Attrition and academic performance of students identified as at-risk using administrative data alone

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This report presents the results of a study on the retention and academic performance of students identified as belonging to 'equity groups' or potentially 'at-risk' using administrative data collected during admissions. It compares data on academic performance and attrition for the nominally at-risk and not-at-risk groups for all undergraduate degree and associate degree students commencing at the university in early 2008. Results show that all risk groups performed worse academically than their cohort members with no administrative risk factors. However, while most groups had higher attrition than students with no administrative risk factors, several groups had markedly lower attrition. The results clearly show the value of administrative data in identifying at-risk groups. Such groups need targeted strategies to improve both retention and performance, the latter being critical to reducing the risk of 'delayed attrition' as students opt out of further study or are excluded via the formal academic review process.

Introduction

Improving student retention and facilitating successful graduate outcomes are key priorities of the University of Tasmania EDGE 2 Agenda. In response to these priorities, in 2007 UTAS made a significant investment into implementation of a University wide transition support programme to focus on supporting first year students. More specifically, the aim of the initiative was to have impact on retention and graduate outcomes by identifying and supporting 'at risk' students who required individualised intervention during their student experience in order to achieve positive academic outcomes. The expectation of the University was that the Service would incorporate a strong emphasis on individualised intervention with students at risk of attrition or poor academic performance. In order to achieve this, the program managers of the new Service needed to develop a means of identifying appropriate students at the point of enrolment using the University Student Record System.

The study of factors that influence the retention, and to a lesser, extent, academic performance, of students in higher education has a long history. The philosophy behind these studies is to understand what is related to, or predicts, attrition or poor academic performance and to use this information to design appropriate interventions (Caison, 2004-5; McKenzie & Schweitzer, 2001). A plethora of factors have been found to predict or influence retention and performance, falling into a number of broad categories: student background and demographics, prior educational achievement and level, psychosocial factors and approaches to study, and institutional and course factors (see review in Scott & Smart, 2005; Wimshurst & Allard, 2008). However, factors found to be predictive in some studies are not always predictive in others (DeBerard, Spielmans & Julka, 2004), due in part to the ways in which

different studies are designed. Indeed, even in the same study with the same methodology, results for student cohorts sampled at different universities have differed (Vandamme, Meskens & Superby, 2007) and in general the results of particular studies cannot be generalised to other environments (Scott & Smart, 2005). A further issue is that academic performance and retention may inherently be different in terms of how well they can be predicted. For example, DeBerard et al. (2004) were able to explain 56% of the variance in academic achievement using a mixture of psychosocial and academic variables, but could not find a statistically significant relationship with retention. Typically, quantitative models of attrition explained less than a quarter of the variance in retention (Scott & Smart, 2005). These authors also highlighted the consistency of message from many studies that a student's decision to leave or remain at university is complex, individual and interactive, and "one student's reason to leave is another's reason to stay" (p4).

Issues such as these pose a logistical problem for universities seeking to identify the factors leading to attrition or poor performance in their commencing student population. The potential pool of factors is large, but realistically there is a limit to the number and size of questionnaires that can be administered to students, particularly as the entire cohort would need to be tested if psychosocial factors were to be used to identify at risk students. In addition, the expense and time involved to collate and analyse the data would be substantial and it might not be achievable in the time frame necessary for identification and early intervention with at-risk students. A further issue is the nature, cost and effectiveness of interventions, whether students would be amenable to taking either the questionnaires or the interventions themselves, or even if appropriate interventions could be designed at all.

Faced with these problems we decided to see what data was already available within the university's administrative data systems that could provide information on students' vulnerability to attrition and poor academic performance. By definition, such an approach was focussed on, and was limited to, the types of information routinely collected during the application and admissions process. Our intention was to build an at-risk 'matrix' so that a student's entire risk profile could be established. This approach was influenced by informal studies within the university that suggested that no individual risk factors were in themselves a guarantee of poor outcomes. This raised the possibility that the amount of risk a student faced could be more significant than the nature of the risk factors themselves.

The research questions we sought to answer in this initial analysis were therefore:

- Can administrative data provide useful information about risk?
- Are 'at-risk' students more likely to leave the university than students with no risk factors?
- Do 'at-risk' students perform worse academically than students with no risk factors?
- Are certain groups more/less at risk of either attrition or poor performance?
- Does increasing number of risk factors mean greater overall risk?

Methods

The study cohort

The study cohort consisted of students who were commencing a bachelor's degree or an associate degree in either summer school or semester one of 2008. Students were either commencing new (i.e., were new students to the university), or commencing old (i.e., had been previously enrolled, but in a different course). This selection procedure therefore

included students who had done prior study and were not necessarily new first year students. A further requirement for inclusion was that they needed to have been enrolled in at least one graded bridging or undergraduate unit, and that they did not subsequently enrol in a postgraduate course in the year. By definition the cohort includes students who withdrew before census date in either summer or semester 1. The cohort consisted of 4868 students in total.

At-risk factors

In conjunction with the University's central administration we identified a range of demographic and administrative information that could be extracted from the data systems that either indicated that student belonged to a traditional equity group, had an existing educational disadvantage, or was flagged as at risk at sometime during the applications and admissions process. These latter risk factors include more direct indications of risk, such as being admitted on probation or accepted into an associate degree rather than a full undergraduate course, to more indirect indicators, such as not being offered a place into their first degree preferences. The latter signal that students did not meet the general entry requirement for their preferred degree, either because they lacked the appropriate pre-tertiary subjects or did not achieve the required level in them. Table 1 lists and gives a description of the risk factors we used in this study as well as the rationale for their inclusion and their inherent reliability as an indicator of at-risk status. Specifically excluded from consideration was information about students who had disclosed a disability or who had obtained a learning access plan through the Disability Service. We emphasise that most of the risk factors, especially demographic ones, are indicators of potential risk, not markers of definite risk.

Table 1. Risk factors identified in the administrative data

Risk factors	Rationale
Demographic	
• Domestic student born overseas	Students born overseas are more likely to come from non-traditional backgrounds and may be first-in-family university students.
• Humanitarian visa holder	In the case of humanitarian visa students there is also an increased likelihood of disrupted or limited prior education, refugee background and traumatic earlier experiences.
Educational disadvantage	
• No Year 11 or 12 or prior tertiary study • Tasmanian Year 12 entrant with low score	Both these groups have limited educational background or achievement, which is significant because of the clear link between high school achievement and university achievement demonstrated within the literature.
Direct indication of risk	
• Has a condition of offer indicating that student is at risk	Conditions are placed on an offer by a faculty for a variety of reasons. Conditions regarded as indicating risk are those that: a) require the completion of a specific bridging or foundation unit, or other unit, for entry or continuation (i.e., student has not yet met the full entry requirements for the course), or

	b) require a specific GPA in a previous course, or c) indicate the student's enrolment is restricted, possibly because the student is on probation.
• Admitted on probation or flagged as at risk during admission	This is a clear indication that the admissions team has flagged that the student is at risk
Indirect indication of risk	
• Admitted into an associate degree	The associate degree is often used as a pathway into a bachelor's degree and allows students to take bridging subjects and university preparation units in order to meet the requirements of entry into a full degree that meets their career aspirations. It is commonly taken by mature age entrants and students who have not completed year 11 or 12. It is also used by students who wish to sample subjects from around the various faculties of the university without being constrained by degree requirements. The group is therefore not homogenous. This group excludes students in specialist professional associate degree courses, such as aquaculture.
• Received an alternative offer	The student was not offered their first course choice. Excludes students who were not offered high-end quota preferences (such as medicine or pharmacy) but who readily met entry requirements for other course and faculties. Since students who do not meet general entry requirements are encouraged to include an associate degree in their list of preferences, this may underestimate the true numbers who were not offered their preferred course.
• Is receiving an access scholarship	Access scholarships are aimed at low-income students including indigenous students and those from rural or regional areas, and are designed to improve these students' ability to access and remain in tertiary education. However, it is recognised that many recipients do not suffer from educational disadvantage.

These different types of risk factors are clearly not mutually exclusive and a student's particular circumstances could potentially result in a cluster of administrative risk factors. For example, students with no year 11/12 or prior tertiary study were also likely to be in an associate degree and to have received an alternative offer rather than their preferred course choice.

Construction of the at risk matrix, and determination of attrition and performance

Lists of students falling into each risk group were consolidated into a matrix of risk factors, and demographic information, summary performance data and attrition information was added. A student was regarded as being retained if they had a valid enrolment in either

semester two or spring school units at the time when semester one results were extracted for analysis (post-census date in semester two). Because the cohort includes students who withdrew before census date, attrition figures are not comparable with officially reported values (e.g., Olsen, 2008). Two indicators were calculated for academic performance—grade point average (GPA) and whether the student failed 50% of more of the total weight of units. GPA was calculated for graded units only, with scaling for unit weight, and averaged over the total weight of graded units a student undertook over the combined spring/semester one period. Terminating passes were treated as fails and awarded a zero, passes were awarded four points, credits five, distinctions six and high distinctions were awarded seven points. Failing 50% or more of the total unit weight would normally bring a student under academic review and possibly result in them being placed on probation.

Results

Risk profile of the cohort

The 929 students identified as being at-risk had between one and six risk factors, and formed almost a fifth (19%) of the entire cohort (Table 2). Most of the at-risk group had one (77.5%) or two (16.5%) risk factors, and 6% had three or more risk factors. The three largest risk factor groups were domestic students who were born overseas, students in an associate degree and students receiving an access scholarship[1] (Table 3).

Table 2: Numbers of students with different numbers of risk factors

Number of risk factors	Number of students	Percentage of cohort	Percentage of students at risk
0	3939	81.0	
1	720	14.8	77.5
2	153	3.1	16.5
3	40	0.8	4.3
4	8	0.2	0.9
5	7	0.1	0.8
6	1	0.02	0.1
Total students	4868	100	

Over 40% of the at risk group were born overseas, including humanitarian visa students (Table 3). About a quarter of the group were in an associate degree and almost a fifth were holders of an access scholarship. Just over 10% of the group had received an alternative offer, were Tasmanian year 12 entrants with a low score, or had a condition of offer suggesting that they were at risk. The nature of the risk for individual students was diverse with in total

[1] This use of access scholarship holding as a risk factor has been problematic in the analysis both due to their numbers (which dominated risk load analyses) and to the view held by the Scholarships Office that the comparative ease with which students could qualify for CAS or CECS scholarships meant that many not at risk students were potentially in this group. For these reasons we decided to omit from the access scholarship group any students who had a standard CAS or CECS, but who had no other access scholarship, and no other risk factors. These students were in effect moved to the no risk factor group.

almost 60 different combinations of risk factors observed within the at risk group. Only seven of these contained 10 or more students.

Table 3: Occurrence of individual risk factors in the study cohort

Risk factor	Number of students	Percentage of cohort	Percentage of whole at risk group	Percentage with additional risk factor(s)
Country of birth not Australia (domestic students*)	357	7.3	38.4	18.2
In an associate degree	241	5.0	25.9	59.8
Access scholarship holder	169	3.5	18.2	33.7
Received an alternative offer	112	2.3	12.1	80.4
Tasmanian Year 12 entrant with a low score	110	2.3	11.8	36.4
A condition of offer suggesting potentially at-risk	99	2.0	10.7	22.2
A probation or at risk flag	69	1.4	7.4	29.0
No Year 11 or 12 or prior tertiary study	68	1.4	7.3	45.6
Humanitarian visa holder	34	0.7	3.7	70.6

*Excludes humanitarian visa holders

Although risk was diverse, students with certain risk factors were very likely to also have other risk factors, for example, 80% of students who received an alternative offer, 70% of humanitarian visa students, 60% of students in an associate degree, and 46% of students with no year 11 or 12 or prior tertiary study, also had other risk factors. Rates were lower for other risk factors, the lowest being 22% for students with a condition of offer suggesting that they were at risk.

Attrition and academic performance of each group

Table 4 shows that a quarter of students with no risk factors underwent apparent attrition, a figure lower than all risk factor groups except humanitarian visa students (15%) and access scholarship holders (10%). Attrition was highest amongst students with no year 11 or 12 or prior tertiary study, students in an associate degree (both 53%) and students who received an alternative offer (48%). In other risk groups approximately a third of students left.

Table 5 shows that students in all risk factor groups performed worse than students with no administrative risk factors. Almost 80% of students with no administrative risk factors had a passing GPA and only 16% failed half or more of their load. In contrast, between a third and a half of students who received an alternative offer, or were a Tasmanian year 12 entrant with a low score or a humanitarian visa holder did not have a passing GPA, and 35-62% of these groups failed a half or more of their load. Other risk factor groups were intermediate, with several groups performing worse, but not dramatically so, than students with no risk factors. These groups were students born overseas, and students with no year 11 or 12 or prior tertiary study.

Table 4: Attrition for each risk factor group in rank order

Risk factor	Overall attrition %
No Year 11 or 12 or prior tertiary study	52.9
In an associate degree	52.7
Received an alternative offer	48.2
Country of birth not Australia (domestic students)	34.2
A probation or at risk flag	33.3
A condition of offer suggesting potentially at-risk	33.3
Tasmanian Year 12 entrant with a low score	32.7
No administrative risk factors	*24.7*
Humanitarian visa holder	14.7
Access scholarship holder	10.1

It should be noted that the rank orderings based on failing half or more of load differed slightly from those based on GPA. Students with a probation or at risk flag would then be amongst the three worse performing groups, and students with no year 11 or 12 or prior tertiary would not be among the top two best performing risk groups (Table 5).

Table 5: Academic performance of each risk factor group

Risk factor	Percentage with overall passing GPA in rank order (worst to best)	Percentage who failed 50% or more of their load	Rank order based on failing 50% or more of load
Received an alternative offer	32.5	62.3	1 (worst)
Tasmanian Year 12 entrant with a low score	35.5	58.1	2
Humanitarian visa holder	37.9	34.5	5
A probation or at risk flag	46.6	43.1	3
In an associate degree	57.1	37.8	4
A condition of offer suggesting potentially at-risk	58.8	20.7	9 (best)
Access scholarship holder	61.5	21.7	8
Country of birth not Australia (domestic students)*	66.9	22.6	7
No Year 11 or 12 or prior tertiary study	70.2	23.4	6
No administrative risk factors	*77.0*	*15.9*	

The effects of risk factor load

Both attrition and academic performance worsened[2] as risk factor load increased (Tables 6 and 7). Attrition was on average ten percentage points higher in students with one risk factor compared with students with no risk factors, and was on average a further five percentage points higher again in students with more than one risk factor.

Table 6: Number of risk factors and attrition

Number of risk factors	Overall attrition %	Number of students
0	24.8	3939
1	35.3	720
2+	40.7	209

The pattern was similar, but dramatically worse, for academic performance (Table 7). The percentage of students with a passing GPA decreased by 12 percentage points in students with one risk factor and a further 18 percentage points in students with more than one risk factor. Similarly, relative to students with no risk factors, having one risk factor increased a student's chances of coming under academic review by 8 percentage points. Additional risk factors increased this by a further 20 percentage points.

Table 7: Number of risk factors and academic performance

Number of risk factors	Percentage with overall passing GPA	Number of students	Percentage who failed 50% of more of load	Number of students
0	77.1	3299	16.0	3315
1	64.9	570	23.9	574
2+	46.9	160	44.4	160

Discussion

The results of this study clearly shows administrative data can provide valuable information about increased risk of attrition and poor academic performance. Of the groups we studied, all but two had higher attrition than students with no administrative risk factors. The groups with the highest attrition levels were students with no year 11 or 12 or prior tertiary study, or who were in an associate degree, or who were not offered their preferred course. The latter two groups were linked as a third of students in the associate degree (76 out of 241) were also in the alternative offer group, presumably because they did not qualify for their preferred course. The determination with which humanitarian visa students held on to the opportunity to do tertiary study, sometimes in the face of discouraging results and slow progress, was evident by their low attrition. The value of scholarship support in improving retention was also obvious, although it is not possible to tell whether it was the financial support that mattered, or whether the commitment of scholarship students to their studies was higher.

[2] We do not provide significances as the figures we report are for the entire population of commencing students for whom a GPA could be calculated.

All risk factor groups did worse in their studies, on average, than students with no risk factors. The group with the highest attrition, students who had not received their preferred course, also performed worse academically with just one third achieving a passing GPA and almost two thirds 'qualifying' for academic probation by failing a half or more of their load. This result suggests that this group of students may also have had an educational disadvantage; however closer inspection showed that only 22 of these 112 students had no year 11 or 12 or were a Tasmanian year 12 entrant with a low score. This raises the issue that motivation in a non-preferred course may be critical to both leaving the university and doing poorly, in the students that stay. Certainly, motivation or poor course choice have both been linked to poor outcomes for students (see review in Scott & Smart, 2005).

Educational disadvantage is an obvious theme underpinning the poor outcomes for the other two worst performing groups—Tasmanian year 12 entrants with a low score and humanitarian visa students. What is perhaps surprising is that students with no year 11 or 12 or prior tertiary did so well, with 70% achieving a passing GPA. A closer inspection of the data for this group showed that the attrition of younger entrants (in their mid-twenties) was almost 100%, leaving behind the older age groups. This may mean that experience and maturity can compensate for fewer years in secondary education. However, there is a possibility that this group included older students who had in fact completed high school studies but whose results were either not available or not disclosed. This illustrates the fact that administrative data may not always be reliable (see also Cao & Gabb, 2007), and that appropriate understanding of its limitations and constraints is important when using it for these purposes.

Perhaps the most significant result arising from this study is the finding that the more times a student showed in a risk factor group, the higher the chance of either attrition or poor performance if the student stayed. What is very significant is that academic performance worsened with increasing risk load to a far greater degree than did attrition. In fact, students with two or more risk factors were almost three times more likely to be placed on academic probation than a student with no risk factors. Since at least some of the risk factors we used potentially overlapped, this finding shows the value of mining the administrative systems for *all* signs or evidence of potential risk. The experience of university staff in the data systems area is critical to this process, but this experience can be 'siloed' away from student support and service areas.

Two obvious questions arise now that the value of using administrative data to identify at risk students is confirmed—can this data be extracted and used so that at risk students are identified early, and what type of intervention(s) are appropriate? Although the initial task seemed straightforward, there were considerable complexities with defining the student cohort and determining 'risk' on the basis of some of the administrative data, particularly as multiple values were stored for some variables and other variables, such as conditions placed on offers, were stored as free text. These complexities reduced the ease with which data could be extracted and collated to produce an individual student's risk profile.

In answer to the second question, the theme that runs through many of the risk factor groups is one of either limited, disrupted, or low achievement in, prior education. This probably also translates into more limited course choice, and conditions placed on offers, for example, a requirement to do specific bridging units. At another level it suggests that many of the at risk students were ill-equipped and under-prepared for a university environment, which they may have felt as both undermining and alien. At present, the Transition Support Service provides

individualised advice to students. However, this form of support relies on students to seek for help, and it arguably has limited capacity to have an impact on early attrition before, and in the first weeks of the semester. Interventions aimed at teaching students how to be effective students, or 'competent consumers of instruction' and to 'thrive as learners' (Ryan & Glenn, 2002-3, pp 319 & 300), may go a long way to assist them to develop both good approaches to study and self-confidence. Such interventions, focusing on academic self-efficacy, have been very successful for students including those who were provisionally admitted and those who did poorly in their first semester (Ryan & Glenn, 2002-3, 2004). They may well be the way forward for improved student success as diversity continues to increase with higher targets for both access and bachelors degree completion.

In addition to providing baseline attrition and performance data on a number of at risk groups, this study demonstrated that on average the likelihood of a student leaving their studies, or remaining, but doing poorly, increased with the number of risk factors. Our goal is to use this research and further analyses of the data to provide evidence to assist the University develop interventions, pathways, policies and procedures to improve the success of students who may be at risk. At present we have a five star access rating. We hope this will translate into five star progression and five star completion if we can make changes that mean that the first year experience is truly foundational for all students.

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