper referencing (from a book, journal or website).
11 - Falsifying the results of one's research.
12 - Preventing other students' access to resources required to complete an assignment.

b - The axes were both measured with a 5-point Likert scale anchored with "1" as Low and "5" as High, based on the following questions:

X-axis: How often does this type of academic dishonesty occur in your classroom?

Y-axis: How significant would this type of academic dishonesty be to the overall integrity of a student's grade in your course?

Fig. 2. Academic dishonesty risk mapping.[a,b.]

exams. The only incident in Quadrant #2 that is not related to cheating on exams is "falsifying the results of one's research". Universities may wish to manage and monitor these types of academic dishonesty and consider whether additional contingency planning is needed. Formal exam writing policies and procedures are frequently employed in this regard.

RM Quadrant #3 focuses on relatively low frequency and low significance incidences of academic dishonesty, and includes only one type of academic dishonesty: i) preventing other students' access to resources required to complete an assignment. This incident is related to assignments, but is not a form of plagiarism. Rather, this incident is more consistent with a Machiavellian perspective among students, whereby their intention is to enhance their own apparent performance by undertaking devious and deceitful behavior that adversely effects the performance of other students. The risk map advises professors to accept, but monitor these types of incidences.

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RM Quadrant #4 focuses on relatively high frequency, comparatively low significance incidences of academic dishonesty, and includes two incidences: (i) requesting special consideration/deferred exam (e.g., for illness) assuming that the conditions are not genuinely met; and (ii) continuing to write after the test time has expired. Both of these incidences are related to examinations. However, the incidences in Quadrant #4 are related to the examination process as opposed the incidences in RM Quadrant #2 which are related to students obtaining unauthorized information during the exam. For example, the first incidence takes place when the student attempts to change the professor's exam conditions based upon disingenuous accommodations, while the second incidence takes place when a student attempts to extend the time limit set by the professor. Professors are encouraged to direct control efforts towards these two incidences of academic dishonesty.

In summary, the risk map reveals that RM Quadrant #1 and RM Quadrant #3 include incidences of academic dishonesty that are related to assignments, while RM Quadrant #2 and RM Quadrant #4 include incidences related to examinations. Furthermore, the quadrants with relatively high significance incidences are focused more so on plagiarism and exam cheating, while the relatively low significance incidences are focused more so around examination and assignment protocols.

4.2.3. Risk levels of academic dishonesty incidences

We further explore the academic dishonesty RM by calculating the *risk level* of each incidence of academic dishonesty. Consistent with risk management practices, we calculate the *risk level* by multiplying the significance by the frequency for each individual incidence. The resulting *risk level* values are presented in Table 3.

We interpret the results of Table 3 as suggesting that incidences of academic dishonesty that are considered to have the greatest impact (significance multiplied by frequency) are: i) having another person complete an assignment or using another student's assignment from a previous semester; and ii) using information without proper referencing (from a book, journal or website). Further measures should be considered to ensure these risks are reduced to more tolerable levels. The incidences of academic dishonesty that can be considered of lowest impact are: i) preventing other students' access to resources required to complete an assignment; and ii) getting someone else to pretend they are the student (impersonation) during a test. The remaining incidences (i.e., incidence 1, 2, 3, 4, 5, 7, 8, and 11) can be considered as having moderate impacts that are tolerable if control measures continue to be implemented.

4.3. The control map and academic dishonesty in accounting programs

The third research question explores whether the development of a control map for academic dishonesty can provide faculty members with insights into the optimal use of control efforts / resources, and strategies for improving control efforts.

4.3.1. Developing a control map for academic dishonesty

We develop the control map ("CM") based on the ten survey questions related to controls for academic dishonesty ("Control Questions") in order to explore the third research question. The ten questions are listed in Section 3 of the Survey Instrument (Appendix 1). First, we calculate the average responses across all respondents for each of the ten Control Questions with respect to their *frequency* and *effectiveness*. To assess the *frequency* of a control, we asked respondents "how often do you use this control in your classroom?" and to assess the *effectiveness* of a control, we asked respondents "how useful do you believe that this control is at mitigating the impacts of academic dishonesty?" Next, we plot the average responses onto the control map by defining the x-axis as the average *frequency* and the y-axis as the average *effectiveness*.

We create quadrants on the CM by following the same process outlined for the RM, which requires dividing both axes based upon the observed mid-point of the range (i.e., highest and lowest values). The quadrants are numbered counter clockwise from one to four, beginning with the upper right quadrant. Furthermore, we provide a label for each of the quadrants based upon the risk management literature. The resulting quadrants are labelled as follows:

- *CM Quadrant 1 – Continue to extensively use these controls*: these are controls for academic dishonesty that are employed frequently and are perceived to be highly effective.
- *CM Quadrant 2 – Promote more usage of these controls*: these are controls that are used relatively less frequently, but are perceived to be highly effective.
- *CM Quadrant 3 – Use according to specific instructor needs*: these are controls that are used relatively less frequently and are perceived to be relatively ineffective.
- *CM Quadrant #4 – Consider reduced efforts, and reallocate time to more effective controls*: these are controls that used relatively frequently, but are perceived to be ineffective.

The results are presented in Fig. 3. In addition to identifying and naming the quadrants in Fig. 3, we also insert a line that represents the theoretical best fit between control usage and effectiveness. This line has a slope of one, such that points falling on the line would represent controls where the frequency of usage matches the effectiveness of the control. Points falling above the line represent controls that are perceived to be more effective than their usage suggests (under-used controls), and points falling below the line represent controls that are seen as less effective than their usage suggests (over-used controls).

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Table 3
Risk levels of academic dishonesty incidences.[a,b]

Incidence	Frequency	Significance	Impact
9	2.81	3.47	9.75
10	2.61	3.22	8.40
1	1.82	3.77	6.86
2	1.77	3.68	6.51
5	1.59	3.61	5.74
7	1.69	3.29	5.56
8	1.99	2.75	5.47
3	2.24	1.95	4.37
11	1.37	3.08	4.22
4	1.36	2.98	4.05
6	1.15	3.45	3.97
12	1.20	2.39	2.87

[a] Consistent with the risk management frameworks, we calculate the impact of the individual incidences by multiplying its frequency by its significance.
[b] The legend for the incidences of academic dishonesty is as follows:

1	–	Copying from another student on a test.
2	–	Using unauthorised material during a test (e.g., phone, notes, pre-programmed calculator, etc.)
3	–	Continuing to write after the test time has expired.
4	–	Communicating by signals during a test.
5	–	Gaining unauthorised access to test material before writing.
6	–	Getting someone else to pretend they are the student (impersonation) during a test.
7	–	Using washroom breaks to access unauthorized materials (e.g., hidden notes, phone access, etc.)
8	–	Requesting special consideration/deferred exam (e.g., for illness) assuming that the conditions are not genuinely met.
9	–	Having another person complete an assignment or using another student's assignment from a previous semester.
10	–	Using information without proper referencing (from a book, journal or website).
11	–	Falsifying the results of one's research.
12	–	Preventing other students' access to resources required to complete an assignment.

4.3.2. Insights from the control map

CM Quadrant #1 focuses on controls that are perceived to be highly effective and used frequently. *CM* Quadrant #1 includes four controls (see Fig. 3). Leading a discussion in class about academic dishonesty with specific examples and explanations of the consequences is a control that is closely linked with both *CM* Quadrant #1 and #4, and is not clearly identified as a highly effective control. The remaining three controls should continue to be used extensively by professors.

CM Quadrant #2 focuses on controls that are not used frequently but are perceived to be highly effective. As a result, professors should be encouraged to use the controls in *CM* Quadrant #2 more frequently. Along with Menzies and Newson (2007) and Scott (2017) we suspect these controls are not widely used as they are considered too time-consuming for faculty members faced with higher student to faculty teaching ratios and pressure to increase their research productivity.

CM Quadrant #3 focuses on controls that are perceived to be ineffective and are used infrequently. Professors should consider using these controls according to their specific needs. For example, with the advent of new technologies, checking the washrooms for unauthorized materials is generally a less useful control as students may use the washroom to access their smart devices. A policy that cell phones and other receiving devices (Fitbits, i-phone watches, etc.) should not be brought into the examination hall may be more appropriate.

CM Quadrant #4 focuses on controls that are perceived to be ineffective, yet are used relatively frequently. One control falls in *CM* Quadrant #4: i) including or referring to the University's policy on academic dishonesty in the syllabus. This control is the most used control among those in our survey. This control is likely used frequently as many institutions may mandate instructors to include this in course syllabi.

We can further interpret the control map by revisiting the PCA based on the same ten control questions (Table 2 – Panel B) which resulted in three components based around *Preventive Controls*, *Detective Controls*, and *Faculty Driven Attitude*. In addition, we can compare the placement of individual controls on the control map, relative to the line of fit. The two controls

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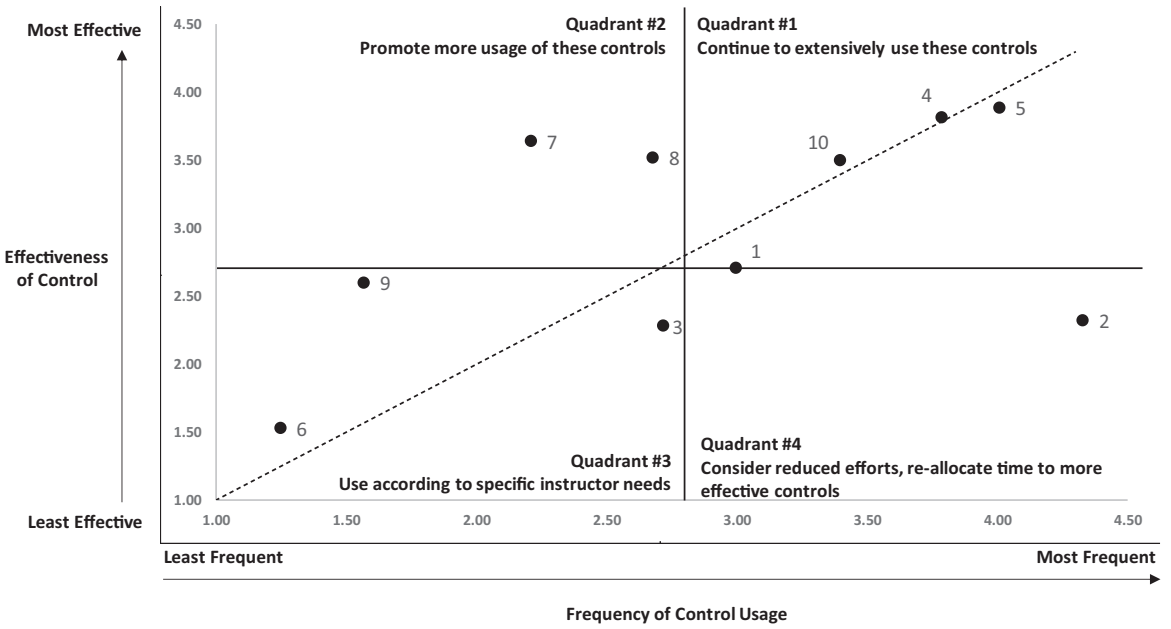

Notes

a – The legend for the controls for academic dishonesty is as follows:

1 - Lead a discussion in class about academic dishonesty with specific examples and explanations of the consequences.
2 - Include or refer to the University's policy on academic dishonesty in the syllabus.
3 - Have students sign a statement that their work is their own.
4 - Using multiple examination versions (e.g., scrambling the order of questions on multiple-choice exams).
5 - Changing assignments and exams each year in order to limit student's access to past materials.
6 - Checking the washrooms before an exam for unauthorized materials.
7 - Creating assessment such that the question responses are unique to a student and cannot be copied.
8 - Using online resources, search engines or other plagiarism software to detect plagiarism.
9 - Requiring students to turn in research materials, with incorporated sections highlighted.
10 - Increase the certainty of punishment if detected.

b - The axes were both measured with a 5-point Likert scale anchored with "1" as Low and "5" as High, based on the following questions:

X-axis: How often do you use this control in your classroom?

Y-axis: How useful do you believe that this control is at mitigating the impacts of academic dishonesty?

Fig. 3. Academic dishonesty control mapping.[a,b.]

that are used the most and perceived to be the most effective are also the controls that primarily load with the *Preventive Control* component (i.e., controls 4 and 5). These controls also lie very close to the line of fit, suggesting they are used appropriately. We also observe that the controls that primarily load with the *Detective Control* component (i.e., controls 6, 7, 8 and 9) are used relatively less frequently even though the they are perceived to be moderately to highly effective (i.e., control 8 and 9). These controls lie above the line of fit, suggesting they are used less frequently than desirable, given their effectiveness. Lastly, we observe that controls that primarily load with Faculty Driven Attitude (controls 1, 2, 3, and 10) are used frequently, but are not generally not perceived to be effective. The only exception is the control of increasing the certainty of punishment if detected (control 10), which is perceived to be highly effective. Control 2 – including the University's policy on academic dishonesty in the syllabus – lies well below the line of fit, indicating it is used more frequently than its perceived effectiveness warrants. Increasing the certainty of punishment can also be considered to have a preventive control element

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even though the PCA analysis did not result in such a factor loading. For example, increasing the certainty of punishment or likelihood of getting caught may reduce moral hazard, influence attitudes toward academic dishonesty, and dissuade students from engaging in academic dishonesty (Power, 2009). In this case, Control Quadrant #1 would tend to capture controls with a preventive element.

Overall, the control map reveals a generally positive association between the ten controls plotted based on their *effectiveness* (y-axis) and *frequency* (x-axis). We calculate the Spearman Rank Correlation for each control with respect to a professor's frequency of use and perceived effectiveness. The correlation for each control is presented in Table 4. Table 4 reveals controls 2, 3 and 7 have the least consistency between effectiveness and use. Table 4 also reveals that controls 1, 8, and 10 have the most consistency with respect to their relative usage and perceived effectiveness.

In conclusion, the results of Table 4 and the pattern of data in Fig. 3 suggests professors generally employ controls they perceive to be effective more frequently. This suggests faculty members' efforts are mostly well-directed. However, the four significant deviations from the line of fit suggest recommendations for improvement. These deviations, in the order of magnitude are: Include or refer to the University's policy on academic dishonesty in the syllabus; Creating assessment such that the question responses are unique to a student and cannot be copied; Requiring students to turn in research materials, with incorporated sections highlighted; Using online resources, search engines or other plagiarism software to detect plagiarism. It has been mentioned earlier that including a reference to the University's policy on academic dishonest is a requirement in most universities, even though it may not be perceived to be an effective tool to control academic dishonesty. Regarding other controls where their frequency and effectiveness do not align, it is possible that creating assessment such that the question responses are unique to a student and cannot be copied and requiring students to turn in research materials, with incorporated sections highlighted, are controls that entail significant time commitment on the part of faculty members (Scott, 2017), therefore, these controls are used less frequently. While the control of using online resources, search engines or other plagiarism software to detect plagiarism may require an upfront time commitment, it may also be these controls are not used frequently because faculty members may not have access to the appropriate database or software.

We provide three overall recommendations based upon the results presented in Fig. 3, Table 2 – Panel A, and Table 4. First, preventive controls tend to be used most often and are also perceived to be most effective. We encourage professors to continue to use these types of preventive controls. However, control 7 (creating assessment such that the question responses are unique to a student and cannot be copied) is perceived to be highly effective but is not used frequently. We encourage administrators to support professors in their implementation of more controls of this nature (e.g., control 7) (see more on this recommendation in the Discussion below). Second, we find that there are some types of detective controls that are perceived to be effective but are used relatively infrequently. As a result, we encourage professors to consider implementing more of these controls, especially those that are perceived to be effective (e.g., control 8 - Using online resources, search engines or other plagiarism software to detect plagiarism). Detective controls could be effective as they may have preventive elements via a feedback loop in forming student attitudes. Third, we note the most frequently implemented control (control 2 - include or refer to the University's policy on academic dishonesty in the syllabus) is also perceived to be among the least effective. This could be due to the mandatory nature of this control. As a result, we recommend that professors and administrators explore how the effectiveness of this control could be enhanced, especially considering its pervasive use. Recall that this control falls in the faculty attitude component. Murphy and Dacin (2011, p.601) find there are "three psychological pathways to fraud nestled within attitude/rationalization: (1) lack of awareness, (2) intuition coupled with rationalization, and (3) reasoning". Understanding the implications of these pathways may permit this control to be utilized more effectively.

5. Summary, limitations and future research avenues

This paper applies professional accounting concepts to academic dishonesty. Specifically, we apply the fraud triangle framework and find this to be a fairly good fit in understanding faculty members' perceptions of academic dishonesty. We find there are two components to each of the FT corners with respect to academic dishonesty. Specifically, our results reveal that the attitude and pressure corners have elements of both faculty and student agency, while the opportunity corner is mostly within the domain of the faculty to prevent or detect academic fraud. In addition, we apply risk mapping techniques to provide insights into the risk profile of individual incidences of academic dishonesty and the optimal usage of controls for academic dishonesty. Our risk mapping analyses reveal that plagiarism and exam cheating are perceived to have the highest overall impact on the integrity of student grades, whereas lower impact incidences of academic dishonesty are generally related to assignment and exam protocols. We further show that faculty efforts to control academic dishonesty are mostly well-directed; however, there may be opportunities to employ specific preventive and detective controls more frequently with additional time, professional development or administrative support.

Our paper is not without limitations. First, our study is based upon data obtained from faculty members regarding their perspectives on academic dishonesty (i.e., incidences, motivators and controls). As a result, our analysis does not reflect the perspectives of students or administrators. We would like to point out that studies examining perceptions of academic dishonesty of students and faculty have found significant correlation between responses (Sims, 1995). Second, as with most survey-based studies, our paper is limited by general uncertainty regarding the linkage between a faculty members' reported perceptions and reality. For example, a faculty member may perceive a control to be effective, when, in reality, it is not. Our

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Table 4
Spearman correlations for control frequency and effectiveness.[a,b]

Control	Spearman correlation coefficient between frequency and effectiveness of control use
1	0.523***
2	0.154**
3	0.377***
4	0.455***
5	0.469***
6	0.457***
7	0.286***
8	0.487***
9	0.407***
10	0.551***

[a] Significance: *** Significant at the 0.01 level (2-tailed), ** Significant at the 0.05 level (2-tailed), * Significant at the 0.10 level (2-tailed).
[b] The legend for the controls for academic dishonesty is as follows:

1	–	Lead a discussion in class about academic dishonesty with specific examples and explanations of the consequences.
2	–	Include or refer to the University's policy on academic dishonesty in the syllabus.
3	–	Have students sign a statement that their work is their own.
4	–	Using multiple examination versions (e.g., scrambling the order of questions on multiple-choice exams).
5	–	Changing assignments and exams each year in order to limit student's access to past materials.
6	–	Checking the washrooms before an exam for unauthorized materials.
7	–	Creating assessment such that the question responses are unique to a student and cannot be copied.
8	–	Using online resources, search engines or other plagiarism software to detect plagiarism.
9	–	Requiring students to turn in research materials, with incorporated sections highlighted.
10	–	Increase the certainty of punishment if detected.

findings are based upon faculty members' perceptions of what controls they consider to be most effective. We are aware, however, that students may invest a considerable amount of time in designing and implementing new methods to perpetrate academic fraud (especially methods using social media, the internet, and emerging technology and communication tools). To the extent that our respondents may not be aware of these new modes of academic dishonesty, faculty members' perceptions of academic fraud and the effectiveness of various control techniques may be inaccurate and outdated. Third, our sample is based upon responses of accounting academics in the U.S. We focused on U.S. academics as the U.S. professional literature has many strong references to the fraud triangle and other risk management techniques. As a result, it is unclear if our results are generalizable to other countries, especially those countries outside of the U.S. that do not have as strong a reference to the fraud triangle in their professional literature.

Another limitation is in regard to the overall response rate. Our response rate is slightly below the response rate for survey research, in general (Baruch, 1999). However, the low response rate concern is mitigated by the fact that our resulting sample size is adequate for the analyses undertaken (Comfrey & Lee, 1992; Tabachnick & Fidell, 1996). Our non-response bias tests (Moore & Tarnai, 2002) do not reveal significant issues, and our respondent profile is consistent with the general population of U.S. accounting academics (Kamath et al., 2011).

It is also important to note a limitation that is specific to the results presented in our Control Map (i.e., Fig. 3). Specifically, it is important to note that the frequency measures include a respondent's voluntary and non-voluntary use of a given control. For example, referring to the University's policy on academic dishonesty in the syllabus is the most frequently used control. The reported control frequency of usage is likely the result of faculty members employing this control voluntarily as they believe it to be appropriate or mandated by their University. Conversely, the reported control frequency of using the control of creating assessment such that the question responses are unique to a student and cannot be copied is most likely to be driven by a faculty member's voluntary usage. This voluntary usage is likely to be more limited as controls of this type are time-consuming to implement. Given the data, it is difficult to separate a faculty member's voluntary versus non-voluntary usage of a given control.

Future researchers are encouraged to continue to investigate the applicability of professional accounting concepts to academic dishonesty. For example, future researchers could conduct a gap analysis between the incidences of academic dishon-

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esty and all available controls for academic dishonesty. Gap analyses are commonly employed by risk managers, and juxtapose the impact of an incident against the effectiveness of a control in order to highlight key risk areas. Additionally, future researchers could employ data that incorporates student, faculty and administrator perspectives. Currently, most prior literature focuses on a single perspective (e.g., this study focuses on the perspectives of faculty members, while Malgwi and Rakovski (2008) focus on student perspectives). Combining multiple perspectives into a single study may result in triangulation opportunities based upon a rich dataset that reflects the complexities and multiple domains of control that influence academic dishonesty. Future researchers are encouraged to undertake further studies to understand whether FT and risk management concepts can be employed successfully to reduce incidences of academic dishonesty in practice.

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Appendix A. Summary of survey instrument

A.1. Section 1 – Incidences of academic dishonesty (“incidence question”)
1. Copying from another student on a test.
2. Using unauthorised material during a test (e.g., phone, notes, pre-programmed calculator, etc.)
3. Continuing to write after the test time has expired.
4. Communicating by signals during a test.
5. Gaining unauthorised access to test material before writing.
6. Getting someone else to pretend they are the student (impersonation) during a test.
7. Using washroom breaks to access unauthorized materials (e.g., hidden notes, phone access, etc.)
8. Requesting special consideration/deferred exam (e.g., for illness) assuming that the conditions are not genuinely met.
9. Having another person complete an assignment or using another student’s assignment from a previous semester.
10. Using information without proper referencing (from a book, journal or website).
11. Falsifying the results of one’s research.
12. Preventing other students’ access to resources required to complete an assignment.

Respondents were asked to rate these twelve incidences of academic dishonesty twice based upon the following two questions:

1) Frequency: How often does this type of academic dishonesty occur in your classroom?
2) Significance: How significant would this type of academic dishonesty be to the overall integrity of a student’s grade in your course?

Respondents were asked to rate these incidences of academic dishonest on a Likert-scale, anchored with “1″ – Low and “5” – High.

A.2. Section 2 - Motivators of academic dishonesty (“motivator questions”)
1. Wanting to help a friend
2. Not likely to get caught
3. Assessment is too difficult
4. Pressure to get good grades
5. Cheating is victimless
6. Assessment was too time consuming
7. Test date or due date was too close to other test/assignments
8. Teaching method did not accommodate student’s learning style

Respondents were asked to rate these eight motivators of academic dishonest on a Likert-scale, anchored with “1” – Not a Strong Motivators and “5” – Very Strong Motivator.

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A.3. Section 3 - Controls for mitigating academic dishonesty ("controls questions")

1. Lead a discussion in class about academic dishonesty with specific examples and explanations of the consequences.
2. Include or refer to the University's policy on academic dishonesty in the syllabus.
3. Have students sign a statement that their work is their own.
4. Using multiple examination versions (e.g., scrambling the order of questions on multiple-choice exams).
5. Changing assignments and exams each year in order to limit student's access to past materials.
6. Checking the washrooms before an exam for unauthorized materials.
7. Creating assessment such that the question responses are unique to a student and cannot be copied.
8. Using online resources, search engines or other plagiarism software to detect plagiarism.
9. Requiring students to turn in research materials, with incorporated sections highlighted.
10. Increase the certainty of punishment if detected.

Respondents were asked to rate these ten controls twice based upon the following two questions:

(1) Frequency: How often do you use this control in your classroom?
(2) Effectiveness: How useful do you believe that this control is at mitigating the impacts of academic dishonesty?

Respondents were asked to rate these incidences of academic dishonest on a Likert-scale, anchored with "1" – Low and "5" – High.

Appendix B. Supplementary material

Supplementary data to this article can be found online at https://doi.org/10.1016/j.jaccedu.2019.01.001.

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