Drop Out Warning Signs

Nate Dickmeyer
Institutional Research & Assessment
LaGuardia Community College
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Most students at LaGuardia exhibit warning signs that they are under the sorts of stresses that can cause them to drop out. This essay details some of these warning signs and measures the retention rates associated with them singly and in combination. Improving retention may rest on how systematically the college is able to respond to these symptoms of stress.

Every year thousands of LaGuardia students tell our office that they are stressed and are thinking of dropping out. They don't actually come by, and we certainly don't offer to help them, but we see the signs in our data. This essay takes a look at how much we know about the signs of stress.

In the Fall 2013 semester LaGuardia had 15,940 degree students. By Fall 2014 10,439 or 65% of them had returned for classes or had graduated and 5,501 had failed to come back. A few hundred of these immediately transferred to another college and a larger number may come back eventually. Nevertheless, we want to look at the disposition of the 5,501 who failed to return. What were the signs?

Freshman stress

1-year Return (or grad) Rate--Freshmen

Categories: All Degree: 65%, Freshmen: 62%, Frosh & Not Oriented: 58%, Frosh & Late Reg: 56%, Frosh & Not Take FSE: 56%, Frosh & Part-time: 55%, Frosh & Absent 7: 41%
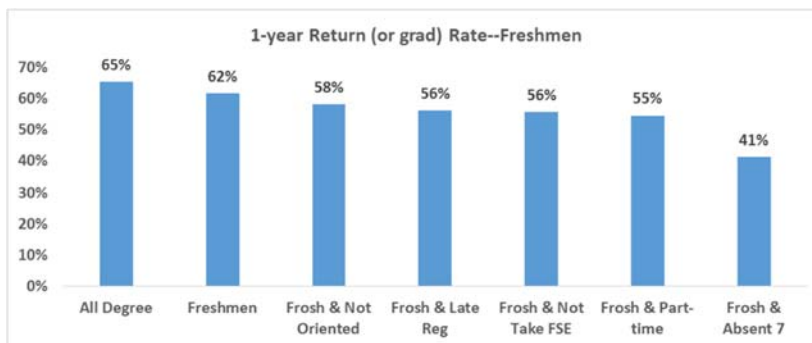
Figure 1

Of all these degree students 2,882 were first-time freshmen. (Note, the following analysis can also be done for new transfer-in students, and the results are very similar.) Figure 1 shows the one-year return rates for students with any of five stress indicators. The one-year return rate for all degree students was 65%, but only 62% for freshman. The one-year return rates for first-time students having at least one, given, stress indicator are (that is, these students may also have had other stresses):

1) 58% for first-time students who did not have the time or did not wish to forego other activities to attend orientation ("Not Oriented");
2) 56% for first-time students who were unable to register until four weeks before the first day of classes in Fall 2014 ("Late Reg");
3) 56% for first-time students who did not take a freshman seminar in Fall 2014 ("Not Take FSE");
4) 55% for first-time students who were unable to go fulltime ("Part-time"); and
5) 41% for first-time students who missed all classes for seven days during the Fall 2014 semester ("Absent 7," measured on Mondays for the previous seven days, excluding any student where a faculty member did not turn in an attendance report).

Figure 2, however, takes these five stress indicators and begins to add them up, one at a time (in an arbitrary order). The more signals a student sends, the less likely the student is to return in a year.
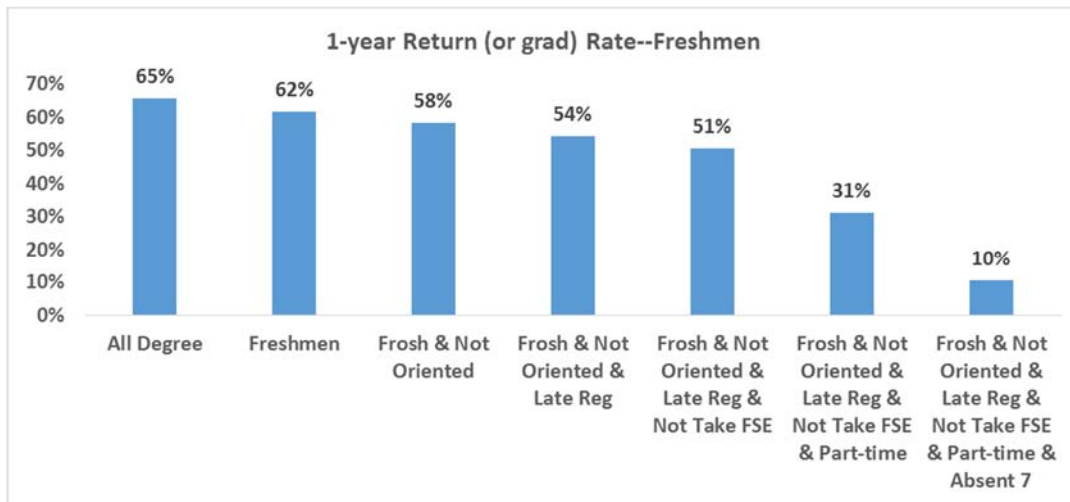

Figure 2

When we look at first-time students who were unable to attend orientation and registered late, the one-year return rate drops to 54%. If we add to those two stress indicators that the student also could not schedule Freshman Seminar, then the return rate drops to 51%. If in addition to those three stress indicators, the student could not attend full-time, then the return rate drops to 31%. Finally, if in addition to those four stress indicators, the student starts to miss classes and misses at least one week, then we only see 10% coming back the next fall.

In Figure 3 we see the generalized result for *any* one, two, three, four or five stress indicators in combination.
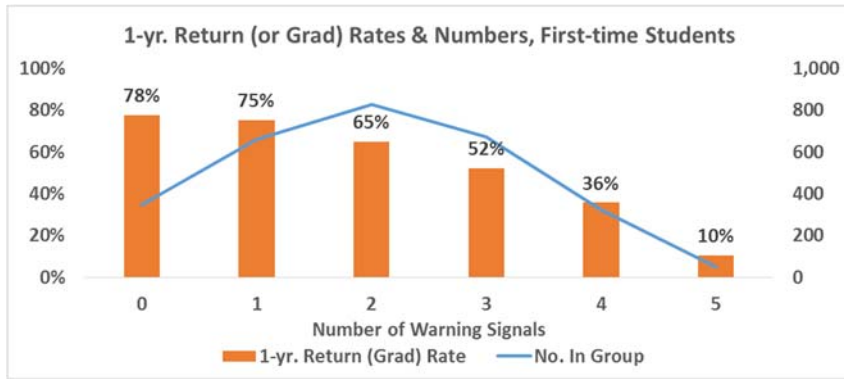
Figure 3

We also see the numbers of first-time students having those levels of stress. Most first-time students present one to three stress indicators, peaking at two. The more warning signs we see, the more likely it is that the student will be unable to continue.

Continuing students

In Figure 4 we show five stress indicators or warning signals for continuing degree students (neither first-time, new transfer-in, nor re-admit). Any student displaying at least one of these signs returns at a lower rate than all continuing students. The one-year return or graduation rate for all continuing students is 68%. Three of these stress indicators were also available for new students. The one-year return (or graduation) rates for students displaying these warning signs were:

1) 63% for students unable to keep at least a 3.00 cumulative GPA (through Spring 2013, ">3 GPA");
2) 59% for students who were unable to take a full-time credit load in Fall 2013 ("Part-time");
3) 56% for students who missed seven days in a row during Fall 2013 ("Missed 7 days min");
4) 52% for students who had financial aid in the 2012-13 academic year and did not receive an award in Fall 2013 ("Off Aid"); and
5) 62% for students who were unable to register earlier than four weeks before the start of classes for fall 2013 ("Late Reg").
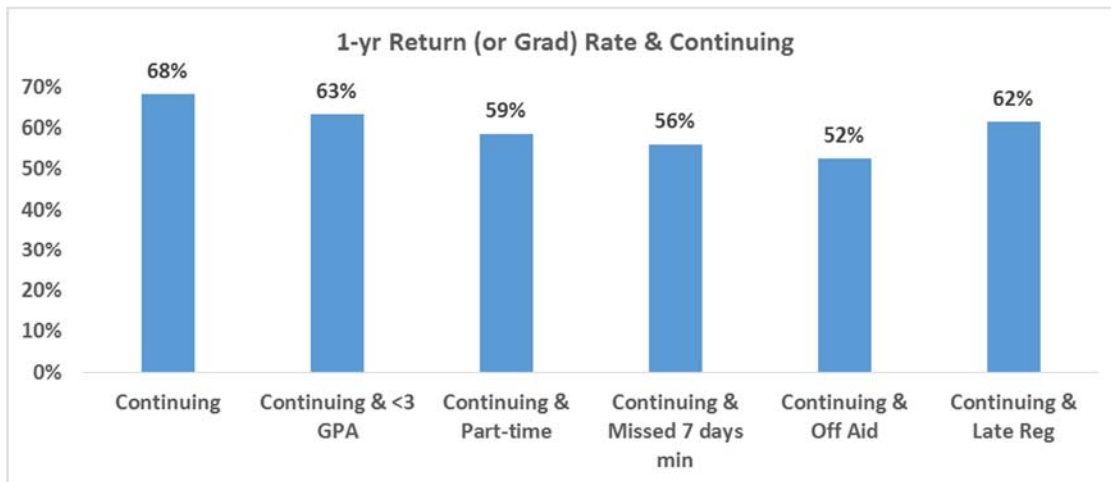
Figure 4

Figure 5 shows what happens when we begin to put these indicators together. When we combine the less than 3.00 GPA stress with the unable to attend full-time stress indicator, we see that the return rate drops from 63% to 54%. It drops to 39% when we also include only students who had a lower GPA, went part-time and were absent for at least seven days in a row. If we add a fourth warning signal, that the student is no longer on financial aid, the return rate drops to 24%. Counterintuitively, mostly because the numbers are small and the generalization does not hold in all cases, the students who registered early with all these other warning signs are the ones who did not return in this small sample. Including only those who registered late actually increases the return rate to 28%. This is an anomaly.
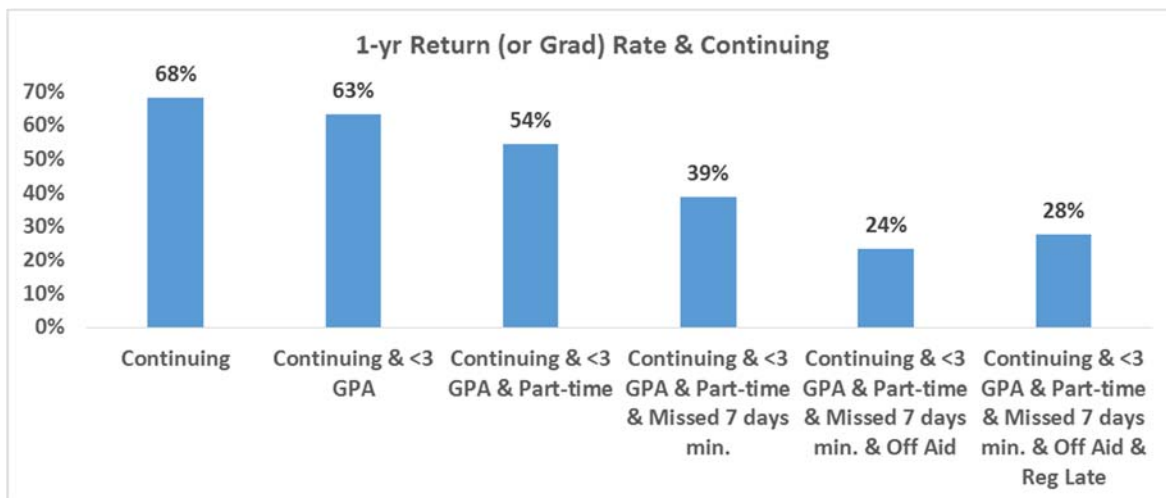

Figure 5

The full generalization, however, holds as shown in Figure 6. As was true with first-time students, the more warning signals a continuing student displays of these five, the less likely the student is to return or graduate. In the case of continuing students, the bulk of students have one and two warning signals. A smaller number have either zero or three. Very few students have more than three.
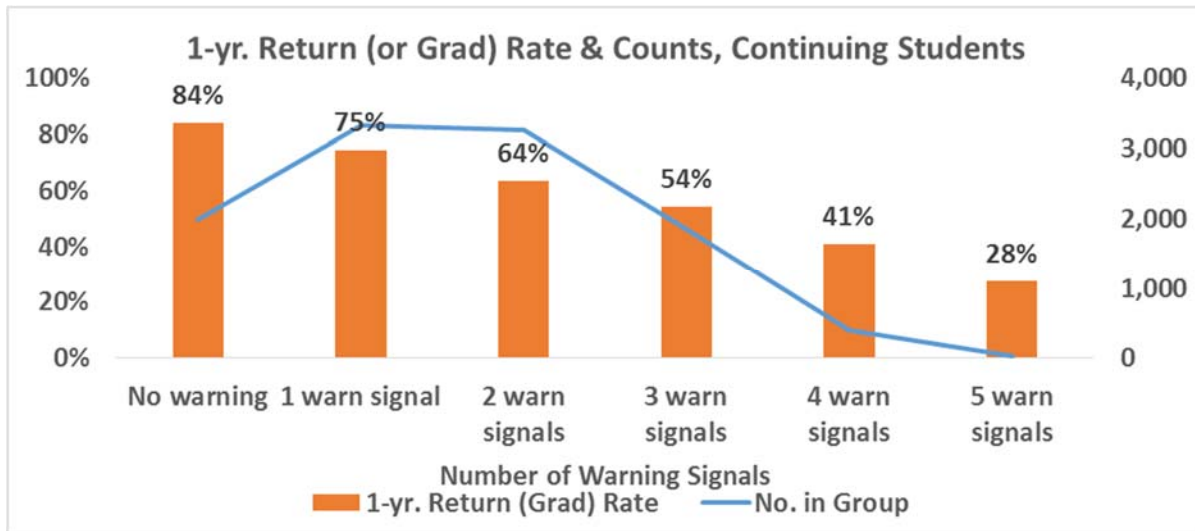
Figure 6

Figures 3 and 6 indicate that the higher the number of stress indicators, the more difficult it is for the student to stay in school. Also, given that the college does make strong efforts to assist students with its services, the higher the number of stress indicators, the more difficult it is for the college to help the student stay in school.

Figure 7 shows the *graduation rate* of continuing students (some of whom may have had very few earned credits in Fall 2013). One-third of students who had no warning signals graduated before Fall 2014. That's a pretty amazing number, when you consider that some of those students probably had fewer than 15 credits. The more stress indicators, the lower the probability that the student graduated. None of the handful of continuing students with five stress indicators graduated.
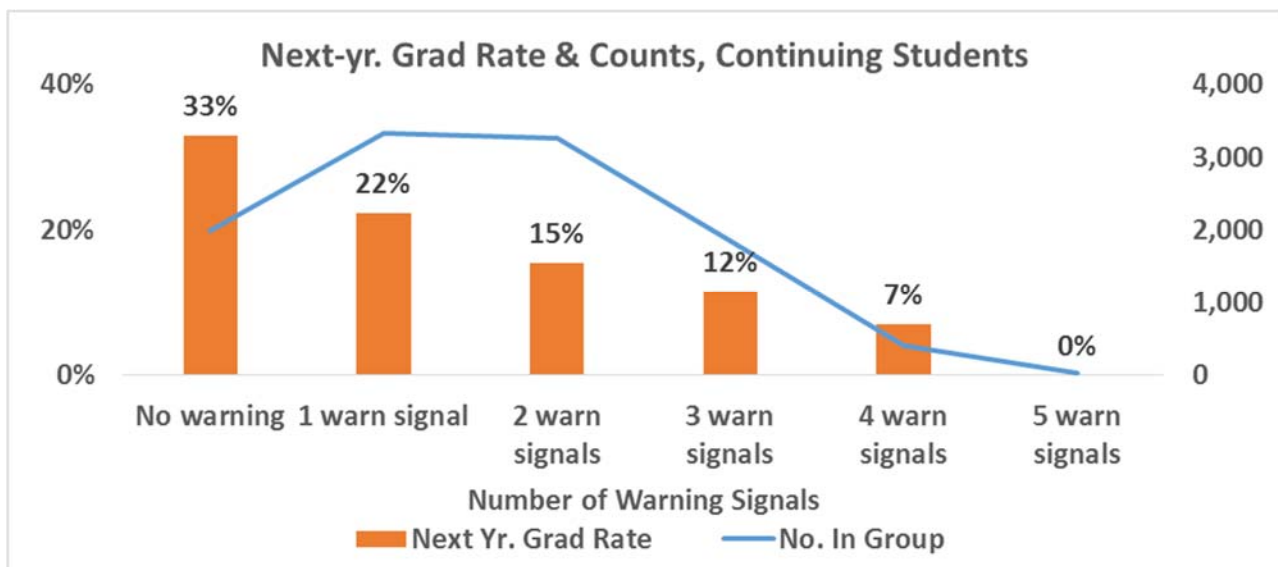

Figure 7

Who Returned and Who Didn't?

Only 427 of the 5,501 students who did not return displayed no warning signal as shown in Figure 8. Almost all of the students who did not return displayed between one and three warning signals. (For new transfer students we used the same type of warning signals we used for first-time students. For re-admit students, we gave all of them at least one warning signal, because they were re-admit students, the time off itself indicating stress.)
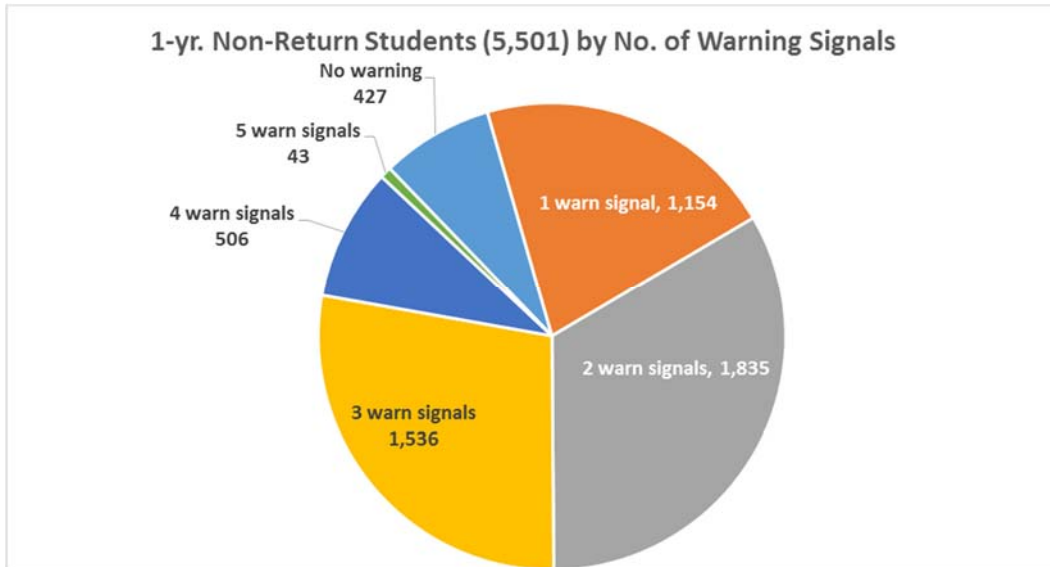

Figure 8

Unfortunately, according to Figure 9, most of the students who *did* return displayed either one or two signals. Perhaps the good news is that the college was able to help many students with challenges stay in school, at least if the students had only one or two levels of stress.
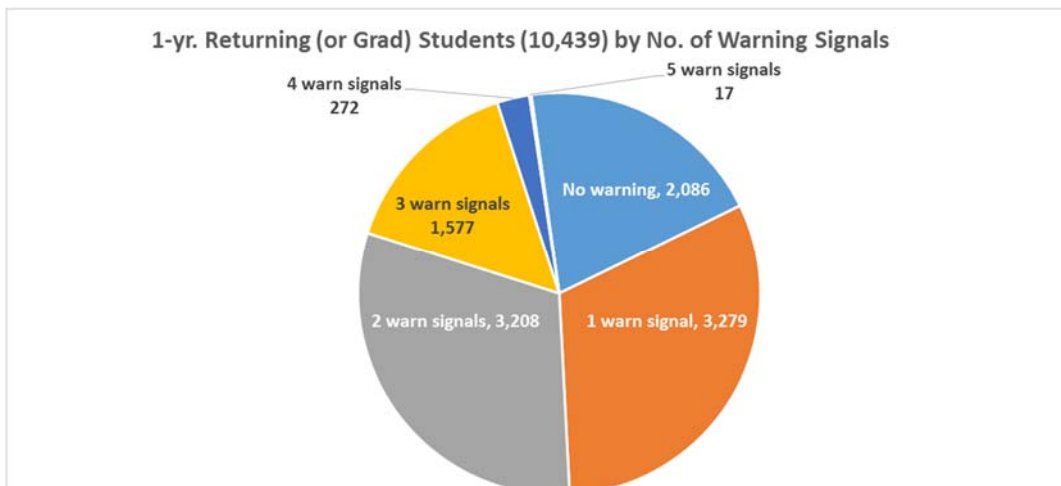

Figure 9

Figure 10 shows a little bit more about the prediction game, telling us about the odds. We would be right to say that most students without warning signals were pretty likely to come

back. Students with four and five warning signals were not very likely to come back. Nevertheless, it's an even bet whether students with three warning signals are coming back. Students with one warning signal and even two warning signals are more likely to come back, but our ability to predict is mediocre at best.
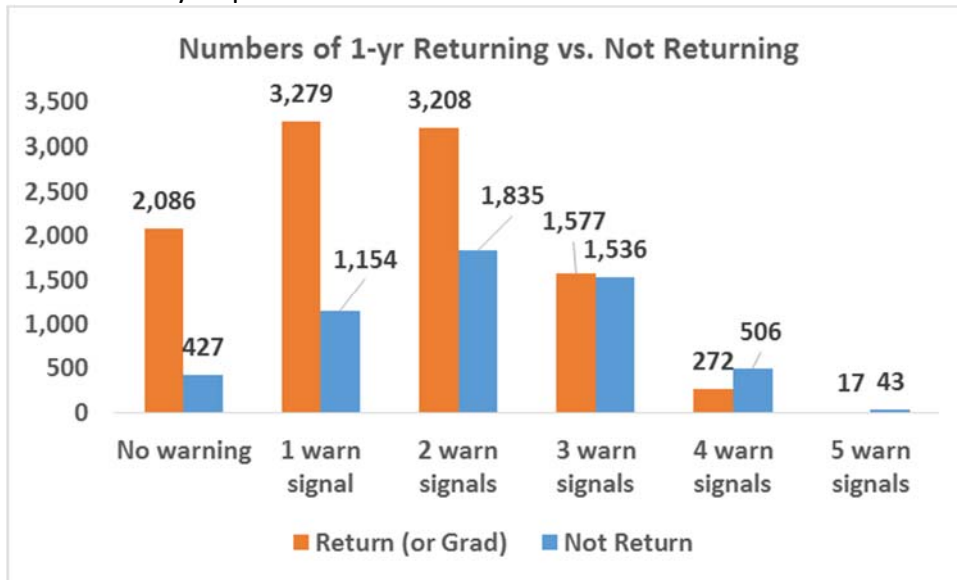

Figure 10

Getting Greater Accuracy

In the IR&A office we have been using statistical analyses to sharpen our predictions. We have been combining warning signals with what I call "intensifiers" to give even more accurate predictions. Intensifiers included gender, number of credits and degree. That is, registering late as a warning sign may be more intense for men than for women, more intense for students with low numbers of credits earned and more intense for AA students.

In this way we have been able to calculate a probability of returning for each individual degree student. The same rule we saw above, however, holds: The more students we include in the prediction, the less likely it is that we will be accurate. We might be able to give you a list of 1,000 students with a 50% probability of not returning, but if you want to know who will not return at an accuracy of 90%, then we can only give you a list of 100.

Figures 11 and 12 show the trade-off between the number of students in the warning-sign group you select for treatment and the number in that group from Fall 2013 who did not return in Fall 2014 (or graduate). Figure 12 is a blowup of the messy lower-right hand corner of Figure 11.

Suppose we had resources to work with ("treat") about 7,000 students. Go up the vertical scale on Figure 12 to the 7,000 mark and find the dots up at that level. There are three which contain between 7,000 and 8,000 students: men, part-time students, and RegLate (those who failed to register earlier than four weeks before the start of classes).

The unbroken line marks the number of students who would have dropped out if we randomly selected a treatment group. At 7,000 we see that line hits the horizontal scale at about 2,400. Because the full group lost about 5,500, a random selection of 7,000 out of 15,940 would mean that we would select about 2,400 who "needed treatment" or actually dropped out from out Fall 2013 enrollment list.

The group "All Men" is more likely to drop out than a random selection of about 7,000. If we select them for treatment, then we have a chance to save about 2,450. Nevertheless, selecting the group "attending part-time" would be smarter. This group is about the same total size as Men (vertical scale), but contains more who are going to fail to return in Fall 2014, about 3,100. Picking the group "RegLate," however, would be less efficient. More students would need the "treatment," but about the same number of potential drop-outs would be found, again, about 3,100.

The dotted line shows the average improvement over a random selection that this whole group of selections makes. The abbreviations for some of these are: URM=under-represented minority, AWOL=positive non-attendance for seven days, AWOL14=positive non-attendance for at least 14 days (both pulled from the Web Attendance lists by E. Lenchner in the IR&A office), TookM96=taking Math 096 in the first semester, PLCM95=placed into Math 095, ENorCS99=taking ENG or CSE 099, and HighRisk(1k, 2k, 3k) indicates a selection of the top 1,000, 2,000 or 3,000 students on the statistical risk develop by J. Zhu in the IR&A office. The full list of abbreviation definitions is given in Appendix A.

The dashed line shows perfect information. If we knew exactly who would drop out, then every person selected, up to a treatment size of 5,501, would be a potential drop out. The closer a set of selection criteria are to this dashed line, the lower is the proportion of unnecessary people selected for treatment.
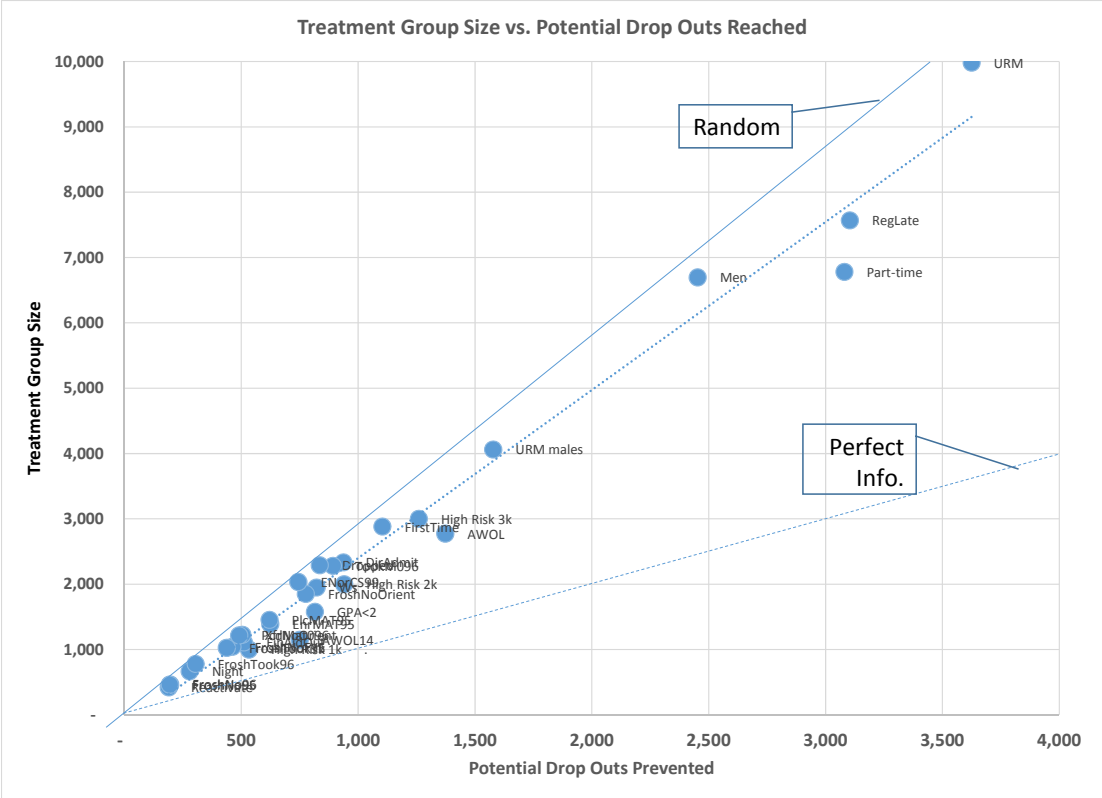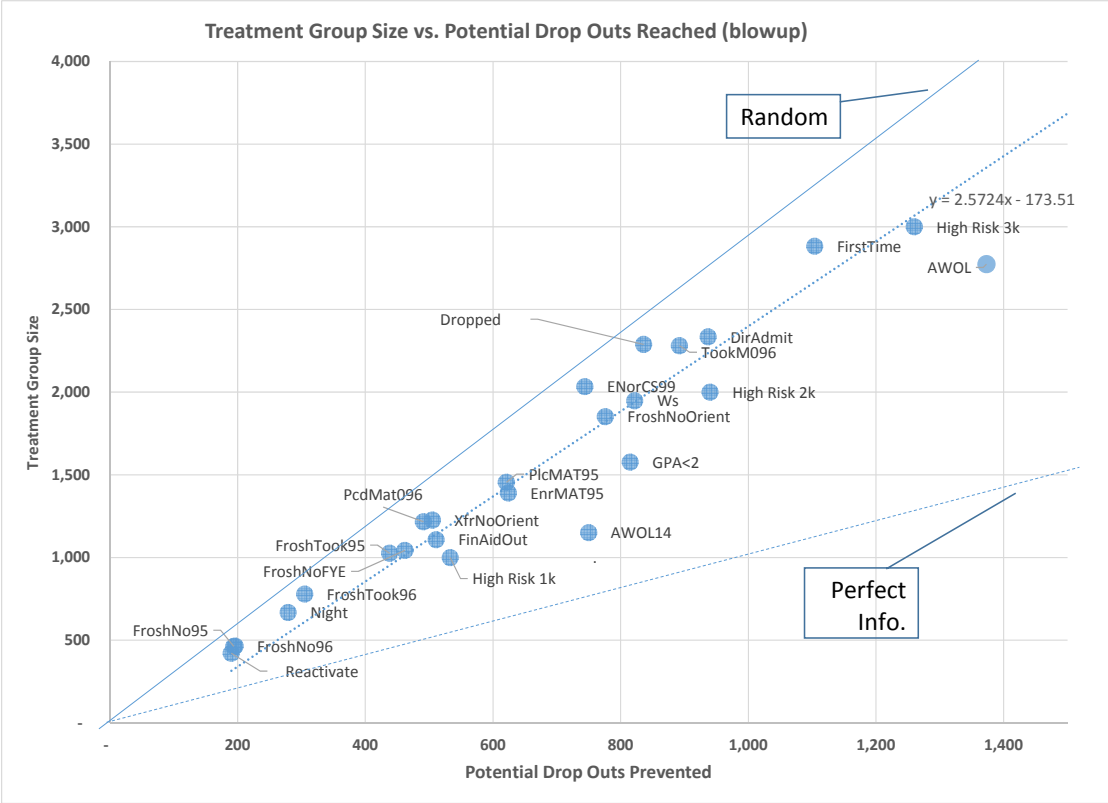
Figure 11

Figure 12

Note that many indicators are interesting and may add to a statistically-based risk assessment, but are worse than the average indicator. Even being placed into Math 095 or Math 096 and not taking this required course in the first semester, while placing the student in slightly higher risk, is not much worse than simply placing into these courses, and these "placed but not taking" groups include far fewer students than the "placed into" groups.

Many indicators have small numbers of students and do worse than the average indicator: reactivated students, being a night student, taking ENG 099 or CSE 099, many variations of Math outcome, dropped a course at the beginning of the Fall 2013 semester, or simply being a first-time student.

Several indicators are about average: not receiving financial aid after receiving it in previous semesters, being a freshman or new transfer student and not attending orientation, receiving a W (of any type) in any previous semester, or being a direct admit.

Note that the AWOL indicators are better than the statistically-derived indicators, but that the AWOL indicators only become available as the semester progresses, while the statistically-derived indicators are available early, that is, at the end of registration. The statistically-derived indicators are also scalable, and the smaller the selection group, the more accurate this indicator is. Other indicators, like part-time status, are not scalable and give the same probability of dropping out no matter what portion of the group is selected.

Lessons
Peter Vaill characterized leadership as requiring time, feeling and focus[1]. I would add "structure." Focus is the strategic concern that defines how resources are to be used, but structure is necessary to build the system upon which those resources are deployed.

Of all degree students enrolled in Fall 2013, 5,501 failed to return for the Fall 2014 semester. More than two thousand of them had three or more warning signs indicating that they were under the kind of stress that would keep them out of school. The college and the students were successful with another two thousand who had three or more warning signs and were able to return the next fall or graduate.

Perhaps our challenge is to begin thinking of avoiding orientation, avoiding the first-year seminar, dropping below a 2.00 GPA, withdrawing from a course, and dropping below full-time, not as failures, but as warning signs, warnings that the student is under stress and having trouble staying in school. Then we need the structures that provide support to some of these students, if not all.

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[1]Vaill, Peter B., "High-performing Systems." In: Sergionvanni and Corbally (ed.) (1984).*Leadership and Organizational Culture.* (Urbana, IL: University of Illinois Press).

As the Information Technology division continues to integrate student systems, more warning signs will become available for testing. We anticipate that most of these will add only marginally to what we now have as warning signs. Early work, however, indicates that each is associated with higher retention. The most promising of these are: 1) Students who do not log into MyLaGuardia in their first weeks; 2) Students in peer tutoring sections who do not use peer tutors; 3) Students who use no supplemental academic services in a semester, and 4) students who do not attend at least three courses with one common friend.

The Advising Office has begun offering workshops to students on probation, helping them manage time better and make wiser course selections. This office has also attempted to reach out to students that faculty recognize are under stress, using the Early Alert system. These are appropriate responses but have had only limited impact because they are optional to the students and response is low. The structural questions remain:

1) Which students who express warning signs should we respond to?
2) Who will be responsible for the response?
3) What resources will we make available for the response?
4) How will we respond?
5) How will we reach each target audience?
6) How will we measure the effectiveness of the response?

Leadership means answering questions 1, 2 and 3 at the top. Questions 4, 5 and 6 can then be answered by the responsible people.

Tables 11 and 12 Codes	
Signal	**Signal (degree students only--Fall 2013)**
AWOL	Students who missed all classes for any seven day period this semester
AWOL14	Students who missed all classes for any 14-day period this semester
DirAdmit	DIRECT ADMITS (code)
Dropped	Dropped a course this semester after 1st day of class
ENorCS99	Taking EN* 099 or CS* 099
EnrMAT95	Taking Math 095 (including Ws)
FinAidOut	Applied before for financial aid and did not receive this semester
FirstTime	First-time, first-semester student
FroshNo95	First-time, placed into 095 and did not take it first semester
FroshNo96	First-time, placed into 096 and did not take it first semester
FroshNoFYE	First-time, first-semester, did not take FYE
FroshNoOrient	First-time, first-semester did not attend orientation student
FroshTook95	First-time, placed into 095 and took it first semester
FroshTook96	First-time, placed into 096 and took it first semester
GPA<2	Students with cum GPA below 2.0 up to this semester (excluding null GPA)
High Risk 1k	Students on IR High Risk List (1,000)
High Risk 2k	Students on IR High Risk List (2,000)
High Risk 3k	Students on IR High Risk List (3,000)
HiGPA	Students with 3.0 or better average before last semester
Men	Men
Night	EVENING (code)
Part-time	Students enrolled part-time this semester
PcdMat096	First-time students and placed into Math 096
PlcMAT95	First-time students and placed into Math 095
Reactivate	REACTIVATE (code)
RegLate	Registered late (4 weeks before class or later) this semester
TookM096	Taking Math 096 (including Ws)
URM	Under-represented minorities
URM males	Under-represented minority males
Ws	Withdrew from a course last semester
XfrNoOrient	New transfer, did not attend orientation student