CHAPTER 5

RESULTS

5.1. INTRODUCTION

Data were collected during the 2008 first-year orientation week. A total of 1 222 responses were received following its distribution among students who attended two sessions of the orientation week (one Afrikaans and one English session). Responses with more than 10 uncompleted questions were regarded as missing and left out from the analysis. Data were cleaned to make sure that only first-time entrants (FTE's) of the 2008 cohort in the Faculty of Economic and Management Sciences were included in the analysis. Forty two responses were left out because of incomplete questionnaires. Six students were left out because they were not newly enrolled first-year students in 2008 (FTE's). Thirty nine of the students were not registered in any faculty and a further 20 students were discarded because of insufficient information from the student database (BIRAP) and nine students were discarded because they were registered in an international educational model (for example Cambridge model) and did not have six subjects that could be counted toward the M-score.

In total, 963 students' responses on the questionnaire were regarded as complete (82% workable questionnaires from the original sample total). An additional criterion was added during the data analysis phase to include only (FTE's) who wrote the Senior Certificate exam in 2007 to make the group more homogeneous. Only 829 of the 963 students who completed the questionnaire complied with the criteria and thus the sample for further analysis is $N = 829$. The number of FTE's on undergraduate level at the Faculty of Economic and Management Sciences in 2008 is 1928 students. The total number of students from this faculty who completed the questionnaire is 50%.

5.2. DESCRIPTION OF THE SAMPLE

Table 5.1. Enrolment by race of the 2008 cohort of first-time entrants

Year	African	Coloured	Indian	White	Total
UP	30.2%	2.2%	4.0%	63.5%	6853
EMS	37.4%	2.2%	5.7%	54.7%	1928
Sample	24.4%	2.5%	2.7%	70.4%	829

Source: BIRAP (2008) – Adapted summary of student numbers: 2008

The enrolment by race in Table 5.1. reflects the 2008 intake cohort of FTE's at the University of Pretoria, the Faculty of Economic Management Sciences and the sample group from the Faculty of Economic Management Sciences, respectively (BIRAP, 2008). Table 5.2. indicates that the sample group from the faculty is somewhat biased toward the white students. The sample size is however large enough to allow for meaningful comparisons between white and African students. Coloured and Indian students, unfortunately, have to be discarded from further analysis where race is to be included as an independent variable because of their low numbers.

Table 5.2. Racial differentiation of the sample

Race	Frequency	Percentage
White	584	70.4
Coloured	21	2.5
Indian	22	2.7
African	202	24.4
Total	829	100.0

Table 5.3. Gender differentiation of the sample

Gender	Frequency	Percentage
Female	510	61.5
Male	319	38.5
Total	829	100.0

Table 5.3. indicates the differentiation based on gender. The sample from the Faculty of Economic and Management Sciences indicates a bias toward female students.

Table 5.4. Differentiation of the sample by matriculation score

M-Score	Frequency	Percentage
9-16	205	24.7
17-23	387	46.7
24-30	237	28.6
Total	829	100.0

Table 5.4. indicates the differentiation based on the matriculation score (M-score). The M-score is a metric score based on the academic achievement of the six best subjects in Grade 12. This is a continuous variable ranging from 1 to 30, but has been categorised for representation purposes as well as for the logistic regression analysis.

Table 5.5. Differentiation of the sample by home language

Home language	Frequency	Percentage
Afrikaans	464	56.0
English	144	17.4
African	187	22.6
Other	34	4.1
Total	829	100.0

Table 5.5. indicates the differentiation based on home language. Home language refers to the language that is spoken at home. There are 11 official languages in South Africa, including Afrikaans and English. The nine official African languages were clustered in the African group of languages. The 'other' languages in Table 5.5. refer to foreign languages, such as French and German.

Table 5.6. Differentiation of the sample by enrolment status

Enrolment status	Frequency	Percentage
Discontinuation	25	3.0
Withdrawal	53	6.4
Persist	733	88.4
Probation	18	2.2
Total	829	100.0

Source: BIRAP (2008) – Adapted summary of student numbers: 2008

Table 5.6. is a summary of the enrolment status of students as they are presented in the student data-base (BIRAP, 2008). 'Discontinuation' represents those students who were dismissed by the faculty due to poor academic performance (institutional withdrawal).

Withdrawal refers to students who withdraw on a voluntary basis. Students who persisted represent those who have passed more than 8 modules (minimum requirement) and are allowed to proceed to the second year of their study, irrespective of academic performance in other modules (EMS, 2008). Probation represents students who have poor academic performance and have to apply for permission to continue with their second year of study with the faculty.

A number of challenges were experienced during the analysis phase. These included the following:

- Different programmes did not have the same credit value, ranging from 88 credits to 171;
- Students from the different programmes did not register for the prescribed number of credits;
- Students are allowed to register for modules from other faculties;
- Some programmes have very low student numbers (below 10 students).

It was therefore decided to convert academic achievement into a ratio to make the dependent variable equitable. The ratio, called academic success, consists of the number of credits passed over the number of credits prescribed by the programme for which the student is registered (refer to Table 4.1.). The programme credit ratio is regarded as one of the ways in which academic achievement is measured by the institution (Smit & Owen, 2007).

5.3. FACTOR ANALYSIS

The 66 items of the Academic Readiness Questionnaire were subjected to a factor analysis using SPSS.V17®. Prior to performing exploratory factor analysis, the suitability of data for factor analysis was assessed. The Kaiser-Meyer-Oklin value was 0.86, exceeding the recommended value of 0.6 (Kaiser as cited in Pallant, 2007) and Bartlett's

Test of Sphericity (Bartlett as cited in Pallant, 2007) reached statistical significance, supporting the factorability of the correlation matrix. For the factor analysis both an orthogonal and oblique factor-analysis were conducted to explore the number of factors. Maximum likelihood factoring was chosen as the approach to identify the number of underlying factors and Kaiser's criterion was used to assist in the decision to retain the number of factors (Pallant, 2007).

The two approaches produced very similar results and the assumption that the factors are not highly related was confirmed in every analysis. Kaiser's rule of only retaining eigenvalues larger than 1.0 was used more stringently by only including factors with eigenvalues larger than 2.0. According to Tabachnick and Fidell (2007, p. 617) only factors with larger eigenvalues are retained, because each eigenvalue corresponds to a different potential factor. The higher the eigenvalue, the higher the corresponding variance explained by a factor. There were 18 factors with eigenvalues larger than 1.0. Based on the 2.0 criteria the researcher was able to reduce the number of factors from 18 to only 5 factors. The 5 factors explained 14.4%, 6%, 4.4%, 3.5% and 3.4% of the variance respectively.

The two factor analysis approaches (orthogonal and oblique) produced very similar results. The orthogonal approach was, however, chosen for further analysis because the result of this approach is regarded as easier to interpret (Pallant, 2007). From the Varimax rotated factor loading patterns there were items in the first three factors that loaded on more than one factor, indicating the possibility of one single factor (Fa) for the first three factors (f1, f2, and f3). A confirmatory factor analysis was done to determine the likelihood of three factors, also using an orthogonal approach. The 'forced' 3 factor analysis explained 14.4%, 6% and 4.4% of the variance respectively. The 5 factor solution explained a total of 31.7% of the cumulative variance, while the 3 factor solution explained 24.8% of the cumulative variance. The 3 factor solution however produced better Cronbach's alphas for each of the sub-scales.

It was decided to explore the 3 factor solution further to determine items to be removed in order to improve the reliability coefficient of each factor. Corrected Item-Total Correlations were monitored to determine the degree to which each item correlates with the total score. According to Pallant (2007) and Field (2005), values less than 0.3 indicate that the item is measuring something different from the scale as a whole. The 'Cronbach's alpha if deleted' was also evaluated to determine the effect of removing items from each sub-scale. The items with low communalities (less than 0.06) and low loadings were discarded. These items were 3, 6, 12, 17, 40, 41 and 44. The raw score Cronbach's alpha for the three factors were Fa =0.87, F2 = 0.63 and F3 = 0.75.

As with the original 3 factor solution the last 3 factor solution (without deleted items) indicated many items loading on Fa. The items of Fa were subjected to a separate factor analysis and the Kaiser-Meyer-Oklin value was 0.88. Three factors were identified in Fa with eigenvalues larger than 2.0. This factor analysis (Fa) explained 17.9%, 6.4%, and 4.7% of the variance respectively (see Appendix Table B.1. for the factor loadings). Factor Fa was subjected to further analysis to determine if further items should be deleted that did not contribute to the reliability of each of the three factors in Fa. Two separate Cronbach's alphas were subsequently done with:

- only those items that loaded heavy on only one factor and had Item-Total Correlations larger than 0.3; This set of alphas provided fair reliability statistics (f1 = 0.70, f2 = 0.60 and f3 = 0.52);
- all the items in Fa as they loaded on f1, f2, or f3. This set of alphas provided improved reliability statistics (f1 = 0.79, f2 = 0.75 and f3 = 0.75).

The Cronbach's coefficient alpha supported the notion that no more items needed to be removed from Fa, irrespective of some items showing low communalities. The three factors that emerged were named 'achievement motivation orientation', 'learning-efficiency', and 'goal orientation'. Factor labels were created based on the five items with the highest factor loadings and named according to the construct identified in literature or the source questionnaire.

Factors F2 and F3 were consequently analysed separately in a 'forced' 2 factor analysis and the Kaiser-Meyer-Oklin value was 0.72. The 2 factor solution (Fb) explained 15.3% and 13.3% of the variance respectively. Cronbach's alpha was also done for the 2 factor solution and provided the following Cronbach's alphas: F2 = 0.63 and F3 = 0.75. The 2 factor solution with F2 and F3 was renamed to f4 and f5 respectively and this scale was termed Fb for further analysis (see Appendix Table B.2. for the factor loadings). The two factors that emerged were named 'integration and support' (f4) and 'reading behaviour' (f5). The combined alphas for Fa was 0.87 and explained 28.8% of the variance, while the combined alphas for Fb was 0.61 and explained 28.6% of the variance. The overall Cronbach's alpha for the ARQ was 0.87, which indicates very good reliability for the scale with this sample (Pallant, 2007).

Table 5.7. Academic Readiness Questionnaire factors and item numbers

Factor	Item number in the ARQ
f1. Achievement motivation orientation	4, 7, 20, 22, 25, 29, 34, 43, 45, 46, 53, 57, 59, 62, 63, 64, 68 = **17**
f2. Learning-efficacy	9, 13, 16, 23, 24, 31, 35, 42, 47, 54, 67, 70 = **12**
f3. Goal orientation	5, 11, 27, 36, 38, 50, 56, 58, 60, 65, 69 = **11**
f4. Integration and support	1, 2, 14, 32, 33, 39, 48, 49, 51, 52, 55, 61, 66 = **13**
f5. Reading behaviour	8, 10, 21, 28, 30, 37 = **6**

Refer to Table 3.11. for a listing of the questionnaire item text corresponding to each of the five factors.

5.4. SCALE RELIABILITY

The reliability of each scale was assessed with Cronbach's coefficient alpha and the Spearman Brown formula (SPSS.V17®).

5.4.1. Cronbach's Coefficient Alpha

The cumulative variance explained for factors 1, 2 and 3 is 28.8%. For factors 4 and 5 the cumulative variance explained is 28.6%. The loss in reliability, according to the drop in Cronbach's alpha value for Fb, is somewhat surprising (refer to Table 5.8. below). The overall Cronbach's alpha for the Academic Readiness Questionnaire is 0.87 which is higher than the recommended 0.70 for social sciences. Except for f4 with a Cronbach's alpha value of 0.63, the remaining four third-order factors produced Cronbach's alpha values above 0.70. The second-order factors had Cronbach's alpha values of 0.87 and 0.61. Table 5.8. shows the Cronbach's coefficient alpha of the factors.

Table 5.8. Cronbach's coefficient alpha of the factors

Third-order factors	Alpha	Second-order factors	Alpha	Variance	Overall alpha
f1	0.79	Fa	0.87	28.8%	0.87
f2	0.75				
f3	0.75				
f4	0.63	Fb	0.61	28.6%	
f5	0.75				

5.4.2. Spearman Brown Formula

The split-half method or the Spearman Brown formula estimates the reliability of the scale by comparing two random halves of the scale with each other. The output from Table 5.9. provides the Spearman Brown formula, the Cronbach's alpha and the Guttman split-half coefficient.

Table 5.9. Spearman Brown formula, the Cronbach's alpha and the Guttman split-half coefficient

Cronbach's Alpha	Part 1	Value	0.811
		N of Items	30[a]
	Part 2	Value	0.747
		N of Items	29[b]
		Total N of Items	59
		Correlation Between Forms	0.637
Spearman-Brown Coefficient		Equal Length	0.778
		Unequal Length	0.778
		Guttman Split-Half Coefficient	0.774

a. The items are: V1, V2, V4, V5, V7, V8, V9, V10, V11, V14, V16, V20, V21, V22, V23, V24, V25, V28, V29, V30, V31, V32, V33, V34, V35, V36, V37, V39, V42, V43.

b. The items are: V45, V46, V47, V52, V53, V54, V55, V56, V57, V58, V59, V61, V62, V63, V64, V65, V67, V68, V69, V70, vv13, vv27, vv38, vv48, vv49, vv50, vv51, vv60, vv66.

The coefficients from the Spearman Brown formula and the Guttman split-half coefficients are 0.78 and 0.77 respectively, which indicate good reliability of the full scale. According to Gregory (2000, p. 85) a coefficient of 0.70 on the Spearman Brown formula is equivalent to an estimated full-test reliability of 0.82. The Cronbach's alpha for the two scales was 0.64, which is lower than the Cronbach's alpha from the overall scale. The Cronbach's alpha represented here is the mean of all possible split-half coefficients (Gregory, 2000, p. 85). The Cronbach's alpha of 0.63 is below the recommended 0.70 which could indicate that some of the items do not correlate positively with one another. Factor Fb had a low internal consistency and could influence

the values of the Cronbach's alpha. The Spearman Brown formula is however reassuring in terms of the reliability of the scale as a whole.

5.5. DESCRIPTIVE STATISTICS OF THE FACTORS

Descriptive statistics allows a researcher to explore the data through a range of analyses. Table 5.10. shows the measure of central tendency, namely the mean and median, which indicate the arithmetic average and middlemost score in the factor (Gregory, 2000, p. 60). The 5% trimmed mean refers to the deleted top and bottom 5% of the cases when the mean is calculated. These statistics, when compared, indicate the effect of outliers in the sample or whether the number of high and low scores is equal or not (SPSS Inc, 2007). The mean and 5% trimmed mean should ideally be close to each other to indicate limited outliers or extreme scores for a scale.

Table 5.10. Descriptive statistics of the Academic Readiness Questionnaire factors

Factor	Descriptive technique		Statistic	Std. error
Achievement motivation orientation	Mean		70.8183	0.23847
	95% Confidence interval for mean	Lower bound	70.3502	
		Upper bound	71.2864	
	5% Trimmed mean		70.9492	
	Median		71.0000	
	Variance		43.505	
	Std. deviation		6.59582	
	Minimum		35.00	
	Maximum		85.00	

	Range		50.00	
	Interquartile range		10.00	
	Skewness		-.378	0.088
	Kurtosis		.707	0.177
Learning-efficacy	Mean		45.7013	0.18960
	95% Confidence interval for mean	Lower bound	45.3291	
		Upper bound	46.0735	
	5% Trimmed mean		45.7532	
	Median		46.0000	
	Variance		28.400	
	Std. deviation		5.32915	
	Minimum		29.00	
	Maximum		60.00	
	Range		31.00	
	Interquartile range		7.00	
	Skewness		-.139	0.087
	Kurtosis		-.113	0.174
Goal orientation	Mean		40.0694	0.20469
	95% Confidence interval for mean	Lower bound	39.6676	
		Upper bound	40.4712	
	5% Trimmed mean		40.1704	
	Median		41.0000	
	Variance		32.010	
	Std. deviation		5.65770	
	Minimum		18.00	
	Maximum		55.00	
	Range		37.00	
	Interquartile range		7.00	

	Skewness		-.367	0.088
	Kurtosis		.476	0.177
Integration & support	Mean		49.0558	0.20055
	95% Confidence interval for mean	Lower bound	48.6621	
		Upper bound	49.4494	
	5% Trimmed mean		49.1893	
	Median		49.0000	
	Variance		31.733	
	Std. deviation		5.63320	
	Minimum		26.00	
	Maximum		64.00	
	Range		38.00	
	Interquartile range		7.00	
	Skewness		-.422	0.087
	Kurtosis		.376	0.174
Reading behaviour	Mean		20.8764	0.15195
	95% Confidence interval for mean	Lower bound	20.5781	
		Upper bound	21.1747	
	5% Trimmed mean		20.9279	
	Median		21.0000	
	Variance		18.493	
	Std. deviation		4.30040	
	Minimum		9.00	
	Maximum		30.00	
	Range		21.00	
	Interquartile range		6.00	
	Skewness		-.132	0.086
	Kurtosis		-.531	0.173

The achievement motivation orientation factor indicates measures of central tendency that are very close to each other (70.8-71.0), indicating that there are not many outlier scores and that the number of high and low scores is balanced. The minimum score is 35 and the maximum score is 85 with a range of 50. The mean of 70.8 indicates that the majority of the students in the sample had high scores on this scale.

The measures of dispersion for the achievement motivation orientation factor indicate a standard deviation of 6.6 points around the mean (70.8). The interquartile range is 10 and indicates that the middle 50% of the sample lies within a range of 10 points. The standard error is 0.24 and suggests that the mean will fall within scores ranging between 70.3 and 70.8, 95% of the time (level of confidence). The skewness value indicates that the cases are clustered toward the right (-0.38). The kurtosis indicates the shape of the distribution. The kurtosis value is positive and indicates a leptokurtic distribution, which is peaked toward the middle with longer tails.

The learning-efficacy factor indicates measures of central tendency that are very close to each other (45.7-46.0), indicating that there are not many outlier scores and that the number of high and low scores is balanced. The minimum score is 29 and the maximum score is 60 with a range of 31. The mean of 45.7 indicates that the majority of the students in the sample had high scores on this scale. The measures of dispersion for the learning-efficacy factor indicate a standard deviation of 5.3 points around the mean (45.7). The interquartile range is 10 and indicates that the middle 50% of the sample lies within a range of 7 points. The standard error is 0.19 and suggests that the mean will fall within scores ranging between 45.3 and 46.1, 95% of the time. The skewness value indicates that the cases are clustered toward the right (-0.139). The kurtosis value is negative and indicates a platykurtic distribution, which is flattened toward the middle (SPSS Inc, 2007).

The goal orientation factor indicates measures of central tendency that are very close to each other (40.1-41.0), indicating that there are not many outlier scores and that the number of high and low scores is balanced. The minimum score is 18 and the maximum

score is 55 with a range of 37. The mean of 40.1 indicates that the majority of the students in the sample had high scores on this scale. The measures of dispersion for the goal orientation factor indicate a standard deviation of 5.7 points around the mean (40.1). The interquartile range is 7 and indicates that the middle 50% of the sample lies within a range of 7 points. The standard error is 0.21 and suggests that the mean will fall within scores ranging between 39.7 and 40.5, 95% of the time. The skewness value indicates that the cases are clustered toward the right (-0.367). The kurtosis value is positive and indicates a distribution which is peaked toward the middle.

The integration and support factor indicates measures of central tendency that are very close to each other (49.0-49.2), indicating that there are not many outlier scores and that the number of high and low scores is balanced. The minimum score is 26 and the maximum score is 64 with a range of 38. The mean of 49.1 indicates that the majority of the students in the sample had high scores on this scale. The measures of dispersion for the integration and support factor indicate a standard deviation of 5.6 points around the mean (49.1). The interquartile range is 7 and indicates that the middle 50% of the sample lies within a range of 7 points. The standard error is 0.20 and suggests that the mean will fall within scores ranging between 48.7 and 49.5, 95% of the time. The skewness value indicates that the cases are clustered toward the right (-0.422). The kurtosis value is positive and indicates a distribution which is peaked toward the middle.

The reading behaviour factor indicates measures of central tendency that are very close to each other (20.9 -21.0), indicating that there are not many outlier scores and that the number of high and low scores is balanced. The minimum score is 9 and the maximum score is 30 with a range of 21. The mean of 20.9 indicates that the majority of the students in the sample had high scores on this scale. The measures of dispersion for the reading behaviour factor indicate a standard deviation of 4.3 points around the mean (20.9). The interquartile range is 6 and indicates that the middle 50% of the sample lies within a range of 6 points. The standard error is 0.15 and suggests that the mean will fall within scores ranging between 20.6 and 21.2, 95% of the time. The skewness value indicates that the cases are clustered toward the right (-0.132). The kurtosis value is negative and indicates a distribution which is flattened toward the middle.

5.6. TEST OF NORMALITY

The Kolmogorov-Smirnov and Shapiro-Wilk statistics are used to test for normality of the factors (Pallant, 2007). Test of normality can also be achieved through a graphical representation of the peakedness of a distribution (kurtosis) and the skewness of a distribution (Tabachnick & Fidell, 2005, p. 79). These outputs were achieved with the descriptive statistics of the factors and indicated that all the factors were skewed, either positive or negative and all had some form of kurtosis, either positive or negative. The indication is that the factors are not normally distributed. Additional tests were conducted to determine normality of the factors with the Kolmogorov-Smirnov and Shapiro-Wilk statistics (refer to Table 5.11.).

Table 5.11. Tests for normality of the factors

Factors	Kolmogorov-Smirnov			Shapiro-Wilk		
	Statistic	*df*	Sig.	Statistic	*df*	Sig.
Achievement motivation	0.046	765	0.001	0.985	765	0.000
Learning-efficacy	0.049	790	0.000	0.994	790	0.004
Goal orientation	0.077	764	0.000	0.988	764	0.000
Integration and support	0.071	789	0.000	0.987	789	0.000
Reading behaviour	0.073	801	0.000	0.987	801	0.000

Tests for normality of the factors, according to Kolmogorov-Smirnov and Shapiro-Wilk statistics, indicated a violation of the assumption of normality (SPSS.V17 *Explore* function). Significance was reached by both the Kolmogorov-Smirnov and Shapiro-Wilk test and therefore the hypothesis that the factors are normally distributed should be

discarded (Field, 2005, p. 94). The results for achievement motivation orientation is $df(765) = 0.05$, $p = 0.001$, learning-efficacy is $df(790) = 0.05$, $p < 0.001$, goal orientation is $df(764) = 0.08$, $p < 0.001$, integration and support is $df(789) = 0.07$, $p < 0.001$, and reading behaviour is $df(801) = 0.07$, $p < 0.001$. The statistics indicated that none of the five factors of the Academic Readiness Questionnaire were normally distributed, which according to Pallant (2007) and Field (2005) is common in large samples. The result of the descriptive statistics also confirmed that the scores from the factors were skewed toward the right or the left and the mean for each of the factor indicated that most of the students scored high on each of the five factors. Tests for normality are important because a normal distribution is usually necessary for most inferential analyses (Tabachnick & Fidell, 2005).

5.7. SPEARMAN CORRELATION COEFFICIENTS

Spearman correlation coefficients between the five factors were used because the factors were not normally distributed, as indicated by the Kolmogorov-Smirnov and Shapiro-Wilk statistics (see Table 5.12. below).

Table 5.12. Spearman correlation coefficients between the five factors

Factor	Achievement motivation orientation	Learning-efficacy	Goal orientation	Integration and support	Reading behaviour
Achievement motivation orientation	**1.000**				
Learning-efficacy	0.489(**)	**1.000**			
Goal orientation	0.500(**)	0.319(**)	**1.000**		
Integration and support	0.194(**)	0.404(**)	0.152(**)	**1.000**	
Reading behaviour	0.311(**)	0.220(**)	0.200(**)	-0.044	**1.000**

** Correlation is significant at the $p < 0.01$ level (2-tailed).

The Spearman correlation coefficients between the factors were not particularly high, ranging from low (-0.04) to average (0.50). It is important that the factors are not highly correlated with each other in order to avoid multicollinearity (Tabachnick & Fidell, 2007, p. 88). According to Tabachnick and Fidell (2007) the correlation coefficient should not exceed 0.90, otherwise some of the factors become redundant in an analysis and contribute to Type I and II errors. The highest correlations occurred between goal orientation and achievement motivation orientation, and between learning-efficacy and achievement motivation orientation. In both cases the correlations were positive, indicating higher scores on the one factor are associated with higher scores on the other factor. There was not much difference between the Pearson and Spearman correlation coefficients, indicating that the large sample size compensates for the lack of normality (Pallant, 2007).

5.8. CROSS-TABULATIONS

Cross-tabulations are used to compare groups and to explore the relationships of variables as part of a multiway frequency analysis. Significance was determined by the Chi-square 'goodness-of-fit' analysis.

Table 5.13. Cross-tabulation of enrolment status and academic success

Enrolment status		**Academic success**			
		<50%	50<100%	100% +	Total
Probation	Count	15	2	1	18
	% within enrolment status	83.3%	11.1%	5.6%	100.0%
Faculty discontinuation	Count	25	0	0	25
	% within enrolment status	100.0%	.0%	.0%	100.0%
Voluntary withdrawal	Count	44	7	2	53
	% within enrolment status	83.0%	13.2%	3.8%	100.0%
Persisting to second year	Count	63	415	253	731
	% within enrolment status	8.6%	56.8%	34.6%	100.0%
Total	Count	147	424	256	827
	% of Total	17.8%	51.3%	31.0%	100.0%

Significant at p <.001 (Pearson's Chi-Square Tests)

According to Table 5.13., the cross-tabulation indicates a significant relationship between academic success and enrolment status. Students who find themselves in the risk categories of enrolment status, namely on probation, faculty discontinuation and voluntary withdrawal are highly concentrated in the poor academic success column (less that 50% credits passed). The students who persist to second year are mostly concentrated in the average academic success column (passing between 50% and 99%

of their credits) and to a lesser extent in the high academic success column (passing 100% and more of the credits).

The relationship between enrolment status and academic achievement is highly significant with $p < 0.001$. Students with better academic achievement are more likely to persist to the second year and are less at risk for withdrawal or faculty discontinuations. Research in Astin (1975, p. 31) indicate that students who withdraw and stop-out show similar patterns of academic high school achievement as those who persist. This pattern does however not hold for withdrawal profiles in a South African university. The relationship between probation, faculty discontinuation and withdrawal with poor academic achievement was expected. Students who are on academic probation or are discontinued by the faculty have poor academic achievement. Students who withdraw voluntarily are usually not motivated to perform academically and consequently have poor academic achievement.

The cross-tabulations from the multiway frequency analysis are summarised in Tables 5.14. and 5.17. The significant variables explaining risk for failure were subsequently highlighted with additional cross-tabulations to show the relationship between those categorised variables (refer to Tables 5.15., 5.16., 5.18., 5.19. and 5.20.).

Table 5.14. Cross-tabulations of the independent variables with risk for failure

		Independent variables	**Risk for failure**
ARQ	Motivation orientation	Achievement motivation orientation	Low score is associated with risk
		Learning-efficacy	Low score is associated with risk
		Goal orientation	Low score is associated with risk
	Support and reading	Integration/support	Low and high score is associated with risk
		Reading behaviour	High score is associated with risk
Biographical information		M-score***	Low score is associated with risk
		Parental education (UP)	No difference between groups
		Housing	Private residence is associated with risk
		Race language***	No difference between groups
		Gender	No difference between groups
		School location	Other provinces is associated with risk

Significance at $p < 0.05$***, $p < 0.01$**, $p < 0.001$***

Table 5.14 provides a descriptive analysis of the independent variables with the dependent variable, namely risk for failure. Only two independent variables were statistically significant on the Chi-square test of independence from a maximum likelihood analysis of variance. These independent variables were ‘race language’ and ‘M-score’ and will be presented in the following two cross-tabulation tables.

Table 5.15. Cross-tabulation of risk for failure and race language

Race language		Fail	Pass	Total
African	Count	92	42	134
	% within race	68.66	31.34	22.30
Afrikaans	Count	264	121	385
	% within race	68.57	31.43	64.06
English	Count	57	25	82
	% within race	69.51	30.49	13.64
Total	Count	413	188	601
	% of total	68.72	31.28	100.00

An interaction effect occurred between race, home language and preferred language of tuition and it was decided to collapse the three variables into one independent variable, called 'race language'. The coloured and Indian students have low frequency counts compared to the white and African students in the sample and will be removed during the analysis. From Table 5.15. the three race language groups are African, Afrikaans and English.

Overall, the results show that the majority of students do not pass all the credits that are prescribed by each programme (68.7%). Inversely, approximately a third of the students pass all the credits that are prescribed by the programme (31.3%). The distribution according to race language is skewed toward Afrikaans students (64%). African students make up 22% of the sample and English students 14%. The relationship between race language and risk for failure, indicate no difference between the three race language groups in terms of risk for failure. The percentage of difference within race language is virtually similar at 69% for the three groups.

There seems to be an incongruity with the results because the maximum likelihood of analysis of the multiway frequency analysis reached significance, but there is no difference in risk for failure present between the three race language groups in the cross-tabulations (refer to Table 5.15.). The cross-tabulations should therefore be used descriptively because other factors could lead to this incongruity, which will be discussed in the multiway frequency analysis results.

Table 5.16. Cross-tabulation of risk for failure and M-score

M-score		Fail	Pass	Total
Low	Count	129	4	133
	% within M-score	96.99	3.01	22.13
Medium	Count	224	61	285
	% within M-score	78.60	21.40	47.42
High	Count	60	123	183
	% within M-score	32.79	67.21	30.45
Total	Count	413	188	601
	% of total	68.72	31.28	100.00

The cross-tabulation of risk for failure and M-score indicates a large difference between the M-score category and academic achievement. From Table 5.16. it is apparent that 129 students who are in the fail category have low M-scores (97%) and only four students in the low M-score category are able to pass all the credits that are prescribed by the programme (3%). Students with medium M-scores have a greater chance of passing, compared to the low M-score students. Roughly about 21% of the students in

the medium M-score category passed all the prescribed credits and 79% failed and are in the risk category. Students from the high M-score category have the greatest chance of passing, if compared to students with a medium or low M-score. Roughly about 67% of students in the high M-score category pass all the credits prescribed by the programme. Inversely, 33% of the students in the high M-score category did not pass all the prescribed by the programme credits.

Table 5.17. Cross-tabulations of the independent variables with risk for withdrawal

		Independent variables	**Risk for withdrawal**
ARQ	Motivation orientation	Achievement motivation orientation	Medium score is associated with risk
		Learning-efficacy	Medium score is associated with risk
		Goal orientation	Low score is associated with risk
	Support and reading	Integration/support	High score is associated with risk
		Reading behaviour	Medium score is associated with risk
Biographical information		M-score***	Low score is associated with risk
		Parental education (UP)	Parental education at the University of Pretoria is associated with risk
		Housing	No association
		Race language***	Afrikaans students are associated with risk
		Gender	Male students are associated with risk
		School location	Gauteng province schools are associated with risk
		Credits registered***	Ratio of less than 1 credits registered is associated with risk

Significance at $p < 0.05$*, $p < 0.01$**, $p < 0.001$***

From Table 5.17., the cross-tabulation results show the profile of a student at risk for withdrawal. Four independent variables were statistically significant on the Chi-square test of independence from a maximum likelihood analysis of variance. These independent variables were 'race language', 'M-score', and 'credits registered'. The variables will be presented in the following cross-tabulation tables.

Table 5.18. Cross-tabulation of risk for withdrawal and race language

Race		Withdraw	Persist	Total
African	Count	4	130	134
	% within race	2.99	97.01	22.30
Afrikaans	Count	56	329	385
	% within race	14.55	85.45	64.06
English	Count	11	71	82
	% within race	13.41	86.59	13.64
Total	Count	71	530	601
	% of total	11.81	88.19	100.00

Overall from Table 5.18., irrespective of race language, the students in this sample were more likely to persist to the second academic year (88%) than to withdraw from their studies, voluntarily or involuntarily (12%). In terms of the relationship between race language and risk for withdrawal, the Afrikaans students have the greatest risk for withdrawal (14.6%) compared to African (3%) and English (13%) students in the sample. The African students in this sample have the lowest risk for withdrawal (3%) and the highest percentage of students progressing to the second academic year (97%). The difference between Afrikaans and English students who withdrew from their studies is marginal and show similar frequencies.

Table 5.19. Cross-tabulation of risk for withdrawal and M-score

M-score		Withdraw	Persist	Total
Low	Count	32	101	133
	% within M-score	24.06	75.94	22.13
Medium	Count	33	252	285
	% within M-score	11.58	88.42	47.42
High	Count	6	177	183
	% within M-score	3.28	96.72	30.45
Total	Count	71	530	601
	% of total	11.81	88.19	100.00

The results in Table 5.19. show that students in the high M-score category are the least likely to be at risk for withdrawal. Roughly about 97% of students in the high M-score category persist and 3% of these students withdraw. Roughly about 12% of students in the medium M-score category withdraw from their studies and about 24% of students in the low M-score category withdraw from their studies. There is roughly a 20% difference between the low and high M-score categories.

Table 5.20. Cross-tabulation of risk for withdrawal and credits registered

Credits		Withdraw	Persist	Total
Less than 1	Count	44	149	193
	% within credits	22.80	77.20	32.11
Equal to 1	Count	4	213	217
	% within credits	1.84	98.16	36.11
More than 1	Count	23	168	191
	% within credits	12.04	87.96	31.78
Total	Count	71	530	601
	% of total	11.81	88.19	100.00

Overall, the results from Table 5.20. show an almost equal frequency distribution among credit registered categories (less, equal or more credits registered as prescribed by the programme). The results in Table 5.20. indicate that students who registered for less than the prescribed number of credits have the highest percentage of students that withdraw from their studies (23%). Roughly about 12% of the students that registered for more credits than was prescribed by the programme have withdrawn from their studies. Only 2% of the students that registered for the prescribed number of credits withdrew from their studies. The students that register for the equal number of credits that are prescribed by the programme have the least risk for withdrawal, while students registering for fewer credits are most at risk for withdrawal.

5.9. RISK FOR FAILURE PREDICTION MODEL

5.9.1. Multiway Frequency Analysis

A multiway frequency analysis was performed with the SAS CATMOD procedure. Multiway frequency analysis is usually used for model building and according to Tabachnick and Fidell (2007) the SAS CATMOD procedure provides separate tests for each effect in the model. The partial effects causal model is based on the maximum likelihood analysis of variance.

Based on Appendix Table B.5., the following observations regarding the maximum likelihood estimates for risk for failure can be made:

- Race language, M-score and reading behaviour reached significance.
- Race language indicated a significant difference between African and English students and between Afrikaans and English students. English students were used as the reference group.
- M-score indicated a significant difference between a low M-score and a high M-score, but no significant difference between a medium M-score and a high M-score. A high M-score was used as the reference category.
- Reading behaviour indicated a significant difference between a low reading behaviour score and a high reading behaviour score, but no significant difference between a medium reading behaviour score and a high reading behaviour M-score. A high reading behaviour score was used as the reference category.

Table 5.21. displays the category log odds, which indicates the likelihood of a student being academically successful.

Table 5.21. Multiway frequency analysis odds index for risk for failure

Category	n	Odds index	Estimated odds
Mean	601	0.294	(Mean odds × category odds)
Race language*			
• African	134	2.245	0.66
• Afrikaans	385	0.639	0.18
• English	82	0.697	0.20
M-score*			
• Low	133	0.089	0.03
• Medium	285	1.011	0.30
• High	183	11.14	3.34
Gender			
• Male	225	1.268	0.37
• Female	376	0.789	0.23
Parental education			
• Parent/s has/have a degree at UP	160	0.932	0.27
• First generation student to UP	441	1.073	0.30
Distance of school			
• Pretoria CBD	247	1.070	0.30
• Gauteng province	129	1.360	0.40
• Other provinces	225	0.687	0.20
Housing			
• UP residence	211	0.996	0.29
• Private residence	390	1.004	0.30
Achievement motivation orientation			
• Low	187	0.903	0.26
• Medium	196	1.100	0.32
• High	218	1.007	0.30

Learning-efficacy			
• Low	183	1.296	0.38
• Medium	188	0.792	0.23
• High	230	0.974	0.29
Goal orientation			
• Low	185	0.830	0.23
• Medium	198	1.081	0.30
• High	218	1.115	0.34
Integration and support			
• Low	164	0.880	0.26
• Medium	227	1.252	0.37
• High	210	0.907	0.26
Reading behaviour			
• Low*	190	1.433	0.41
• Medium	184	0.944	0.28
• High	227	0.739	0.22

* Indicates variables that reached statistical significance

The full model with all the variables included in the model produced a likelihood ratio Chi-square value of 523.91, $df(562)$, $p = 0.873$. According to Tabachnick and Fidell (2007), a good model has a non-significant G^2. The likelihood ratio Chi-square value did not reach significance and the difference between the observed and expected frequencies therefore indicates the model to be satisfactory. The maximum likelihood computations also converged with an intercept Chi-square of (1) = 30.24, $p < 0.001$.

According to the SAS CATMOD model, students are more likely to fail than to pass the programme credits (0.29), thus more than two thirds of the students are at risk for failure

(refer to Table 5.21.). Of the independent variables in the model, race language, M-score, and reading behaviour were statistically significant.

Parameter estimates are usually used to determine the relative strength of effects (Tanachnick & Fidell, 2007, p. 902). The low M-score category has the relative highest effect in the model with a parameter estimate of -2.4216. A low M-score thus has the largest effect on risk for failure. The second largest effect is for African students with a parameter estimate of 0.8088.

The estimated odds of a variable can be determined by multiplying the odds of each category in the model with the mean odds. Using the mean odds as base, the following odds for each factor/variable was calculated:

- **Race language:** African students are 2.25 times the mean odds likely to be successful academically (estimated odds of 0.66), even if they have been adjusted for other variables. The estimated odds of Afrikaans students and English students to pass are 0.18 and 0.20 respectively. In terms of race language, both Afrikaans and English students, all else being equal, are at risk for failure.
- **M-score**: Students in the high M-score category are 11 times the mean odds likely to pass (estimated odds of 3.3). Students in the average M-score category are at the baseline or average of the group. Students in the low M-score group, all else being equal, are extremely at risk for failure (estimated odds of 0.03).
- **Gender:** Male students tended to have higher odds of success (estimated odds of 0.37) and female students have lower odds of success (estimated odds of 0.23). Female students are therefore more at risk for failure.
- **Parental education**: Students whose parents were never enrolled for a tertiary qualification at the University of Pretoria (estimated odds of 0.30) are less at risk for failure than students whose parents have enrolled for a tertiary education at the University of Pretoria (odds of 0.27). This variable measures if a student is first-generation to the University of Pretoria and it could therefore imply that the

remainder of students are either real first-generation students or that their parents studied at another institution.

- **Distance from school**: Students who attended schools in Gauteng (estimated odds of 0.40) and the Pretoria CBD (estimated odds of 0.30) are more likely to pass. Students who attended school from other provinces are more at risk for failure (estimated odds of 0.20). The distance of the school from the university is used to indicate the distance between the student and his/her support base.
- **Housing:** No difference in risk for failure could be determined for students who live in private dwelling or university residence. Both are at the mean odds.
- **Achievement motivation orientation**: A student who has an average achievement motivation score (estimated odds of 0.32) is more likely to pass than students with either a low or high achievement motivation score, all else being equal.
- **Learning-efficacy**: Students with a low learning-efficacy score are more likely to pass (estimated odds of 0.38). Cross-tabulations indicate that African students tended to cluster in the lower category on the learning-efficacy scale.
- **Goal orientation:** Students who are able to plan their study time and expend a lot of effort into their work are more likely to pass (estimated odds of 0.34). Interaction effects occurred between 'goal orientation' and 'race language'. Interaction effects between goal orientation and race language showed significance, but did not show significant results for any of the categorical combinations (see Appendix Table B.20.).
- **Integration and support**: Students who scored average on this scale are more likely to pass (estimated odds of 0.37). Integration and support show interaction effects with learning-efficacy and goal orientation. The statistically significant interaction effects between 'integration and support' and 'learning-efficacy', indicate that an average score on both the variables decreases the category and overall odds by 0.57 (see Appendix Table B.18.). There is no clear order or relationship between the other combinations and this hinders clear interpretations. The statistically significant interaction effects between 'integration and support' and 'goal orientation' indicate that a low score on both variables increases the category and overall odds by a factor of 1.81, indicating a negative interaction (low category relationship) contributes the most to academic success in this model (see Appendix Table B.19.).

- **Reading behaviour**: Students who enjoy reading are most at risk for withdrawal (estimated odds of 0.22). Students who have poor reading behaviour are more likely to pass than any of the other students (estimated odds of 0.41).

5.9.2. Multiple Regression Analysis

Multiple regressions were used because it indicates the net effects of each variable in a regression equation and thus shows the relative importance of each independent variable. The dependent variable 'academic success' is expressed as a ratio between the number of credits passed and the number of credits registered for (Smit & Owen, 2007). This ratio indicates the degree of academic achievement at university (continuous variable). The minimum is 0 and the maximum score is 1.38, with a standard deviation of 0.28, a mean of 0.76 and the variance is 0.077. The independent variables were either continuous or dichotomous. 'Distance of school' consisted of three categories, namely Pretoria, Gauteng and other provinces. Pretoria and Gauteng were collapsed into one variable called 'Gauteng province' to make 'distance of school' a dichotomous variable. 'Home language' and 'preferred language of tuition' were not added because of its covariance with race.

Standard multiple regressions were used to determine the variance explained in the dependent variable 'academic success'. Missing cases were deleted 'list-wise', meaning that records with any missing data on any of the 12 variables used in the regression were omitted from the analysis. The adjusted R^2 of 0.38 indicate that more than a third of the variance in academic success is explained by the independent variables. This model reached statistical significance with $F(12) = 32.9$, $p < 0.001$, indicating that the independent variables in the model are significant predictors of the academic success (see Appendix Table B.7. for the full regression model). The regression analysis tests the linear relationship between each independent variable with the dependent variable after adjusting for the effects of all the other independent variables.

In this model, seven variables explained academic success with statistical significance. M-score, credits registered, goal orientation, and race were highly significant on the *p*-value of each variable ($p < 0.001$). Learning-efficacy (-2.1), gender (2.3) and distance of school are significant (-2.0) at the $p \leq 0.05$ level. The remainder of the variables did not show a linear relationship with academic success and was not statistically significant.

The beta weight (standardised regression coefficient) indicates whether the relationship between the dependent and independent variable is positive or negative, as well as the relative importance of each variable. The variables with the largest beta weight was M-score (0.593), followed by race (0.255), credits registered (0.149), goal orientation (0.131), learning-efficacy (-0.085), gender (0.081) and distance of school (-0.068). By squaring the zero-order correlation, the variance of each variable can be determined. According to the zero-order correlations (*r*) the variance of 40% can be accounted for almost entirely by M-score, with a zero-order correlation of 0.547. The rest of the variance is explained by credits registered (0.162), race (0.122) and goal orientation (0.166) followed by the last of three variables, thus indicating the importance of M-score in the model.

The estimated regression (*B*) coefficient for M-score is 0.034 after controlling other variables. This indicates that a one-unit increase in M-score is associated with higher academic success, with a ratio increase of 0.034. According to the beta weight, academic success will increase by a factor of 0.593 if M-score increases with a unit, thus indicating that an increase in M-score would enhance a student's chance of academic success.

The estimated regression (*B*) coefficient for race is 0.175 after controlling other variables. This indicates that a one-unit change in race (moving from white to African students) is associated with an increase of academic success, with a ratio increase of 0.175. According to the beta weight, an increase of one standard deviation unit in race would increase academic success by 0.255 standard deviation units. The regression indicates that African students have higher academic success than white students.

The estimated regression (*B*) coefficient for credits registered is 0.002 after controlling other variables. This indicates that a one-unit change in credits registered (one-digit increase in the ratio) is associated with an increase of academic success, with a ratio increase of 0.002. According to the beta weight, an increase of one standard deviation unit in credits registered would increase academic success by 0.149 standard deviation units. This indicates that for each credit registered extra a student would increase the standard deviation of academic success by 0.149 standard deviation units, thus indicating that students registering for more credits have more academic success.

The estimated regression (*B*) coefficient for goal orientation is 0.006 after controlling other variables. This indicates that a one-unit change in goal orientation (one digit increase in the scale score) is associated with an increase of academic success, with a ratio increase of 0.006. According to the beta weight, an increase of one standard deviation unit in goal orientation would increase academic success by 0.131 standard deviation units. The scores for goal orientation range between 18 and 55. A score increase from 18 to 19 would increase the standard deviation of academic success by 0.131 standard deviation units, thus indicating that students with higher goal orientation scores are more successful academically.

The estimated regression (*B*) coefficient for learning-efficacy is -0.004 after controlling other variables. This indicates that a one-unit change in learning-efficacy (one digit decrease in the scale score) is associated with an increase of academic success, with a ratio increase of 0.004. According to the beta weight, a decrease of one standard deviation unit in learning-efficacy would increase academic success by 0.085 standard deviation units. Scores range between 29 and 60. A score decrease from 60 to 59 would increase the standard deviation of academic success by 0.085 standard deviation units, suggesting a negative linear relationship between learning-efficacy and academic success.

The estimated regression (*B*) coefficient for gender is 0.047 after controlling other variables. This indicates that a one-unit change in gender (moving from female to male students) is associated with an increase of academic success, with a ratio increase of 0.047. According to the beta weight, an increase of one standard deviation unit in gender would increase academic success by 0.081 standard deviation units. The regression indicates that male students have higher academic success than the female students.

The estimated regression (*B*) coefficient for distance of school is -0.040 after controlling other variables. This indicates that a one-unit change in distance of school (moving from other province to Gauteng province) is associated with a decrease of academic success, with a ratio of 0.040. According to the beta weight, a decrease of one standard deviation unit in distance of school would increase academic success by 0.068 standard deviation units. The regression indicates that students who attended schools closer to the university (Gauteng province) have higher academic success than students who attended school further away from the university (other provinces).

In summary, the multiple regression analysis indicates the following linear relationships with academic success: M-score relates positively to academic success, indicating that students with higher M-scores have more academic success. African students tend to have more academic success than white students. The higher the total number of credits students registered for, the more successful they will be. Students who scored higher on the goal orientation scale will be more successful academically. Students with lower scores on the learning-efficacy scale are more successful, indicating a negative linear relationship. Male students tend to be more successful academically than female students, and students who attend schools closer to the university (Gauteng province) are more successful than students who attend schools from other provinces.

Predicting academic success would be possible by using the *B* coefficients in the following equation (refer to Appendix Table B.7.):

Academic success = 0.034*M-score + 0.002*Credits registered + 0.047*Gender + 0.175*Race + 0.006*Goal orientation - 0.004*Learning-efficacy.

5.9.2.1. Multiple regression analysis: white students

Standard multiple regressions were used to determine the variance explained in the dependent variable 'academic success' for white students (see Appendix Table B.8.). The adjusted R^2 is 0.404, indicating that 40% of the variance is explained by the model for white students. This model reached statistical significance with $F(11) = 30.8$, $p < 0.001$. In this model there were six variables that were statistically significant in explaining academic success. The variable with the largest beta weight was M-score (0.631), followed by goal orientation (0.133), credits registered (0.132), learning-efficacy (-0.114), gender (0.102) and parent education (-0.090). According to the zero-order correlations (r) the variance of 40% can be accounted for almost entirely by M-score, with a zero-order correlation of 0.601. The rest of the variance is explained by credits registered (0.167) and goal orientation (0.157) followed by the last of four variables.

The estimated regression (B) coefficient for M-score is 0.037 after controlling other variables. This indicates that a one unit increase in M-score is associated with higher academic success, with a ratio increase of 0.37. According to the beta weight, an increase of one standard deviation unit in M-score would increase academic success by 0.631 standard deviation units, thus indicating that white students with higher M-scores are more successful academically.

The estimated regression (B) coefficient for goal orientation is 0.007 after controlling other variables. This indicates that a one-unit change in goal orientation (one digit increase in the score of the scale) is associated with an increase of academic success, with a ratio increase of 0.007. According to the beta weight, an increase of one standard deviation unit in goal orientation would increase academic success by 0.133 standard deviation units. The scores for goal orientation range between 18 and 55. A score increase from 18 to 19 would increase the standard deviation of academic success by

0.133 standard deviation units, thus indicating that white students with higher goal orientation scores are more successful academically.

The estimated regression (*B*) coefficient for credits registered is 0.002 after controlling other variables. This indicates that a one-unit change in credits registered (one-digit increase in the ratio) is associated with an increase of academic success, with a ratio increase of 0.002. According to the beta weight, an increase of one standard deviation unit in credits registered would increase academic success by 0.132 standard deviation units. This indicates that for each credit registered extra a student would increase the standard deviation of academic success by 0.132 standard deviation units. White students registering for more credits have more academic success.

The estimated regression (*B*) coefficient for learning-efficacy is -0.006 after controlling other variables. This indicates that a one-unit change in learning-efficacy (one digit decrease in the scale score) is associated with an increase of academic success, with a ratio increase of 0.006. According to the beta weight, a decrease of one standard deviation unit in learning-efficacy would increase academic success by 0.114 standard deviation units. Scores range between 29 and 60. A score decrease from 60 to 59 would increase the standard deviation of academic success by 0.114 standard deviation units, suggesting a negative linear relationship between learning-efficacy and academic success.

The estimated regression (*B*) coefficient for gender is 0.061 after controlling other variables. This indicates that a one-unit change in gender (moving from female to male students) is associated with an increase of academic success, with a ratio increase of 0.061. According to the beta weight, an increase of one standard deviation unit in gender would increase academic success by 0.102 standard deviation units. The regression indicates that white male students have higher academic success than white female students.

The estimated regression (*B*) coefficient for parent education at UP is -0.057 after controlling other variables. This indicates that a one-unit change in parent education at UP (moving from parents have a UP degree to UP first-generation students) is associated with an increase of academic success, with a ratio increase of 0.057. According to the beta weight, a decrease of one standard deviation unit in parent education at UP would increase academic success by 0.090 standard deviation units. The regression indicates that students who are first-generation to the University of Pretoria have higher academic success than students whose parents graduated at the University of Pretoria.

5.9.2.2. Multiple regression analysis: African students

Standard multiple regressions were used to determine the variance explained in the dependent variable 'academic success'. The adjusted R^2 is 0.289, indicating that 29% of the variance is explained by the model for African students (see Appendix Table B.9.). This model reached statistical significance with $F(11) = 5.9$, $p < 0.001$. In this model there were three variables that were statistically significant in explaining academic success for African students. The variables with the largest beta weight was M-score (0.463), followed by credits registered (0.203) and parent education at UP (0.175). According to the squared zero-order correlations (*r*) the variance of 29% can be accounted for almost entirely by M-score, with a zero-order correlation of 0.432. The rest of the variance is explained by credits registered (0.303) and parent education at UP (0.093).

The estimated regression (*B*) coefficient for M-score is 0.025 after controlling other variables. This indicates that a one-unit increase in M-score is associated with higher academic success, with a ratio increase of 0.025. According to the beta weight, an increase of one standard deviation unit in M-score would increase academic success by 0.463 standard deviation units, thus indicating that African students with higher M-scores have higher academic success.

The estimated regression (*B*) coefficient for credits registered is 0.002 after controlling for other variables. This indicates that a one-unit change in credits registered (one-digit increase in the score) is associated with an increase of academic success, with a ratio increase of 0.002. According to the beta weight, an increase of one standard deviation unit in credits registered would increase Academic success by 0.203 standard deviation units. This indicates that for each credit registered extra an African student will increase the standard deviation of academic success by 0.203 standard deviation units.

The estimated regression (*B*) coefficient for parent education at UP is 0.129 after controlling other variables. This indicates that a one-unit change in parent education at UP (moving from UP first-generation students to Parents have a UP degree) is associated with an increase of academic success, with a ratio increase of 0.129. According to the beta weight, an increase of one standard deviation unit in parent education at UP would increase academic success by 0.175 standard deviation units. The regression indicates that students whose parents graduated at the University of Pretoria have higher academic success than students who are first generation to the University of Pretoria.

5.9.3. Tree-analysis of the Academic Readiness Questionnaire Factors

Classification tree-analysis (CRT) was performed to determine the contribution of the factors of the Academic Readiness Questionnaire with academic success. The tree-analysis indicated that only three of the five factors from the Academic Readiness Questionnaire are able to predict academic success. According to the analysis, 76% of the sample was predicted correctly. The primary factor that predicted academic success was goal orientation (planning in the model).

Students with goal orientation raw scores greater than 35.5 almost have a 10% higher chance of being successful than students with a score lower or equal to 35.5. Of the students who have high goal orientation scores, the students with learning-efficacy scores greater than 53.5 are more than 10% likely to achieve academically than

students with scores equal to or lower than 53.5. The results thus indicate that students who believe they are goal oriented by planning their learning tasks and who believe they have the ability to reach their academic goals are more likely to be successful academically than students who have the same goal orientation scores but have lower efficacy expectations of reaching their academic goals.

Of the students with lower goal orientation scores, the students who have integration and support scores equal to or lower than 49.5 are more than 15% likely to be successful academically than students who have scores greater than 49.5. The results indicate that students who do not plan their study time (goal orientation) and who place too much emphasis on support from the institution, family and social indicators are less likely to be successful than students with low goal orientation scores but need less support from the institution and the environment.

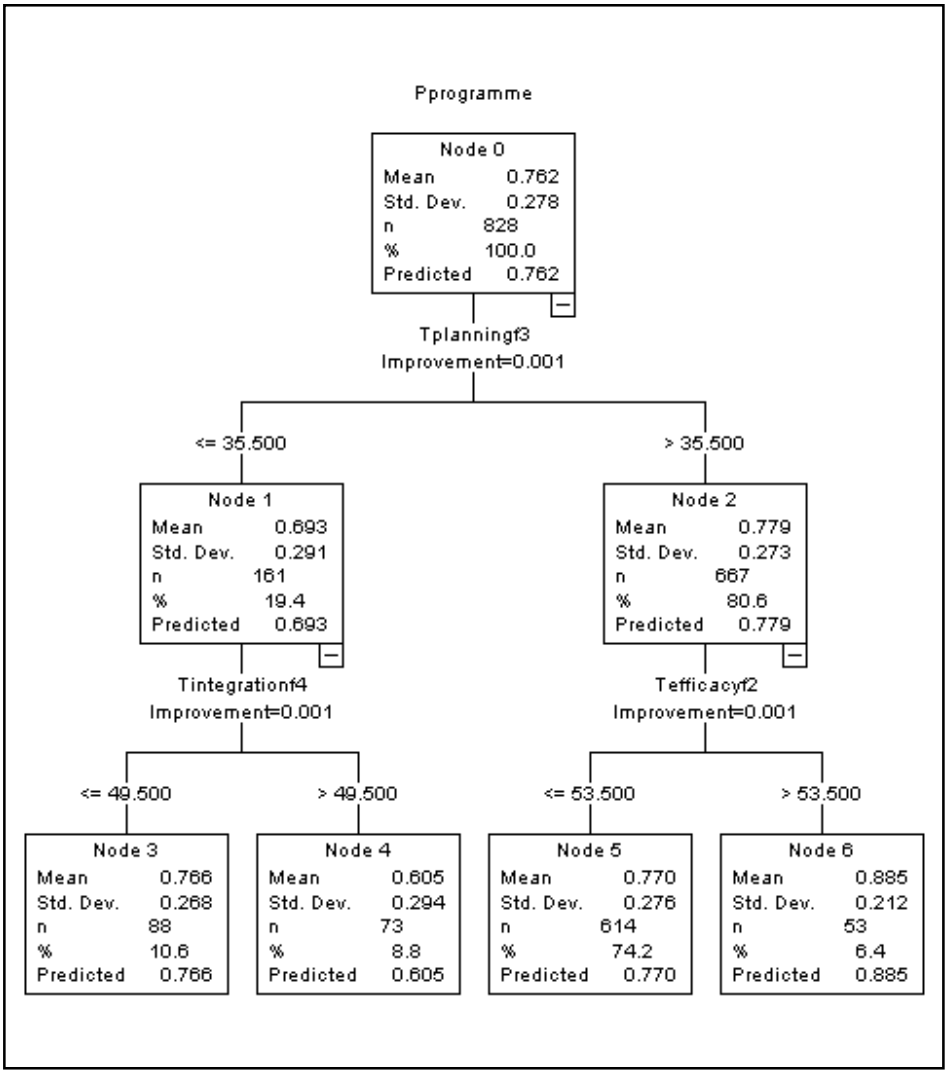

Figure 5.1. Tree-analysis (CRT) of Academic Readiness Questionnaire Factors

5.9.4. Tree-analysis of the Academic Readiness Questionnaire Items

Tree-analysis indicates that a number of items from the Academic Readiness Questionnaire are able to predict academic success. According to the analysis, 76% of the sample was correctly predicted. The item that predicted academic success the best was item 13: *I expect to have a harder time to perform academically than most students here.* Students with a low score on the item did not expect to have a harder time to perform academically.

This item was reverse scored in the analysis and thus in the tree-analysis those students who score higher than 3 on this item were academically more successful (79.9%) than students who scored equal to or below 3 (69.7%). This means that students who believe that they do not expect to have a hard time to perform academically, actually performed better than those who expect to have a hard time to perform academically.

Item 52 was related to the students who scored equal to or less than 3 on item 13. Regarding item 52: *If I run into problems at university, I have someone who would help me,* students who feel that they have a hard time to perform academically and who think they have the necessary support when they run into problems (>4) are less successful academically (57.9%) than those who believe they do not have sufficient support (≤4) (72.8%). This could indicate that students who have lower learning-efficacy beliefs and who have high expectations of support (external attribution style) or do not take much personal responsibility have lower academic performance.

Higher scores on item 13 are subsequently informed by item 23 and item 24 (Item 23: *I am as skilled academically as the best students here*; Item 24: *I enjoy working on complex, intellectually demanding problems)*. The students who do not expect to have a hard time to perform academically (Item 13) believe they are skilled academically as the best students (83.6%) and enjoy working on complex and intellectually demanding problems (86.5%). This is in contrast to students who believe they are not as skilled as the best students (72.2%) and do not like working on complex and intellectually demanding problems (77.4%).

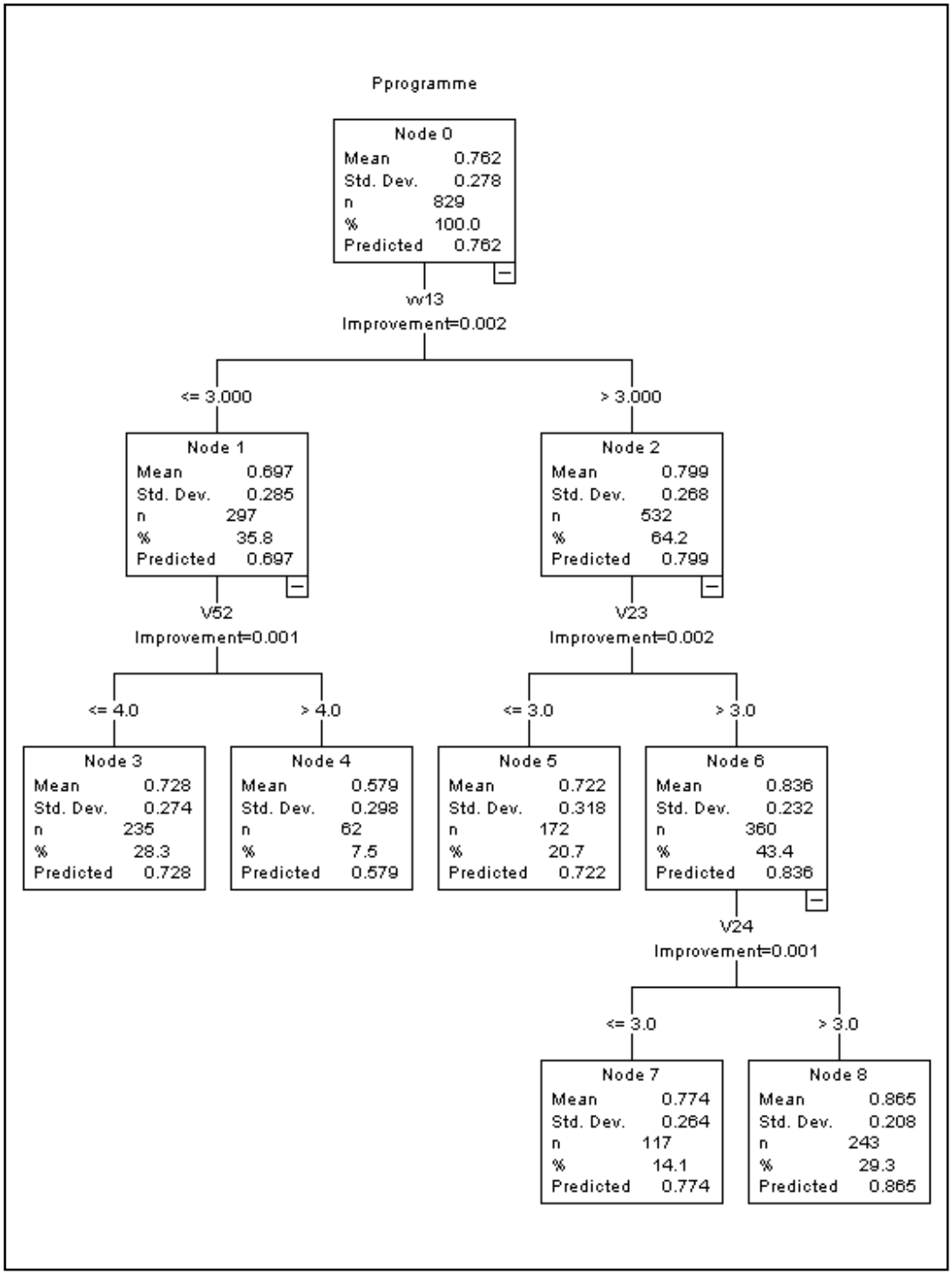

Figure 5.2. Tree-analysis (CRT) of Academic Readiness Questionnaire Items

5.10. RISK FOR WITHDRAWAL PREDICTION MODEL

The multiway frequency analysis performs categorical data modelling that can be represented by a contingency table. For this procedure, all the variables were placed in categories and a multiway frequency analysis was performed with $n = 601$. Observations with missing values for any variable listed in the model were omitted from the analysis. The maximum likelihood estimates for risk for withdrawal are shown in Appendix Table B.6.

Based on Appendix Table B.6., the following observations regarding the maximum likelihood estimates for risk for failure can be made:

- Race language, M-score, credits registered and reading behaviour reached significance.
- Race language indicated a significant difference between African and English students and between Afrikaans and English students. English students were used as the reference group.
- M-score indicated a significant difference between a low M-score and a high M-score, but no significant difference between a medium M-score and a high M-score. A high M-score was used as the reference category.
- Credits registered indicated a significant difference between students with a low credit ration and a high credit ratio and between a one credit ratio and a high credit ratio. A high credit ratio was used as the reference category.
- Reading behaviour indicated a significant difference between a medium reading behaviour score and a high reading behaviour score, but no significant difference between a low reading behaviour score and a high reading behaviour M-score. A high reading behaviour score was used as the reference category.

5.10.1. Multiway Frequency Analysis

The model indicated the strength of association between dependent and independent variables by way of likelihood or odds. For example, when three students from the three

categories in Race language, namely; African, Afrikaans and English are compared with one another and these three students are identical in all the other variables, the African student will be 3.8 times the mean odds likely to persist to the second year.

Table 5.22. Multiway frequency analysis odds index for risk for withdrawal

Category	***n***	**Odds index**	**Estimated odds**
Mean	601	15.07	(Mean odds × category odds)
Race language*			
• African	134	3.844	57.93
• Afrikaans	385	0.491	7.69
• English	82	0.529	7.97
M-score*			
• Low	133	0.423	6.37
• Medium	285	0.967	14.57
• High	183	2.447	36.88
Credits registered*			
• <1	193	0.436	6.57
• =1	217	3.145	47.40
• >1	191	0.729	10.99
Gender			
• Male	225	0.888	13.38
• Female	376	1.126	16.97
Parental education			
• Parent(s) has/have a degree	160	0.827	12.46
• First-generation student	441	1.209	18.22
Distance of school			
• Pretoria CBD	247	1.213	18.28
• Gauteng province	129	1.012	15.25

• Other provinces	225	0.814	12.27
Housing			
• UP residence	211	0.844	12.72
• Private residence	390	1.185	21.16
Achievement motivation			
• Low	187	1.234	18.60
• Medium	196	0.926	13.95
• High	218	0.875	13.19
Learning-efficacy			
• Low	183	1.158	17.45
• Medium	188	0.840	12.66
• High	230	1.028	15.49
Goal orientation			
• Low	185	0.824	12.42
• Medium	198	0.966	14.56
• High	218	1.256	18.93
Integration and support			
• Low	164	1.062	16.00
• Medium	227	1.042	15.70
• High	210	0.904	13.62
Reading behaviour			
• Low	190	1.291	19.46
• Medium*	184	0.662	9.98
• High	227	1.169	17.62

* Indicates variables that reached statistical significance

According to the multiway frequency analyses, students are 15 times more likely to persist to the second year, thus one in 15 students are at risk for withdrawal (Table 5.22.). Of the independent variables in the model, race language, M-score, credits registered and reading behaviour were statistically significant. Interaction effects from a

hierarchical analysis were unstable due to the low frequency counts in some of the table cells and will not be discussed here.

According to the model, and using the mean odds as a baseline:

- **Race language**: African students are 3.8 times the model average likely to persist to the second year. The estimated odds of persisting for African students are 57, even if they have been adjusted for other variables. The estimated odds of persisting for Afrikaans students in the model are 7.69 and English students 7.97. In race language, both Afrikaans and English students, all else being equal, are at risk for withdrawal.
- **M-score**: Students in the high M-score category are 2.45 times more likely to persist to the second year, thus with an odds of 36.7 to persist. Students in the average M-score category are almost at the baseline or average of the group. Students in the low M-score group, all else being equal, are at risk for withdrawal.
- **Credit registered**: Students who registered for more credits than prescribed and students who register for less than the credits prescribed are at risk for withdrawal, all else being equal. Students who register for fewer credits than is prescribed are most at risk for withdrawal with an estimated odds of 0.657. Students registered for exactly the prescribed number of credits (a ratio of one) have an estimated odds of 47.43 to persist to the second year.
- **Gender:** Female students tended to have higher odds of persisting (estimated odds of 16.97) and male students have higher odds of withdrawing (estimated odds of 13.38).
- **Parental education**: Students who are first-generation students to the University of Pretoria are more likely to persist (estimated odds of 18.22) than students whose parent(s) has/have graduated from the University of Pretoria.
- **Distance of school**: Students who attended schools in the Pretoria CBD are more likely to persist to the second year than students who attended from schools in the Gauteng province or schools in other provinces. The proposition is that the further the distance of a school, the more at risk a student is for withdrawal.
- **Housing**: Students who live in private residences are more likely to persist to second year and living in university residences places a student at more risk for withdrawal.

- **Achievement motivation orientation:** A student who has a low achievement motivation orientation is more likely to persist to the second year (estimated odds of 18.6) than students with either a medium or high achievement motivation, all else being equal.
- **Learning-efficacy**: Students with a low learning-efficacy score are more likely to persist to the second year (estimated odds of 17.45).
- **Goal orientation:** Students with a high goal orientation score are more likely to persist to the second year (estimated odds of 18.93).
- **Integration and support**: Students from all three categories are virtually at baseline (1), thus performing at the model average of 15.
- **Reading behaviour**: Students who are average leisure readers are most at risk for withdrawal (estimated odds of 9.98). Students who do not read that much for leisure are actually more likely to persist to the second year than any of the students in the low or high M-score categories.

5.10.2. Binary Logistic Regression Analysis

A binary logistic regression analysis was performed to assess the impact of a number of factors on the likelihood of risk for withdrawal. Logistic regression analysis allows one to assess how well a set of predictor variables predicts or explains the dependent variable. It gives an indication of the adequacy of a model by assessing 'goodness-of-fit'. It also provides an indication of the relative importance of each predictor variable or the interaction among the variables (Pallant, 2007).

The model contained 12 independent variables (race, M-score, parent education at UP, gender, residence, school location, credits registered, achievement motivation, learning-efficacy, goal orientation, integration and support and reading behaviour*).*

From the logistic regression analysis (*n* = 619), only three of the independent variables made a unique statistical significant contribution to the model (race, M-score and credits registered). Goodness-of-fit is measured using the Hosmer-Lemeshow statistic where a

good model gives a non-significant Chi-square result (Tabachnick & Fidell, 2007, p. 459).

The full model containing all predictor variables was statistically non-significant using the Hosmer-Lemeshow statistic with p = 0.918. The model as a whole explained 23.3% (Nagelkerke R^2) of the variance in risk for withdrawal. Classification for the withdrawal group was very low, with 12.2% of withdrawing students and 99.3% of persisting students correctly predicted, for an overall success rate of 88.9%.

Logistic regression analysis is thus unable to predict risk for withdrawal, but is accurate in predicting who will persist to the second year. Table 5.23. show regression coefficients, Wald statistics, odds ratios, and 95% confidence intervals for odds ratios for each of the twelve predictors.

Table 5.23. Logistic regression predicting likelihood of risk for withdrawal

Factor	*B*	*S.E.*	*Wald*	*df*	*p*	Odds ratio	95.0% C.I. for EXP(B)	
							Lower	Upper
Race(1)***	-2.238	0.587	14.531	1	0.000	0.107	0.034	0.337
Credits registered*	-0.015	0.006	5.444	1	0.020	0.986	0.974	0.998
M-score***	-0.204	0.034	36.823	1	0.000	0.816	0.764	0.871
Gender(1)	-0.165	0.306	0.292	1	0.589	0.848	0.465	1.544
Residence(1)	0.156	0.293	0.282	1	0.596	1.168	0.658	2.075
Achievement motivation	-0.020	0.028	0.512	1	0.474	0.980	0.927	1.036
Learning-efficacy	0.050	0.034	2.178	1	0.140	1.051	0.984	1.123
Goal orientation	-0.012	0.027	0.208	1	0.648	0.988	0.937	1.041
Integration/support	0.018	0.031	0.341	1	0.559	1.018	0.958	1.082
Reading behaviour	0.036	0.038	0.890	1	0.345	1.036	0.962	1.116
Distance of school	0.256	0.297	0.743	1	0.389	1.292	0.721	2.315
Parent education at UP	0.423	0.298	2.013	1	0.156	1.526	0.851	2.736
Constant	2.145	1.987	1.166	1	0.280	8.543		

Significance at $p \leq 0.05$*, $p \leq 0.01$**, $p \leq 0.001$***

As shown in Table 5.23., only three of the independent variables made a unique statistical significant contribution to the model, namely race, M-score and credits registered. The Wald statistic indicates that M-score has the greatest effect size (36.8), followed by race (14.5) and credits registered (5.4).

The odds ratio of 0.107 for race is less than 1, indicating that for each unit change in the predictor, thus moving from white to African the odds of being at risk for withdrawal is 0.11. The odds for African students to be at risk for withdrawal is decreased by almost 90%. From the cross-tabulations of the multiway frequency analysis, only four African students withdrew from their studies, while 70 white students withdrew from their studies.

The odds ratio of 0.816 for M-score was less than 1, indicating that for each change in unit, the odds of being at risk for withdrawal is 0.82. Thus, as students' M-scores increase by one unit, the odds for withdrawal are decreased by 18%. Generally speaking, the students with a low M-score have a higher probability to withdraw from their studies.

The odds ratio of 0.986 for credits registered was also less than 1, indicating that for each change in unit, the odds of being at risk for withdrawal is 0.99. The odds are virtually at 1, indicating that the effect size is virtually zero. For completeness, as the number of credits registered increase, the odds for withdrawal is decreased by 1%. Cross-tabulations between the variables indicate that students who register for the prescribed number of credits are less at risk for withdrawal than students who register for more or less than the prescribed number of credits. Students who are more realistic in choosing their credit load are therefore less at risk for withdrawal.

5.10.3. Tree-analysis (CHAID)

A classification tree-analysis (CHAID) was conducted with the binary dependent variable 'withdraw and persist'. The independent variables in the analysis were the items from the Academic Readiness Questionnaire. The overall prediction of the dependent variable, risk for withdrawal when analysing the items was only 11.6%. It is not worth mentioning the items that contributed to the prediction of risk for withdrawal due to its poor predictability of risk for withdrawal. It should however be noted that when separated from

the biographical variables, none of the five factors from the ARQ were able to predict risk for withdrawal.

The various analyses that were made to determine the predictability of risk for withdrawal was only marginally successful and it was decided to conduct telephonic interviews with the students who discontinued their studies to determine the salient factors that contribute to withdrawal. The 'exit interviews' would provide students an opportunity to voice their reasons for withdrawal. The exit interviews become necessary because none of the factors or items from the ARQ were able to predict risk for withdrawal and the interviews would provide additional information that could be assessed as entry characteristics.

5.11. EXIT INTERVIEWS

At the University of Pretoria, the withdrawal rate of the first-year entering student population typically measured up to the end of the first-year exams is 8.6% (BIRAP, 2008). This percentage excludes institutional withdrawal due to being absent from exams, exclusions from exams (due to poor academic performance) and students who do not pass the supplementary exams.

Table 5.24. Summary of institution-wide first-year student discontinuation (2008 cohort)

UNDERGRADUATES	Number discontinued				
	White	Coloured	Asian	African	Total
First-time entrants (Full-time)	451	10	22	138	621
% with regard to total enrolled first-time entrants					**8.6%**
% with regard to enrolled per population group	**10.0%**	**6.2%**	**7.5%**	**6.2%**	

Source: BIRAP (2008) – Adapted summary of student numbers: 2008

From Table 5.24. it is evident that the majority of students who withdraw from their studies institutionally from all faculties and programmes are white students. Thus, 10% of the white student population have withdrawn from their studies, compared to only 6.2% of the African student population. The results from the Economic and Management Sciences sample correspond well with the overall institutional withdrawal rates, including the distribution in terms of race. BIRAP data for the Faculty of Economic and Management Sciences reveals that 82 students discontinued their studies during the 2008 academic year. The known racial differentiation indicated that 10 students were African, 63 were white students, five students were Indian and four of the students' racial group was unknown. The number of students that completed the Academic Readiness Questionnaire and withdrew from their studies was *N* = 53, but only 42 students were available for telephonic interviews (79% of the *N*). From the 42 students that were interviewed only two students were African and 40 students were white. The results from the multiway frequency analysis, logistic regression and the exit interviews are thus highly biased toward the white student sample. All interpretations on these analyses should keep the statistical bias in consideration. A note of confidence in the results are that the trend experienced are consistent with cohort research on withdrawing students over a number of years (Du Plessis et al. 2006; Lemmens, Du Plessis, Rai, De Klerk,

Mitchell, Julie, Barker, & Van Niekerk, 2008; Lemmens, Du Plessis, Roopen, Solomon, Rungasamy, & Reynolds, 2010).

5.11.1. Reasons for Withdrawal and Sub-reasons Contributing to Withdrawal

Participants were asked to indicate the reason for withdrawing from their studies and, in addition, they were probed for contributing reasons that influenced their decision to withdraw. Ten broad reasons/categories were identified for withdrawal. During the study it was found that the primary reason participants withdraw from their studies was due to choosing the wrong programme (study choice). The findings by reason/category (Table 5.25.), are summarised in the following sections.

Table 5.25. Main reason for withdrawal

Reason from students	Frequency	Percentage
Academic	3	7.1
Study choice	26	61.9
Family responsibilities	3	7.1
Work responsibilities	1	2.4
Health	3	7.1
Financial	2	4.8
Personal	1	2.4
Institutional	2	4.8
Faculty discontinuation	1	2.4
Total	42	100.0

5.11.1.1. Academic reasons

Academic problems were named by 7.1% of the participants as the main reason for withdrawal. The most prominent reason given was unmanageable workload, which resulted in unexpected poor academic performance. Some participants also mentioned that they felt unprepared for tertiary education from the start. Additional contributing reasons related to study choice, with an uncertainty about the career choice that were 'forced' down as a result of not getting admitted for their first programme choice or being pressured (by parents) into a certain career field. A few personal sub-reasons for discontinuation included academic backlog due to unforeseen circumstances, or social/ sport responsibilities.

5.11.1.2. Study choice reasons

Study choice was the largest main contributing reason, with 61.9% of the participants citing study choice as their main reason for withdrawal. The majority of these participants were uncertain about their choice of career or found that the programme was not interesting, not what they expected it to be, or that they simply did not enjoy the course they enrolled for. Some students commented that the university should communicate better with prospective and current participants. This applies to areas such as programme information, where participants should be better informed about the various programmes available, the core and elective modules that are available for a programme and what these modules entail, as well as the career opportunities that are related to each programme. In addition, prospective students should be better informed on the admission criteria for specific programmes when they are still at high school, in order for them to choose the correct subjects at school.

Contributing reasons are that a few participants were accepted for their first career choice at another tertiary institution (refer to Table 5.26.). Academic reasons contributing to withdrawal were poor academic performance resulting from unsuccessful study methods, clashes in the programme roster or a heavy workload. Financial concerns were also mentioned by some participants, stating that they could not continue due to financial difficulties in the family or needing to work to fund their studies. Personal factors

contributing to their decision were mostly transport and/or residential issues and inability to balance academic and other activities.

5.11.1.3. Family responsibility

Only 7.1% of the participants indicated family responsibility as the main reason for withdrawal, stating the need to support the family due to death, sickness or financial pressure. Heavy workload, disinterest in the programme and isolation from family were also named as contributing reasons for withdrawal.

5.11.1.4. Work responsibility

Work responsibility was the main contributor for 2.4% of the participants. Some students accepted a good job opportunity, others needed to work to fund their studies, or worked part-time and found that this impeded their studies.

5.11.1.5. Health reasons

Health problems caused the discontinuation of 7.1% of the participants. They suffered academic backlog due to physical illness or emotional distress and poor academic performance followed. One participant also mentioned peer pressure as a contributing factor.

5.11.1.6. Financial reasons

Two students discontinued their studies due to financial reasons, mainly because their funding ran out or the cost associated with studying became too much. The financial needs of their family added to their financial concerns. Under personal concerns, transport and/or residential issues placed further pressure on these participants. Other contributing factors associated with their programme were insufficient material, uncertainty about career choice or disinterest in the course.

5.11.1.7. Personal reasons

Personal reasons were named as the main reason for withdrawal by 2.4% of the participants. They mentioned an inability to balance academic and other activities, transportation and/or residential problems, inability to adjust to campus life and feeling isolated due to the distance from their family. Academic contributors mentioned were unexpected poor academic performance and insufficient interaction with lecturers. Study choice also influenced their decisions, with uncertainty about programme or career choice and disinterest in the programme. Family problems named were death or illness in the family and financial needs of the family. Financial difficulties (high cost of studies) affected one participant.

5.11.1.8. Institutional problems

A number of participants indicated institutional concerns as their reason for withdrawal (4.8%). One of the students had a negative academic experience and the other students had difficulty with social/sport responsibilities. Academic reasons that contributed to withdrawal decisions were a clash in the roster and unmanageable workload. A few participants were accepted at other institutions for their first choice of studies. The only personal problem mentioned was insufficient support from family members.

5.11.1.9. Faculty discontinuation

A small (2.4%) proportion of participants were discontinued by the faculty due to poor academic achievement.

Table 5.26. Sub-reasons for withdrawal

Sub-reasons from students	Responses	
	Frequency	Percentage
Not performing as expected	5	5.6%
Unsuccessful study methods	1	1.1%
Inadequate material, facilities or equipment	1	1.1%
Organisation of programme	1	1.1%
Clash in roster	1	1.1%
Workload of programme	7	7.8%
Not prepared for study	1	1.1%
Unable to balance social and academic	1	1.1%
Wrong career choice	15	16.7%
Uncertain career goals	7	7.8%
Course does not fit my interest	4	4.4%
Programme not what I expected	3	3.3%
Not admitted for first study choice	4	4.4%
External pressure to study a degree	1	1.1%
Realisations about job responsibilities	1	1.1%
Did not enjoy the programme	8	8.9%
Accepted at another institution for 1st choice	4	4.4%
Doubt the job prospects	1	1.1%
Family responsibilities	2	2.2%
Death or sickness in family	2	2.2%
Received a good job opportunity	1	1.1%
Academic backlog because of sickness	1	1.1%
Acute/chronic emotional illness	1	1.1%
Financial pressures – associated costs	1	1.1%
Struggle to fit into campus community	1	1.1%
Experience a feeling of isolation – distance from	3	3.3%

parents		
Other activities take up too much time	1	1.1%
Not receiving sufficient support from family	1	1.1%
Peer pressure	2	2.2%
Transport problems	1	1.1%
Residential issues	2	2.2%
From small town – struggling to adapt	1	1.1%
Negative academic experience at UP	1	1.1%
Unhappy with language of tuition	1	1.1%
Social/sport responsibilities	1	1.1%
Total	90	100.0%

5.11.2. Major Influences on Studies

From Table 5.27. it is evident that the major influences that the particular problem had on participants' education was that they were not motivated to study, they performed poorly academically, and it caused intolerable stress and pressure. The primary reason for withdrawal is incorrect study choice and from the influence one can infer that making the incorrect study choice has severe influences on academic performance, motivation to continue with the particular programme and causes stress. The stress is partly due to poor academic performance but also due to the confusion of changing programmes in many cases. According to Bean (2005), some levels of stress can provide motivation but too much stress can have a negative influence on retention, reducing one's institutional fit and commitment.

Table 5.27. The major influences on studies

Problem influence	Frequency	Percent
Caused stress/pressure	7	14.0%
Wanted to give up	2	4.0%
Disrupted studying	2	4.0%
Not motivated	10	20.0%
Not go to class	5	10.0%
Not enough time to study	6	12.0%
Perform poor academically	10	20.0%
Difficulty concentrating	1	2.0%
Did not study	2	4.0%
Lack of engagement	2	4.0%
No influence on studies	**2**	**4.0%**
Positive influence	**1**	**2.0%**
Total	50	100.0%

5.12. CONCLUSION

In this chapter the statistical techniques used to analyse the data were discussed. Descriptive statistics were used to explore the data. Factor analysis was used to group the questionnaire items in meaningful factors for further analysis. Reliability statistics indicated that the factors have good internal consistency. Further analyses were chosen on its ability to measure the dependent variables. The statistical techniques used to measure risk for failure include cross-tabulations, multiway frequency analysis, multiple regression analysis and tree-analysis. The statistical techniques used to measure risk for withdrawal include cross-tabulations, multiway frequency analysis, logistic regression analysis and telephonic interviews. The interpretation of the results follows in Chapter 6. The interpretation will follow a similar format as the results. Firstly, risk for failure will be interpreted, followed by risk for withdrawal and lastly the standardisation of the Academic Readiness Questionnaire will be discussed.

CHAPTER 6

INTERPRETATION

6.1. INTRODUCTION

The purpose of this chapter is to integrate the results from Chapter 5 and to interpret it with the theoretical framework discussed in Chapter 2. The significant predictors from each risk model, namely failure and withdrawal, will be discussed separately because of the different trends that were observed following analysis of the data. Risk for failure's significant predictors will be discussed first, followed by the significant predictors of risk for withdrawal. The risk for withdrawal model includes the results from telephonic exit interviews. The salient results from the exit interviews will be discussed in this chapter. Finally, the Academic Readiness Questionnaire's psychometric properties will be discussed as part of the aim of the research to standardise the instrument.

The interpretation of the results is largely limited to the academic achievement and withdrawal of first-year students. The white students were somewhat over-represented in the sample, compared to African students which could have influenced the statistical results.

6.2. PREDICTING RISK FOR FAILURE

The different type of analyses that were conducted to determine the predictability of academic achievement consisted of cross-tabulations, multiway frequency analysis (SAS CATMOD), multiple regression analysis and classification tree-analysis. The cross-tabulations are used descriptively to determine the relationship among categorical variables. Cross-tabulations are co-frequency tables of frequencies and are used to explore the relationship between each independent variable with the dependent variable. This procedure is usually followed by a multiway frequency analysis.

The multiway frequency analysis and multiple regression analysis measure the relationship between a dependent variable and a number of independent variables. In multiway frequency analysis, the dependent and independent variables are categorical, whereas in a multiple regression analysis the dependent variable is continuous and the independent variables can be continuous and dichotomous (Tabachnick & Fidell, 2007). The dichotomous variable for academic achievement is thus coded pass/fail and the continuous variable consists of a ratio of the number of credits passed and the number of credits prescribed by the programme.

It became evident that the stringent criterion that all the credits prescribed by a programme should be passed in the final exam in order to be considered as successful leads to an outcome that only one third of the students in the sample could fulfil. The stringent criterion further leads to fewer independent variables to emerge as significant predictors. The classification tree-analysis identified both factors and items in the Academic Readiness Questionnaire that have a relationship with academic success.

From the multiway frequency analysis cross-tabulation tables, it is evident that 31% of the students in the sample passed all the credits that were prescribed by the programme. The cross-tabulations thus indicate that almost 70% of the students in the sample are at risk for failure. The multiway frequency analysis confirms that students have mean odds of 0.30 of being academically successful, all else being equal. The only significant predictors of the multiway frequency analysis (SAS CATMOD) were (first-order effects):

- race language;
- M-score; and
- reading behaviour.

The multiple regression analysis produced seven variables that were statistically significant in explaining academic success. The *R* for regression was significantly

different from zero, with $F(12) = 32.9$, $p \leq 0.001$. The adjusted R^2 of 0.38 indicates that more than a third of the variance in academic success is explained by the independent variables. The significant predictors explain virtually all the variance in the model. These are:

- M-score (0.593);
- race (0.255);
- credits registered for (0.149);
- goal orientation (0.131);
- learning-efficacy (-0.085);
- gender (0.081); and
- distance of school (-0.068).

The size and direction of the relationships suggest that risk for failure (inverse of academic success) is associated with:

- white female students;
- with a low M-score;
- who registered for less credits than is prescribed by the programme;
- who have lower scores on the goal orientation scale;
- who have higher scores on the learning-efficacy scale; and
- who attended schools from other provinces.

6.2.1. The Influence of Racial Background and Language

The influence of racial background by the authors of the three retention models as discussed in the literature review is highly evident. Relationships between academic success and race language showed contradictory results, which could be due to the sample bias. The multiway frequency analysis indicate that African students are more likely to be successful academically (estimated odds of 0.66), after adjusted for other variables. In race language, both Afrikaans and English students, all else being equal, have higher odds of being at risk for failure (estimated odds of 0.18 and 0.20 respectively) than African students. The cross-tabulations demonstrated virtually no

difference in performance between the three race-language groups. African, Afrikaans and English student groups share similar averages in failure (31.28%).

Multiple regression analysis for the white and African students combined indicates that African students are more successful academically than white students during the first year of study. Race, as a variable, was highly significant ($p < 0.001$) and had the second largest beta weight (0.255) after M-score, indicative of the relative importance of race in explaining academic success. The zero-order correlation is a reflection of the Pearson correlation coefficient and indicates the strength and direction of relationship between race and academic success. The low correlation between race and academic success (zero-order correlation of 0.122) could indicate that the relationships between the two variables are not completely linear, but more curvilinear due to the different academic success profiles of the white and African students.

Race, as a variable, was split between white and African students with the 'Split-file' option in SPSS.V17® to allow for separate multiple regression analysis between the two racial groups. The same variables were used as in the student sample regression analysis, except for race that was excluded. It is clear from the output that the independent variables that predict academic success differ for the two race groups. The variables that are able to predict academic success for white students are M-score, goal orientation, credits registered, learning-efficacy, gender, and parental education at UP. The variables that are able to predict academic success for African students are M-score, credits registered, and parental education at UP. The variables that predict academic success in the white students are similar to that of the student sample model when compared to the African students and one can reason that the predictor variables in the student sample model are highly influenced by the white students' profile. The conclusion from the results is that a broader spectrum of risk variables is available to predict risk for failure for white students (six variables), while the spectrum of risk variables for African students is very narrow and limited to three predictor variables.

African students from the sample registered at a Historically White Afrikaans Institution are performing academically better that their white counterparts at first-year level. A proposed hypothesis for the improved academic achievement of African students compared to white students stems from the literature of Rodgers and Summers (2008, p. 182). The African students who enter Historically White Institutions face both psycho-social (self-perceptions and perceptions of interactions with others) and social-cultural (perceptions of interactions with others with respect to ethnicity or race) challenges. For African students to be successful they have to develop 'biculturalism' because they have to function in two individual cultures.

It could be argued that the majority of the African students in the sample have developed an ability to balance the cultural or racial demands of the system and can address racial issues that might affect their studies (Sedlacek, 2004). According to Sedlacek (2004), the African students who understand the system have higher academic achievement and are more able to adjust to a Historically White Institution than those who do not. This hypothesis cannot be substantiated by the data collected in this study and the search for other possibilities in the available data to support the racial differences in academic performance continues.

Racial or cultural background in South Africa was highly linked with poor literacy levels of households, low socio-economic status and impoverished academic school environment in the past (Van Heerden, 1997). These and other factors influenced African students' high school academic achievement in the past and to some extent these factors are still present (Jones et al., 2008). A shift in the socio-economic status of many African people in South Africa lead to the improvement of the socio-economic status of many African people which indicates that the artefacts that are necessary to stimulate learning and development of children are more so part of the domestic environment. African children also have greater access to quality schools and have active role models from the same cultural background which can counter the 'stereotype threat' (Rodgers & Summers, 2008).

On the other hand, it could be argued that the African students who enrolled at the Faculty of Economic Management Sciences at the University of Pretoria have higher academic ability and that racial background has nothing to do with the African students being more successful than the white students on first-year level. Scott (2009) argues that the African students who enter universities have high academic ability and is a highly selective group. African students could therefore, based on Scott's argument, achieve academically better than white students, irrespective of the type of institution.

The sections on high school achievement and the number of credits registered will provide some answers to the differences in academic achievement between the two racial groups.

6.2.2. The Influence of High School Achievement

High school academic achievement is widely regarded as the best predictor of first-year academic achievement by various researchers (Astin, 1975; Astin & Oseguera, 2005; Camara, 2005b; Sternberg & Grigorenko, 2002). M-score was used as a measure of high school achievement for the 2008 cohort. A positive relationship was demonstrated using cross-tabulations between M-score and pass/fail, where low M-score is associated with more students being in the fail group than in the pass group. As the M-scores progressively increased, a shift from the low to the high M-score category, more students passed. Graduation rates at the institution under study confirm that students with higher M-scores are more likely to graduate within the minimum time (BIRAP, 2008).

The multiway frequency analysis also confirms these relationships. Students in the low M-score category are less likely to be academically successful (0.089 times the overall odds of 0.294). This indicates that students with low M-scores are extremely likely (more than a 99% chance) to be in the risk for failure category. Students with an average M-

score are 70% less likely to be successful with three out of every 10 students being academically successful.

Results from the multiple regression analysis confirmed that students with low M-scores are extremely at risk for failure and students with average M-scores become progressively less at risk for failure. A relatively strong correlation between M-score and academic success was demonstrated (zero-order correlation of 0.55) which elevates M-score to the single best predictor of academic success in the model, which corresponds to international and national research results.

M-score is a marginally stronger predictor in the case of white students than of African students (Rodgers & Summers, 2008). International research indicates that high school achievement is a poorer predictor of academic success for African students. The results of this research support this finding. Sternberg (2007) and Bean (2005) confirm the association between socio-economic status, quality of the school and academic preparedness of some students. The study by Jones et al. (2008) confirms that a large number of African students are still entrenched in an impoverished environment and the poorer resourced schools contribute to a lack of academic preparedness of students. African students from these under-resourced schools do not necessary have less ability than African students from well-resourced schools or even white students, but that they are prepared differently or under-prepared, hence the weaker ability of M-score to predict academic success for African students. Nevertheless, M-score is still the single best predictor of academic success for African and white students and has to be included in a prediction model for both racial groups.

The interaction effect between race language and M-score that resulted from the multiway frequency analysis is worth noting (see Appendix Table B.17.). When M-score and the factors from the readiness questionnaire are removed from the model, virtually no difference in the odds of the three race language groups was found, with Afrikaans students having marginal better odds of academic success. The reason for the difference in the model compared to the cross-tabulation has to do with the partial effect

of M-score in the model. As mentioned earlier, African students do not show the same pattern of prediction along M-score categories as for instance the English students. This finding indicates that African students, relative to Afrikaans and English students, achieve academically better, M-score being equal. Theoretically the finding could indicate that the negative effect of prior schooling (ex-DET schools) can be overcome with time and that African students do pick up on the skills and resources when entrenched in a supportive academic environment. Afrikaans students show similar but less significant patterns of success as African students. It can thus be argued that African students show higher academic success than white students. Afrikaans and English speaking students are thus at risk for failure.

The difference in M-score patterns for the three race language groups does not, however, provide the full picture to explain the differences in predicting risk for failure. The number of credits that the students registered for differs by race and provides additional clues to the differences in predicting risk for failure.

6.2.3. The Influence of Credits Registered

Credits registered refers to the number of credits students registered for in their first academic year. In the beginning of each academic year, students register for a number of modules with assigned credits based on the notional hours that students have to spend on each module in a programme. The variable does not take account of the prescribed number of credits by the programme or the number of credits that were failed or passed. Credits registered was not included in the multiway frequency analysis because the dependent variable, academic success, was coded binary and in this instance the number of credits registered as a variable would have led to the exclusion of some of the cases.

The multiple regression analysis indicated a highly significant positive correlation between the number of credits that students register for and their academic success ($p < 0.001$). The results indicate that students who register for more credits are usually

more successful academically (based on the expected change in the standard deviation of academic success of 0.149 if there is a one-unit change in the number of credits registered).

The low correlation between the variables suggests a curvilinear relationship which indicates an optimal number of credits with students at either side of the curve being at risk for withdrawal. Students who register for fewer or for more credits than is prescribed are at risk for failure. The students with fewer credits are usually more at risk for failure than the students who register for more credits than prescribed. A cross-tabulations with a Chi-square 'goodness-of-fit' test showed statistical significant differences between the number of credits registered (binned in thirds with SPSS.V17® Visual Binning option) and risk for failure (binary variable fail/pass) with Pearson's Chi-square < 0.001, *df*(2) (see Appendix Table B.10.).

The cross-tabulations indicate that the students who registered for less than 139.1 credits (low credits registered category) and the students who registered for more than 148.0 credits (high credits registered category) are highly clustered in the risk for failure category (83.4% and 80.4% respectively). Students in the average category, or who registered close to the number of credits prescribed by the programme (139.1-148.0 credits) have a lower chance of being at risk for failure (44.6% clustered in the risk category). Evident from exploring the data is that students with low M-scores have a smaller range between the minimum and maximum number of credits that they register for (76.5-197.0 credits). Students with average M-scores registered for credits with a range of 90.5 to 215.0 credits and students in the high M-score category registered for credits with a range of 88.0 to 231.0.

Analysis of variance (ANOVA) however indicated on the Levene test that the variances are not homogenous and the Brown-Forsythe and Welch test was used to determine the difference between the three M-score categories and the number of credits that students register for (see Appendix Table B.11.). Both tests point to a highly significant difference in the number of credits registered between the three M-score groups, which is consistent with the standard ANOVA results ($F(2) = 6.551$, $p = 0.002$). The Games-Howell method was used in Post hoc tests because homogeneity of variance did not hold in the data, which was determined by the Levene test. The Games-Howell method

indicates significant differences between students in the low and high M-score category (p = 0.001), but not between low and average or between average and high M-score categories. A Scheffe test indicated significant differences between the low and average M-score categories as well as between the low and high M-score categories, but these results are only tentative because of the lack of homogeneity of the data (see Appendix Table B.12.).

Cross-tabulations further indicate significant differences between the M-score category and the credits registered category with Pearson Chi-square < 0.001, *df*(4) (see Appendix Table B.13.). Trends highlighted by the cross-tabulations show that students in the low M-score category (which are highly at risk for failure), tend to register for either fewer credits, thus being in the low credits registered category (49.3%) or in the high credits registered category (32.2%). Students with average M-scores follow the same trend as the low M-score students with 35.9% of the students in the low credits registered category and 35.9% in the high credits registered category. Both the low and high credits registered categories have already been identified as at risk for failure, especially for students in the low M-score category and this enhanced the risk. Students with high M-scores tend to be in the average credits registered category (58.2%) and only 15.6% of the students are in the low credit registered category and 26.2% of the students are in the high credit registered category. Even though high M-score students register for more credits than prescribed, these students have good odds of passing and their odds of failure is very low. It is the low and average M-score students that are at greater risk when they register for more credits than they can cope with because they increase their odds of failure.

The distribution of credits registered differentiated by race indicates a significant difference with a Pearson Chi-square < 0.001, *df*(2) (see Appendix Table B.14.). The cross-tabulations indicate that almost half of the African students are clustered in the low credits registered group (48.5%), while 28.6% of white students are clustered in the low credits registered group. White students progressively move to the higher credit registered group (average credits = 33.6% and high credits = 37.8%), while African students regressively move toward the higher credit registered group (average credits = 35.6% and high credits = 15.8%). When comparing the M-score category and race, the

results indicate that 35.1% of African students are clustered in the low M-score category and 51.5% of African students are clustered in the average M-score category.

Cross-tabulations indicate that African students tend to register for fewer credits and should therefore be more at risk for failure. Yet, African students have a lower risk for failure than white students. This indicates that a number of the African students in the average M-score category and possibly the high M-score category are clustered in the low credits registered category, (a lower credit load) even though some African students show an ability to register for more credits based on their high school marks. The interaction effect that is present in the multiway frequency analysis for race language and M-score could be explained in that African students with ability take less credits and are then able to achieve academically better than white students, all else being equal.

Overall it seems as if African students tend to register for fewer credits than white students with the same high school academic achievement, measure by the M-score category. This finding is contrary to Van Heerden's (1997) study which indicated that African students usually underestimated the workload and the quality of the work required. It seems that African students from the study are overly cautious when loading their programme credits and this behaviour is actually benefiting the African students.

6.2.4. The Influence of Goal Orientation

Goal orientation measured here consist of three related components, namely effort or academic apathy, planning of study time by setting goals, and being methodical in ones behaviour. The suggestion is that the components measured by goal orientation coincide with one of Conley's academic behaviours, namely study-skill behaviours. The study-skill behaviours compose of time management, which according to Conley (2007) refers to planning a task, setting up the study environment, breaking up the tasks into manageable chunks and balancing competing tasks.

Goal orientation has a positive linear relationship with academic success, but with low zero-order correlations, ranging between 0.157 and 0.166. Goal orientation emerged as the second strongest predictor on the student sample model (beta weight of 0.131), after M-score (beta coefficient of 0.593), thus indicating the importance of the variable even

though its contribution to the variance explained is only 1.7%, according to the squared partial correlations. Goal orientation on its own is a weak predictor of academic success, but contributes some variance to the student sample and white student prediction model.

Goal orientation however emerged in a classification tree-analysis as the best predictor of academic success among the five factors of the Academic Readiness Questionnaire, irrespective of race (see Perna & Thomas, 2008). Goal orientation as a form of study-skill behaviour (Conley, 2007) and recognised as a form of self-regulated learning (Pintrich & De Groot, 2000) is regarded as an important component in any learning task. The students with high goal orientations scores will be able to plan their learning tasks, have self-evaluation skills which provides the drive to plan and monitor goals and provide feedback as to how the student is doing in relation to academic performance and goals (Bandura, 2006).

Why did goal orientation as study-skill behaviour explain only 1.7% of the variance in the regression model? Possible reasons from theory suggest that multiple factors interact with goal orientation and the reciprocal relationship with academic success could lead to changes in goal orientation and in subsequent academic behaviours and motivation while students are in the institutional environment. Pintrich (2000) argues that achievement goals are formed based on beliefs or perceptions about ability, competence, success and effort. Schunk (1991) adds that these perceptions are based on some form of self-evaluation that are themselves based on subjective standards (see Bandura, 2006), the type of goals that were set (performance or mastery), the importance or value of reaching the goal as well as the causal attributions of past achievements.

Students thus enter the university with certain beliefs that influence their goal orientation and based on their initial goal orientation they evaluate their performances. When the self-evaluations indicate that the goals are not reached, it decreases perceptions about ability, lowers motivation and leads to lower effort (Pintrich, 2000). Subsequent causal attributions about the influence of performance have an effect on success expectancy, behaviour, and affective reactions toward the task (most prominently anxiety) (Schunk,

1991). In summary, the environment has an important influence on goal orientation and academic achievement, regardless of initial goal orientations.

Furthermore, a curvilinear relationship could be present between goal orientation and academic success as is evident in the multiway frequency analysis. Multiple regression analysis assumes a linear relationship between variables and when this is not achieved it renders the variable insignificant. Goal orientation was not a significant predictor of African students' academic achievement (multiple regression analysis) and showed a curvilinear relationship (multiway frequency analysis) which supports this theory. White students, on the other hand, have significant positive relationships with academic success on both analyses.

An approach or avoidance goal orientation could be used to interpret the goal orientation factor. According to Bean and Eaton's model (as cited in Bean, 2005) an approach or avoidance behaviour is associated with academic achievement. Students who have avoidant behaviour are at risk for failure and withdrawal, compared to students who have an approach orientation (refer to Pintrich's 'work avoidant' goals). Achievement motivation orientation, which differentiates between mastery and performance, was not statistically significant in predicting risk for failure and this suggests that in this study it does not matter whether your goal is to master the subject or to reach a specific performance goal, but whether you approach or avoid the achievement goal that has been set.

Goal orientation is a significant predictor of academic achievement in the multiple regression analysis for the main effects as well as for the white students, but not for the African students. The multiway frequency analysis's hierarchical structure (interaction effects) between goal orientation and risk for failure indicated a low but significant relationship between race language and goal orientation (p = 0.045). Tree-analysis cannot differentiate between races and could not support or discard the results of the multiple regression or multiway frequency analysis. The findings of Rodgers and

Summers (2008) confirm that motivational constructs such as goal orientation are not the same for African-American students as it is for white students.

Overall, the multiway frequency analysis showed that students in the medium goal orientation category (students who are flexible in their planning, with sufficient effort and who are not completely methodical) are more successful academically. The students at risk for failure are the students with a goal avoidance orientation, thus with low effort, little planning and low structure dependence or methodicalness. The picture however differs from the overall effects when comparing the white and African students. Successful African students have a balanced goal orientation, are flexible in planning learning tasks, apply sufficient effort and are not completely methodical. African students with an avoidance goal orientation are also successful to an extent, and African students with an approach goal orientation have the lowest odds of success, thus at risk for failure.

Hierarchical effects of the multiway frequency analysis show that African students in the low goal orientation category increase the odds of the goal orientation scale with 33% (Factor of 1.6 x Factor of 0.83 = Odds of 1.33), and African students in the medium goal orientation category increase the odds of the goal orientation scale by a factor of 1.34 (Factor of 1.34 x Factor of 1.16 = Odds of 1.55). The African students in the medium goal orientation thus increase the overall odds of academic success by 55%. African students in the high goal orientation category actually decrease the odds of goal orientation by 50%. African students with a medium goal orientation score are least at risk for failure compared to the African students with a high goal orientation score who have a high risk for failure. Even though African students in the low goal orientation category have the highest factor change in goal orientation, the main effect for the low goal orientation category is the lowest.

The question now is: why are African students with an avoidance goal orientation more successful than African students with an approach goal orientation? This question is asked because the opposite trend is apparent in the main effects of goal orientation. African students with an approach goal orientation have the highest odds for failure and

it could be reasoned that the African students in this category believe that they have adequate study goals and usually put effort into their work, but this does not necessarily indicate success. Some students are regarded as 'actively failing students', which refers to students who work hard at their studies with good study habits but still fail, regardless of all their effort (Buskist & Howard, 2009). Other students are regarded as 'passively failing students', which refers to students who procrastinate studying and therefore fail (Buskist & Howard, 2010). Passively failing students do not have clear educational or career goals, were pressured to study a degree and were apathetic toward their work (Buskist & Howard, 2010).

Goal avoidance behaviour is associated with 'self-handicapping' and leads to less effort and lower academic performance (Urdan, Ryan, Anderman, & Gheen, 2002). According to Urdan et al. (2002), some students will purposefully conform to something known as 'self-handicapping', where they procrastinate preparing for a test or exam and use a lack of preparation time as an excuse for poor academic achievement. According to this research, self-handicapping is positively correlated with an external regulatory style and with performance goals and these relationships are stronger for African-American students compared to their white counterparts (Rodgers & Summers, 2008). Bandura (1986) states that people who procrastinate are unlikely to set short-term goals that regulate behaviour such as increasing effort, planning and self-evaluation.

Universities seem to bring out performance oriented learning environments and according to Kaplan and Maehr (as cited in Rodgers & Summers, 2008, p. 181) this environment 'emphasize[s] differences and encourage competition'. According to Steele and Anderson (as cited in Rodgers & Summers, 2008, p. 181), the accentuation of differences produced by the performance oriented environments are more salient and different for African-American students, compared to white students. According to the researchers, the African students take on what is known as a 'stereotype threat' which has a negative effect on academic achievement. According to Rodgers and Summers, students who identify with the stereotype are more likely to experience the negative effects associated with this phenomenon. In the absence of role models in African cultures, the stereotype will be kept alive in predominant white institutions.

Goal orientation was not a significant predictor of academic success for African students and one can reason that African students from less resourced schools are not taught to set goals for learning and it is possible that the concepts are not fully mastered by some African students (Van Heerden, 1997). These students are frequently from under-resourced and rural schools (Jones et al., 2008).

A further investigation into the interaction effects of the multiway frequency analysis indicates that the white students, consisting of the Afrikaans and English students, have a positive relationship with goal orientation. The Afrikaans and English students in the high goal orientation category increase the mean odds of the high goal orientation category by a factor of 1.41 and 1.53 respectively. The odds of the high goal orientation category is virtually one and the Afrikaans students thus increase the overall odds of success by 40% and English by 53%. The Afrikaans and English students that are at risk for failure are from the low goal orientation category. The Afrikaans students decrease the odds of goal orientation by 11% and English students decrease the odds by 30%. The results thus show a difference in prediction between the white and African students. The white student groups, Afrikaans and English, seem to have an approach goal orientation and are more successful academically than African students, with English students being the most successful. We also see that white students with an avoidance goal orientation are at risk for failure, and English students with an avoidance goal orientation are more at risk for failure than Afrikaans students.

The classification tree-analysis indicated goal orientation to be the best predictor among the factors of the readiness questionnaire. The critical raw score of the goal orientation scale is 35.5. Students who score less than 35.5 and who score greater than 49.5 on the integration and support factor are at risk for failure. Cross-tabulations indicate significant differences between race and the integration and support factor (Pearson Chi-square $p < 0.001$, $df(2)$). The cross-tabulations indicate that 80% of white students tend to cluster highly around scores of 48 and higher on the integration and support scale, while 86% of African students tend to cluster highly around scores of 52 and lower on the same scale. The trend on the goal orientation scale is that successful African students cluster

predominantly in the low goal orientation group with lower scores on the integration and support factor.

The classification tree together with the cross-tabulations indicate that of the students who are at risk – thus the students who have an avoidance goal orientation (score less than 35) – the African students are least at risk for failure and the white students are more at risk for failure. The differentiating factor seems to be the difference in the scores on integration and support for African and white students. The successful African students have a balanced or an avoidance goal orientation for their studies and have fewer family and financial support and are less sociable. The white students who are at risk for failure have an avoidance goal orientation and have higher integration and support scores. The white students at risk therefore avoid exerting effort into their studies, spend less time planning their studies and are less methodical in their behaviour, together with high family and financial support and high sociability scores.

The white students with an avoidance goal orientation experience more stress and are more dependent on external sources for support (external locus of control). The African students have less family and financial support compared to white students and African students do not expect to become socially involved within the university, which is necessary for social integration (Tinto, 1993). African students also receive less information regarding the university and the programmes that are available, yet the African students in the risk group are less at risk for failure. The African students thus show some signs of resilience regardless of their circumstances (Masten & Reed, 2002).

An item that emerged as a predictor of academic success that relates to the integration and support factor is item 52 of the readiness questionnaire: ‘If I run into problems at university, I have someone who would help me’. Students with scores equal to or lower than 4 on this item are less dependent on support from others and confirms the relationship that African students have lower support structures than white students, yet students in this category have a 70% prediction of success, compared to students with high scores (higher than 4) who have a 59% prediction of success. From the results we find that students in the risk category, thus an avoidance goal orientation and low

integration and support scores, are also successful, but the odds are lower and therefore the risk for failure is higher (refer to Appendix Table B.19.).

In summary, goal orientation emerged as the best predictor from the ARQ. The trend of prediction however differs among the racial groups, where white students with high scores are more successful and African students with average scores are more successful.

6.2.5. The Influence of Learning-efficacy

Learning-efficacy measured in this study consists of two main components, namely internal locus of control and academic self-efficacy. According to Bandura (1986) there is a strong relationship between locus of control and self-efficacy, but they are regarded as independent constructs even though they have been clustered together on a factor analysis. Students with high scores on the learning-efficacy scale think they have the academic skills to be successful at university and have an internal locus of control. Zimmerman (2000) states that self-efficacy indicates if a person expects to be able to do the task and does not indicate how well a person will do on the task.

Learning-efficacy has a significant relationship with academic success, as indicated with the multiple regression analysis for the student sample model as well as for the white students, but not for the African students. A discrepancy in the direction of the relationship exists for the student sample model as well as for the white students, because the beta weight indicated a negative relationship and the zero-order correlations indicated a positive relationship. The African students' output shows consistency in that both the beta weights and zero-order correlations are positive, but the relationship is not significant.

The multiple regression analysis indicated a very poor positive relationship with academic success and learning-efficacy (and then only in the case of white students). Learning-efficacy contributed less than 1% of the variance in the model and had a zero-order correlation ranging between 0.069 and 0.071. The poor predictability of learning-

efficacy could indicate that some students enter the university with high efficacy expectations, not knowing what is expected of them and then perform poorly. Bandura (1986) reasons that people who do not have accurate efficacy judgements will not completely know which skill-set to use in order to attain their goals (see Ochse, 2003).

Furthermore, the learning environment at university does not always provide clear guidelines on what is expected from students and contributes to inaccurate efficacy expectations. When there is limited information to feed back into efficacy judgements, it leads to reductions in effort to continue with a learning task (Bandura, 1986). Some students could have high learning-efficacy expectations when entering the university, but due to ill-defined learning expectations and poor academic marks at the beginning of the semester, students lower their efficacy expectations which could lead to further poor performance (see Henson, 1976). Bandura states that the lapse in time between assessments of self-efficacy and the behaviour influences the accurate prediction of the behaviour (1986). The reason for this is that people re-evaluate their efficacy judgements over time in order to develop skill and ability to pursue tasks under various circumstances and at different levels of difficulty.

An assumption that can be made based on Bandura's seminal research is that white students with high learning-efficacy scores make clear efficacy judgements based on the factors mentioned by Bandura, even though these factors are not measured by the questionnaire directly (1986). The factors relate to differences in time, level of the performance, generality of the task, strength of the beliefs, clarity of the circumstances, clarity of goals and self-awareness. Good efficacy judgements do not guarantee academic success because continuous failures, especially failures early in a student's first academic year, will lower perceived efficacy judgements. The students with high self-efficacy judgements are, however, more likely to look at other reasons for failure (internal locus of control) than ability, such as insufficient effort or poor learning strategies.

A classification tree-analysis showed that learning-efficacy is an important predictor of academic success among the factors of the readiness questionnaire. The relationship in the tree-analysis is positive, indicating that students with a learning-efficacy score greater than 53.5 and a goal orientation score greater than 35.5 are more successful academically than students with the same goal orientation score, but who have learning-efficacy scores equal to or less than 53.5. According to Pintrich (as cited in Rodgers & Summers, 2008) self-efficacy is always related to some goal in mind. The students with low learning-efficacy under-estimate their abilities and consequently do not set effective goals. Students with high self-efficacy levels will increase their effort and work more persistently to reach their goals (Bean & Eaton, 2000). Students with high self-efficacy levels who usually have an internal locus of control are more likely to pursue academic activities because they believe that they will have a positive influence on their environment (Bean, 2005).

Tree-analysis of the items from the readiness questionnaire indicates that items 13, 23 and 24 are important in predicting academic success. These items all relate to learning-efficacy. The most important, item 13, relates to students' expectations to be academically successful. The item that predicted academic success the best was item 13: 'I expect to have a harder time to perform academically than most students here*'.* Students with a low score on the item did not expect to have a harder time to perform academically (high learning-efficacy), and actually performed better than those students who expected to have a hard time to perform academically (low learning-efficacy). Furthermore, item 23 relates to students' beliefs about their skills. Students who believe to have the necessary skills to be successful at university, together with an optimistic view of being academically successful have higher academic success than the students who do not believe they have the necessary skills to be successful. Student who doubt their abilities exert less effort toward their studies and attribute poor academic achievement to luck (Weiner, 1972).

Students who enjoying complex and intellectually demanding tasks (item 24), are more successful academically. Students who score above 3, together with higher beliefs in their academic skills and have high learning-efficacy, are more successful academically. There were no significant differences between race and items 23 or 24. This shows that African and white students have equal perceptions of their academic skills and both

enjoy working on complex problems. This result is contrary to the finding that African-American students tend to devalue academic achievement because they perceive themselves to not have the ability to excel, thus using a protective mechanism to keep their self-efficacy judgements intact (Rodgers & Summers, 2008). 'Selective devaluing' usually occurs in cultural groups who accept biases in academic achievement by devaluing its importance.

There were no significant differences on a Chi-square analysis between race and the learning-efficacy scale as a whole, but there was a significant difference present between race and item 13 of the Academic Readiness Questionnaire ($p < 0.001$, $df = 4$). The cross-tabulations indicate that African students clustered in the lower scores (low learning-efficacy), thus having a lower prediction of success and white students tended to cluster in the higher scores (high learning-efficacy), thus expecting to be successful. African students thus expect to have a harder time to perform academically, compared to white students.

Racial differentiation on self-efficacy judgements by Rodgers and Summers (2008) indicates that African-American students who attend Historically White Institutions have lower levels of perceived efficacy judgements than students who are enrolled at Historically African Institutions. The research results of this study confirms the research done by Rodgers and Summers that African students from the sample have lower learning-efficacy scores than white students from a Historically White Institution. The reason for this, according to Rodgers and Summers, is possibly due to the efficacy expectations, especially vicarious experiences and social persuasion as proposed by Bandura (1983). Research by van Laar (as cited in Rodgers & Summers, 2008, p. 180) indicates that African students make more external attributions for failure, thus having lower expectations for success which leads to lower academic achievement (see Eccles et al. as cited in Rodgers & Summers, 2008, p. 180).

The results indicate that students who believe they have an approach goal orientation by planning their studies and exerting the necessary effort and who believe they have the ability to reach their academic goals are more likely to be successful academically than students who have an approach goal orientation but with lower efficacy expectations. The differences between the races relate to the 'expected difficulty' of being successful

academically. In our findings the African students with medium and low learning-efficacy scores have higher academic achievement than African students with high learning-efficacy scores. This could be related to the fact that African students in the sample register for fewer credits and are therefore able to be more successful academically. It is possible that the effect of the African students' prediction probability on the model influenced the direction of the relationship with academic success as well as the shape (non-linear). White students with high learning-efficacy scores have clear efficacy judgements and have an internal locus of control which is positively associated with academic success.

6.2.6. The Influence of Gender

Gender produced significant results on a multiple regression analysis for the overall model and for white students, but not for African students.

The results from the regression analysis indicate that female students are significantly more at risk for failure than male students. There is some inconsistency between the beta weight (0.081) and the zero-order correlation (-0.053) for white students and the student sample model. The beta weight indicates that male students have more academic success, while the zero-order correlations indicate that female students are more likely to be successful academically. Cross-tabulations from the multiway frequency analysis and the multiway frequency analysis itself indicated that gender had a non-significant relationship with academic achievement.

The inconsistency in the direction of the relationship between gender and academic achievement together with the non-significant results of the cross-tabulations and the multiway frequency analyses makes gender a questionable predictor variable. The results by South African researchers also indicate the inconsistencies experienced by adding gender as a predictor of academic success (Du Plessis, Müller, & Prinsloo, 2005).

6.2.7. The Influence of Distance of High School

The distance of the high school that students attended was categorised by the province where students attended high school. The multiway frequency analysis differentiated between schools that are in Pretoria, the Gauteng province and 'other' provinces. The three groups where collapsed into two groups consisting of Gauteng province (Pretoria and Gauteng combined) and 'other' provinces for the multiple regression analysis. The multiway frequency analysis produced a non-linear relationship between the geographic locality of the school and risk or failure. The trend is that students from schools that are in other provinces, geographically the furthest, have greater odds for failure than any of the other groups (odds of 0.21). These relationships were not significant; however the trend is noteworthy.

The multiple regression analysis showed significant results for the student sample model, but not for the white or African students. The relationship pointed to a low negative relationship, indicating that students from Gauteng province are more successful academically than the students from other provinces (p = 0.045). The emotional separation that students from other provinces have to make is understandably greater than for students who are closer to their familiar environment and could have contributed to feelings of incongruence and isolation (Bean, 2005; Tinto, 1993) which affect academic achievement and in some instances lead to withdrawal (Jones et al. 2008). Even though this variable shows significant results, its contribution to the model is very low.

6.2.8. The Influence of Parental Education at the University of Pretoria

Parental education at the University of Pretoria produced significant relationships for the white and African students' multiple regression analysis, but not for the student sample model. Parental education at the University of Pretoria produced significant results, however its contribution is very low. The direction of the relationships between African and white students also differed. This variable does not specify true first-generation status, but whether a student's parent(s) studied at the University of Pretoria.

The relationship between parental education and academic success for white students is negative (beta weight: -0.060; zero-order correlation: -0.034). White students' parent(s) who did not study at the University of Pretoria or whose parents have no university degree, are marginally more successful than the white students whose parents studied at the University of Pretoria. The practical difference from the beta weight and correlation is so low that no difference really exists within the group.

White students are traditionally from form Model-C or 'privileged' schools. Kuh et al. (2007) argue that students from privileged high schools are usually well prepared for higher education, which has a confounding effect on being a first-generation student. First-generation students are thus able to be just as successful academically as second-generation students if they are well prepared academically.

The opposite is relevant for the African students. The African students whose parent(s) studied at the University of Pretoria are marginally more successful that the African students whose parent(s) did not study at the University of Pretoria or who have no university degree (beta weight: 0.175; zero-order correlations: 0.093). It seems that in the case of African students the parents' familiarity with the university environment contributes to the students' academic achievement. These parents are able to provide additional motivational support to students (Jones et al., 2008; Johnston, 2000).

6.2.9. The Influence of Reading Behaviour

Reading behaviour produced a significant relationship with academic success in a multiway frequency analyses and a multiple regression analysis ($p < 0.10$). Reading behaviour included in the multiway frequency analysis pointed to a negative linear relationship. Students in the low reading category have greater odds of passing than students in the average and high reading categories (odds of 0.43, 0.28 and 0.22 respectively).

The multiple regression analysis only showed significant results for the African students (p = 0.081), but not for the white students or the model overall. Students who read less are more likely to be academically successful (beta weight: -0.150; zero-order correlation: -0.138). Neither reading comprehension, nor reading ability is assessed by this item, as it rather focuses on the reading behaviour of the students in the sample. The assumption that students who have a reading 'culture' and enjoy leisure reading would be more successful, is therefore questioned.

It could be hypothesised that students who spend too much time reading non-academic material could limit the time being engaged with their academic work. Reading ability and comprehension are regarded as more important in predicting academic compared to mere reading behaviour or language use (first or second) (Du Plessis et al., 2005).

6.3. PREDICTING RISK FOR WITHDRAWAL

Research points to a relationship between high school academic achievement and risk for withdrawal and between academic success and withdrawal, but this research is not always clear cut (Bean, 2005; Tinto, 1993). Both Tinto (1993) and Bean (2005) make a distinction between the association between ability in the form of prior school performance and voluntary and involuntary withdrawal. According to Tinto, students that are involuntary discontinued are usually of lower ability, thus having lower academic achievement at school. Students who withdraw voluntarily do not necessarily have poor school performance. Bean (2005) states that even students with high academic performance in high school might withdraw from an institution and therefore retention is based on more factors than only academic ability alone.

Cohort research shows that about 30% of undergraduate students nationally withdrew from their studies by the end of their first academic year in 2008 (Scott, 2009). From the findings it seems that the first-year experience plays an important role in the persistence behaviour of students. It is especially in the first academic year that the majority of

students withdraw from their studies and for various reasons (Braxton et al., 2004; Du Plessis, Lemmens & Boardman, 2006; Jones et al., 2008; Scott et al., 2007; Seidman, 2005; Tinto, 1993). At the University of Pretoria the withdrawal rate of the first-year entering student population typically measured up to the end of year exams is 8.6% (BIRAP, 2008).

The withdrawal rate excludes institutional withdrawal due absenteeism from exams, exclusions from exams due to poor academic performance and students who fail the supplementary examinations. The attrition rate of the 2000 student cohort at the institution being studied indicated that the first-year attrition rate in relation to the total attrition rate over five years was estimated at 29%. This indicates that first-year withdrawals up to registration for the second year make up a sizeable portion of all institutional withdrawals.

As shown in a logistic regression analysis (Table 5.23.), only three of the independent variables made a unique statistical significant contribution to the model, namely (in order of Wald effect size statistic): M-score (36.8), race (14.5), and credits registered (5.4).

6.3.1. The Influence of Racial Background and Language

According to the multiway frequency analysis model, African students are more likely to persist to the second year (3.8 times the model average). African students are thus more likely to persist (57 times), followed by Afrikaans students (7.4 times) and English students (7.9 times). In race language, both Afrikaans and English students, all else being equal, are at risk for withdrawal. The odds of African students to be at risk for withdrawal is decreased by 90%, indicating that only one in 10 African students are at risk for failure.

From the cross-tabulations of the multiway frequency analysis, only four African students withdrew from their studies, while 70 white students withdrew from their studies. A binary logistic regression analysis also confirmed that the odds based on the first-year withdrawal rates are in favour of African students completing their degrees. One would reason that the results indicate a change in the trends seen from the national attrition rates in professional Bachelor degrees in Business/Management (33% of African students and 83% of white students graduate after five years) (Scott et al., 2007; Scott, 2009).

Institutional withdrawal rates indicate that African students have a lower overall percentage of withdrawals when compared to white students (6% and 10% respectively). Referring to Rodgers and Summers' (2008) hypothesis that African-American students have to develop a 'double consciousness' in order to persist at a Historically White Institution (HWI) could indicate that African students from the sample have developed an ability to function in the predominantly Afrikaans traditions of the university while staying rooted to their ethnic identity. According to research in Sedlacek (2004), African-American students who understand racism and are prepared to address it have higher academic achievement and are more able to adjust to an HWI than those who do not. Sedlacek (2004) indicated that the understanding of racism as one factor together with the other psychological factors are better predictors of retention and academic success for African-American students than for white students (see Tracey & Sedlacek, 1989, p. 638).

The persistence behaviour of African students could also relate to the role of the family in deciding which programme the student should enrol for (Van Heerden, 1997). The student is required to remain in the programme to conform to group dynamics. Tinto shows that 'external communities' influence persistence through the type and amount of support that they give (Tinto, 1993). Authors like Jones et al. (2008) and Johnston (2000) show that first-generation students, by implication African students, are more likely to persist because of high levels of motivation and persistence. The external communities however to do not always understand the way they should support the

student, especially when experiencing difficulties, which could influence the persistence behaviour of these students in the long run.

A possible reason that is noted with caution relates to the relationship between M-score and race, and the relationship between withdrawal and academic success in the first year. Firstly, the partial effect of M-score on the academic achievement of race language indicates that African students have higher odds of academic achievement, all else being equal. Another factor, namely credits registered, also come into play. African students tend to lower their credit load to be able to stay enrolled in the programme, hence fewer African students withdraw from their studies. Institutional findings indicate that African students are able to persist during the first year, but have lower throughput rates up and until the fifth year, compared to white students (BIRAP, 2010). This trend is evident for six cohorts, starting from 2003 until 2008. The institutional throughput rates therefore correspond to the national trends (Scott et al., 2007; Scott, 2009). African students from the 2008 cohort are therefore only persisting during their first year whereafter they have higher withdrawal rates than white students (refer to Appendix Table B. 16.).

The findings suggest that white students too easily decide to withdraw voluntarily from their programme in the first-year. African students tend to persist during the first-year whereafter they progressively start to withdraw during and beyond the second-year. Research in Furr and Elling (2002) show a similar trend where fewer African-American students withdraw in the first semester compared to white students, whereafter the rates change in the favour of white students. Furr and Elling (2002) reason that the institutional environment, a construct not measured in this study, could lead to African-American students feeling isolated because of the quality of their interactions in a HWI.

6.3.2. The Influence of High School Achievement

A multiway frequency analysis showed that students in the high M-score category are likely to persist to the second year (estimated odds of 36.7 to persist). Students in the average M-score category are almost at the baseline or average of the group. Students in the low M-score group, all else being equal, are highly at risk for withdrawal.

A logistic regression indicated that M-score is the best predictor of withdrawal among all the other variables in the model. The results indicate that a low M-score is highly predictive of risk for withdrawal. Research indicates that high school academic achievement has mixed results as a predictor of withdrawal behaviour (Astin, 1975, p. 30; Nora, Barlow, & Crisp, 2005, p. 134). Some research in Nora et al. (2005) and in Astin (1975) shows that high school achievement does not have much influence on withdrawal behaviour, while other research shows that overall grade point average (GPA) is predictive of student withdrawal (Astin, 1975, p. 98; Nora et al., 2005, 134). Based on the results, high school academic achievement, as measured with an M-score, is a good predictor of persistence in the first academic year of Economic and Management Sciences students. The relationship is negatively correlated, where lower academic achieving students are more at risk for withdrawal.

Generally speaking, students who are academically and socially under-prepared for the challenges of the university are usually unable to make the transition to university and withdraw from their studies, irrespective of ability. These students are more frequently from under-resourced schools where students are frequently taught to use superficial learning strategies (Astin, 1975; Jones et al., 2008). According to Jones et al. (2008), the quality of the high school is highly related to the academic preparedness of students.

6.3.3. The Influence of Credits Registered

A multiway frequency analysis indicated that students who register for more credits and who register for less credits than prescribed are at risk for withdrawal, all else being

equal. Students who register for fewer credits than is prescribed are most at risk for withdrawal. Students who registered for exactly the prescribed number of credits are three times more likely to persist to the second year than any other student. Cross-tabulations from the multiway frequency analysis between the variables indicate a similar trend.

A binary logistic regression analysis indicated that there was not much difference between the three credits registered groups and risk for withdrawal (for each unit increase in the number of credits registered, the odds of withdrawal are decreased by 1%).

There is consistency among the outcomes of the three types of analyses. The students with fewer credits are usually more at risk for withdrawal than the students who register for more credits than was prescribed. Students who are more realistic in choosing their credit load are therefore less at risk for withdrawal. The correlation between the variables suggests a curvilinear relationship which indicates an optimal number of credits to be registered for, with students at either side of the curve being at risk for withdrawal. Racial differences cannot be determined, because only four African students withdrew from their studies during the first academic year.

6.3.4. The Influence of Reading Behaviour

Students who have average leisure reading behaviours are most at risk for withdrawal. Students who have poor leisure reading behaviours are actually more likely to persist to the second year than any of the students in the low or high M-score categories. The findings suggest that students who do not like to read for pleasure are more likely to persist.

Astin and Oseguera (2005, p. 259) also found negative predictive betas for 'reading for pleasure' and graduating in four and six years (-0.03 and -0.04 respectively). It might be that reading for pleasure limits involvement in academic work because reading for pleasure actually becomes a distracter of learning, or a legitimised form of procrastination. Successful and persisting students actually avoid reading too many books that are not prescribed, or reading for pleasure, and focus more on reading what is prescribed by the lecturer.

6.4. EXIT INTERVIEWS

No other variables could show significant prediction of withdrawal behaviour in its broadest form (voluntary withdrawal, probation and institutional exclusions). The tree-analysis showed very low predictions and even the variables that were able to predict risk for withdrawal were highly influenced by the low number of African students who withdrew from their studies, compared to the white students. It was therefore decided to conduct telephonic interviews with the students who withdrew voluntarily from their studies to determine their reasons for withdrawal.

The results of this study show that it is not completely possible to isolate singular reasons for withdrawal and that clusters of reasons fall into a number of broader orientations (Willging & Johnson, 2004). Even though the different orientations are regarded as theory driven by different authors, the reality is that these orientations are inherently interwoven with each other. Not all students will experience the same set of primary and secondary reasons for withdrawal. Irrespective of the set of reasons, there usually is an interactive effect between the reasons that eventually lead to withdrawal. The orientations used broadly refer to perspectives of reasons for withdrawal.

The aim of the exit interviews was to investigate the reasons why first-year students withdraw from their studies as well as establishing trends among student withdrawal. Various reasons for student withdrawal were identified and explored in order to gain a

more comprehensive understanding of the reasons for first-year student withdrawal. Ten different broad categories of reasons as registered on the cancellation letter for first-year student withdrawal were used. These reasons include academic reasons, career/study choice, family responsibility, work responsibility, health reasons, financial reasons, dismissal, personal reasons, institutional reasons and faculty discontinuation. During the study it was found that the primary reason students withdraw from their studies are because of incorrect career/study choices.

6.4.1. Scope of Withdrawal

The following orientations were identified from the literature as a way to cluster the reasons that are associated with student withdrawal, namely a psychological orientation, sociological orientation, academic orientation, organisational influences and external environment.

6.4.1.1. Psychological orientation

Psychological orientation refers to the individual characteristics that could have a direct impact on a student's decision to withdraw. Students enter the institution with various abilities, values and traits (Braxton et al., 2004).

Students with clear occupational goals are seen as having strong goals (intentions) and/or commitments (motivations) which usually lead students to persist until degree completion (Bean, 2005; Tinto, 1993). From the exit interviews it is evident that the majority of students withdraw from their studies due to incorrect study choices. These students, for instance, choose the wrong career or programme or have uncertain career goals. The influence of the wrong career/programme choice is a lack of motivation that influenced these students to be uncommitted to the attainment of their initial goals which consequently resulted in poor academic achievement. Persons lacking the motivation, regardless of great goals, will be unable to commit themselves to the attainment of initial goals (Tinto, 1993).

Tinto (1993, p. 54) postulates that a sense of incongruence is experienced when students make poor or uninformed decisions regarding the university or the programme they enrol for, compared to their actual career needs and interests. Making poor programme choices or not being able to study a programme of first choice could contribute to a feeling of incongruence. According to Tinto, choosing a university leads to a set of 'expectations' and the nature of these expectations informs the final decision of the student (Tinto, 1993). Students usually self-evaluate their pre-entry expectation with early experiences within the institution's social and academic systems. The closer the match between perceived expectations and actual experiences, the more likely students will feel a sense of belonging.

The wrong career/programme choice is also regarded as a salient secondary reason that contributes to any of the primary reasons that influence a student's withdrawal behaviour. The assumption here is that students become unsure and doubt their study choice when they start experiencing a problem at university. Secondary reasons usually also contribute to decisions to withdraw and students have to weigh the extent of the problem with the future hope of attaining the goal of graduating and the likelihood of working in the chosen field (Tinto, 1993). Having a number of contributing challenges, in this instance, outweighs any hope of attaining future occupational goals.

A large number of students who provided study choice as reason for withdrawal changed their course during the study year. These students are thus not true withdrawals and should be regarded as course changers. Study choice and academic reasons were the main reasons for students for changing their study course.

It seemed that most students who changed their study course due to 'study choice' either:

(i) did not get accepted for their first choice and planned on changing their course to their first choice later in the year, or

(ii) identified the study course they really want to follow and decided to change.

It seemed that most students who changed their study course due to 'academic reasons' changed because they either:

(i) could not cope with the demands and workload of their course, or
(ii) struggled with the subject matter of the course and changed to a less demanding study course.

Changing courses is common among university students. Various intrinsic and extrinsic factors have been identified in course change among university students. Extrinsic factors include supportive, but not meaningful directive parents, a lack of familial guidance, and a lack of knowledge regarding the chosen career. Intrinsic factors include students finding it difficult to make long-term decisions, the course does not fit their personal interests and they have a desire for one that does, as well as satisfaction with majors that met those requirements (Firmin & MacKillop, 2008, p. 5).

Students who are also not able to study in their first choice of study, for whatever reason, will feel discouraged, feel less loyal and believe their education is of less practical value (Bean 2005, p. 229). Braxton et al. agree that psychological influences such as levels of motivation and self-efficacy are highly related to risk for withdrawal in commuter institutions (2004). Some students are able to make changes to their situation when there is a mismatch, and change courses or decide to transfer to another institution (Tinto, 1993, p. 54). Some students go ahead to study their second choice, but withdraw because there is a mismatch between the programme and their interest (Du Plessis et al., 2006; Johnston, 2000; Jones et al., 2008).

The most notable reason why students do not make informed choices is because information about the social and academic system of the university that is most important for integration is usually not available in the brochures (Jones et al., 2008). As determined earlier, it is the social and academic systems of the university that affect

withdrawal behaviour. The difficulty is that these systems are best known by personal experience and peer communication. The formal attributes of the university: size, academic staff, and students are important sources of information on the character of the institution, but institutions do not provide substantial information of what is to be expected of the informal campus climate (Tinto, 1993, p. 55). Disadvantaged students furthermore have less access to career guidance and limited financial resources to change course once they have enrolled (also see Du Plessis et al., 2006; Jones et al., 2008).

There were a number of students who indicated that the programme was not challenging and according to Bean and Eaton (2000, p. 57) such students will revert to avoidance behaviour such as not going to class, not studying or doing poorly academically. These and other reasons were indicated by students during the interviews as the effect of the problem on their studies which eventually led to the students withdrawing from their studies.

6.4.1.2. Sociological orientation

A number of students indicated as their secondary reasons that they felt isolated because of the distance from their families and in some instances some students could not adapt to the campus environment. Some students also experience residential issues which contributed to their decision to withdraw. According to Tinto (1993), the social and academic systems, both formal and informal, are interwoven with each other and events in one may directly or indirectly influence events in the other over time. It is possible that a student who is sufficiently incorporated in the academic system but not in the social system can still decide to withdraw. Institutions, however, do not perceive social integration as a minimum standard for compulsory withdrawal, but does so with academic integration. Therefore, even though it is important for students to be socially involved in different informal or formal social communities, it is more important to be involved academically (Tinto, 1993).

A few students indicated external pressures to study for a degree as a secondary reason. According to Johnston (2000), parents should not pressure students into taking unsuitable programmes, thus forcing their choice of a programme on to the student. Students who are free to choose the 'university of choice' and their programme, without parental enforcement, are more likely to persist, according to Johnston (2000).

6.4.1.3. Academic orientation

The results showed that a number of students indicated insufficient interaction between lecturer(s) and the students and in exceptional instances perceived discrimination or racism against students from the lecturer(s)' side. According to Bean (1980, 2005) the lack of substantial interaction decreases the subsequent commitment to the institution and influences students' decisions to withdraw. When academic staff is not supportive, the institution is perceived to be unsupportive and this leads to withdrawal behaviour as seen in this sample and in the literature (Bean, 2005).

A number of students were discontinued by the faculty and indicated as secondary reason, an inability to adapt to the campus environment, or they experienced insufficient interaction with the academic staff. Braxton and Lien (2000, p. 25) associate these reasons as having a lack of 'normative integration' that leads to intellectual isolation. Braxton and Lien (2000, p. 25) argue that students who were not able to find their programme interesting had a feeling of 'intellectual isolation'. Intellectual isolation may occur when students have limited choices of courses to choose from or when a programme is not challenging enough for the student. Braxton and Lien (2000) explain that feelings of isolation could influence feelings of institutional fit and commitment. According to Bean (1980, 2005), feelings of fit influence decisions to withdraw from the institution directly.

Intellectual isolation occurs when students do not find their programme as interesting or intellectually stimulating. Both a lack of integration and isolation are seen as factors that could lead to voluntary withdrawal and poor academic performance (Bean, 1980;

Braxton & Lien, 2000, p. 25). When students are also not permitted to study their first choice, these students are more likely to withdraw and go to another institution (Tinto, 1993).

Students who reported personal reasons for withdrawing from their studies either experienced (i) transportation and accommodation problems, (ii) struggled to fit into the campus community and experienced a feeling of isolation because of the distance from their parents. Students who experienced transportation and accommodation problems usually reported financial reasons as the main reason for withdrawing from their studies.

Students who struggled to fit into the campus community were also likely to report that they come from a small town, struggle to adapt to both the academic and social environment, and experience a feeling of isolation because of the distance of their parents. When the academic and social systems of the institution are weak, the additional external demands placed on the student can lead to increased decisions of withdrawal. Consequently, the students that experienced intellectual isolation were not able to meet the expectations of the institution academically and this led to institutional discontinuation (Tinto, 1993).

6.4.1.4. Organisational influences

Some students also experienced institutional reasons for withdrawing from their studies. The problems which were identified were transportation issues to and from campus, as well as between campuses; poor facilities such as the library, food facilities, lacking air-conditioning in classes; students felt that their safety was threatened; students had problems with lecturers, including being unprepared for class, unavailability and inapproachability, poor language and teaching skills and 'racism' towards some students. When the institution is committed to the students' welfare by showing respect toward students and having concern for the growth and development of students, these students will be more committed to the institution and will have stronger intentions of persisting (Braxton & Hirschy, 2005). Students in general should feel a sense of belongingness and integration, even more so is that minority students are more

dependent on a supportive institutional environment to become socially and academically oriented (Rodgers & Summers, 2008).

6.4.1.5. External environment

The factors represented here are family and peer support, work and family obligations and community influences (Braxton et al., 2004). The external environment can have a positive or negative influence and plays an important role in decisions to enrol for a degree programme (Braxton et al., 2004). Bean indicated that parental support is an important factor that influences persistence rates (also see Moxley, Najor-Durack & Dumbrigue, 2001). More specifically, a parent's educational level provides the impetus for students to persist at their studies (Bean, 2005, p. 228). Accordingly, parental education gives a student an advantage in their interaction with the institution and adjustment to the institution.

Some students also experienced personal problems after the onset of a family crisis, such as experiencing feelings of isolation from their parents because of an illness in the family or marital challenges. Students who perceive that their participation at university create hardship for their families are less likely to continue (Braxton & Hirschy, 2005). Support or discouragement from friends, community and family members also serves as external influences that affect students.

6.4.1.6. Economic influence

In South Africa a large part of the population is dependent on public funding in order to complete a degree (Jones et al., 2008). This means that a large group of students with less financial resources are at risk for not fitting in and consequently withdrawing from their studies. Some authors point to a direct link between the ability to pay for studies and retention because money directly affects a student's ability to pay for studies (Braxton et al., 2004; Tinto, 1993). These students may experience a combination of financial issues, work responsibilities, and family responsibilities, which in turn have a negative influence on academic performance. These students either have to withdraw due to the inability to afford university, their obligation to work and to support their family

or discontinuation from the faculty due to poor academic performance. According to Jones et al. (2008) students cannot be fully engaged academically or socially when they are barely able to sustain their physical needs. Scott et al. (2007) indicate that financial reasons are significant factors but that there is little systematic knowledge as to the underlying reasons for withdrawal, both exclusions and voluntary.

Many authors mentioned in this thesis points to the direct relationship between finances and withdrawal (Bean, 2005; Du Plessis et al., 2006; Schuh, 2005, St. John et al., 2004; Tinto, 1993). According to Seidman (2005) some students will mention financial problems as reasons for withdrawal even though there might be another reason, in other words personal reasons (see Bean, 2005, p. 234). The essence of financial reasons for withdrawal, according to Tinto, is 'merely an end product of decisions regarding withdrawal. It reflects the weighing of benefits as well as costs and as such mirrors the nature of the student's academic and social experiences on campus' (Tinto, 1993, p. 67). According to Astin and Oseguera (2005), students who have financial support during their studies are more likely to complete their studies. Thus students from disadvantaged backgrounds could be assisted to enter the university and persist to degree completion with financial assistance if the total costs of the financial pressures are covered (Nora et al., 2005, p. 141).

6.5. STANDARDISATION OF THE ACADEMIC READINESS QUESTIONNAIRE

The purpose of the Academic Readiness Questionnaire is to function as a screening tool for students prone to risk for failure and withdrawal. For a questionnaire to screen for risk, the instrument has to be reliable, valid and be free of bias.

6.5.1. Reliability

A scale is regarded as reliable when the identified constructs are measured consistently (Durrheim, 1999a; Field, 2005). Two types of reliability statistics were used for the Academic Readiness Questionnaire (ARQ). The first is the Cronbach's coefficient alpha and the second is the Spearman-Brown split-half reliability coefficient. A value of 0.70 is regarded as satisfactory for social research, according to Field (2005). Two caveats from Field (2005) should be mentioned here; the first is that a larger number of items in a scale could increase the alpha value, and secondly that an alpha value can be achieved with various number of factors. This indicates that an alpha value should not be used as a measure of 'unidimensionality'. It is recommended to have an alpha value for each factor separately.

The overall Cronbach's alpha for the ARQ is 0.87 which is 0.17 higher than the recommended 0.70 for social sciences. The final ARQ consists of 59 items. According to Field (2005, p. 668) the number of items could increase the Cronbach's alpha value. Unidimensionality was not assumed for the ARQ and therefore the five factors identified were subjected to separate reliability analysis. Four of the five third-order factors produces Cronbach's alpha values above 0.70, except for f4 (integration and support) with a Cronbach's alpha value of 0.63. The second-order factors had Cronbach's alpha values of 0.87 and 0.61. The loss in reliability, according to the drop in alpha value for Fb, is ascribed to the fact that the scale measures diverse themes of integration and support, which explains the relative lack of consistency within the factor. It was decided to conduct Spearman Brown formula and the Guttman split-half coefficient to confirm the reliability statistics of the Cronbach's alpha.

The coefficients from the Spearman Brown formula and the Guttman split-half coefficient are 0.778 and 0.774 respectively, which indicate good reliability of the full scale. According to Gregory (2000, p. 85), a coefficient of 0.70 on the Spearman Brown formula is equivalent to an estimated full-test reliability of 0.82. The Cronbach's alpha for the two scales was 0.64, which is lower than the Cronbach's alpha from the overall scale. The Cronbach's alpha represented here is the mean of all possible split-half

coefficients (Gregory, 2000, p. 85). The Cronbach's alpha of 0.63 is below the recommended 0.70 which confirms the low inter-item correlations of the ARQ and that the items do not relate well with one another in the full scale. Factor Fb, consisting of integration and support and reading behaviour had very low inter-item correlations (0.08) that could influence the values of the Cronbach's alpha here. The Spearman Brown formula is however reassuring in terms of the overall internal consistency of the scale.

The inter-item correlations should be examined by viewing the mean correlations for the items of the scale (Field, 2005). The average inter-item correlations for the ARQ was 0.114, indicating that the items of the scale did not relate that well with each other. The mean inter-item correlations for the five third-order factors ranged from 0.119 to 0.322, indicating that the items did not seem to relate well with each other for all the factors. The numbers of items in the third-order factors are much less than in the full scale and these factors produced average inter-item correlations.

Each of the five scales, as well as the full ARQ scale, was subjected to reliability analysis to investigate each individual item's 'Cronbach's alpha if deleted'. Any item that has a substantially greater Cronbach's alpha value than the overall Cronbach's alpha value for the scale was deleted, thus contributing to the increased reliability of the scales. The 'corrected item-total correlation' indicate the correlations between each item and the total score. Depending on the size of the sample, item-total correlations should ideally be above 0.30 (Field 2005). The five scales of the ARQ had item-total correlations between 0.2 and 0.3, which is adequate if one has a large sample, such as is the case here. The integration and support scale had item-total correlations below 0.2, effectively rendering the particular scale unreliable.

6.5.2. Validity

Validity refers to the extent to which the conclusions made from a test are appropriate, meaningful and useful (Gregory, 2000, p. 96). Four types of validity have been achieved to some extent with this research.

6.5.2.1. Face validity

Face validity is achieved when a test or questionnaire seems valid to test users and other stakeholders. Face validity is, however, not achieved through scientific methods, but is nevertheless important to achieve social acceptability (Gregory, 2000). For the purposes of this study, the ARQ has good face validity because the questionnaires that were used are well recognised and the literature review confirmed the use of the specific non-cognitive variables. The design and layout of the ARQ also contributed to face validity.

6.5.2.2. Content validity

The second type of validity, content validity, is achieved when the items on a questionnaire are representative of the total spread of traits, abilities or preferences that are supposed to be measured by the test. During the development phase of the questionnaire, an extended literature search was conducted to investigate the factors associated with failure and withdrawal. Numerous questionnaires and test items were investigated to identify relevant constructs and items for the ARQ. Experts in the field, as suggested by Gregory (2000), were considered for their expert opinion on the items and the item constructs to measure academic readiness from a non-cognitive perspective. The ARQ therefore has adequate content validity because the processes that were followed correspond to the requirements of content validity.

6.5.2.3. Predictive validity

The third type of validity, predictive validity is a type of criterion-related validity. 'Criterion related validity is demonstrated when a test is shown to be effective in estimating an examinee's performance on some outcome measure' (Gregory, 2000, p. 99). According to Gregory, predictive validity is measured with regression type equations. Various

regression type analyses were performed to determine the predictive validity of the ARQ, such as multiple regression analysis and logistic regression analysis. These techniques were used to predict the two criterion outcomes, namely risk for failure and risk for withdrawal. The above discussion on the prediction of risk indicated that goal orientation and learning-efficacy of the ARQ are predictors of risk for failure, but none of the ARQ factors were able to predict risk for withdrawal on a logistic regression analysis.

Goal orientation was a significant predictor of academic achievement in the multiple regression analysis for the main effects as well as for the white students, but not for the African students. It is concluded that goal orientation has predictive validity for the white students, but not for the African students.

The next assessment related to prediction is the practical value of this predictor, thus to what extent goal orientation, as measured with the ARQ, is able to predict a change in academic success. Goal orientation has a positive linear relationship with academic success, but has low zero-order correlations, ranging between 0.157 and 0.166. Goal orientation emerged as the second strongest predictor, after M-score, thus indicating the importance of the variable even though its contribution to the variance explained is only 1.7%, according to the squared partial correlations. The practical value of the predictor on its own is rather weak in terms of predicting academic achievement and contributes limited variance to the overall prediction model.

Learning-efficacy consists of two main components, namely internal locus of control (autonomy) and academic self-efficacy. High scores on the learning-efficacy scale refer to students who believe they have the academic skills to be successful at university and who have a general internal locus of control. Learning-efficacy had a significant relationship with academic success, as indicated in the multiple regression analysis for the student sample model as well as for the white students, but not for the African students. A discrepancy in the direction of the relationship exists for the student sample model as well as for the white students, because the beta weights indicate a negative relationship and the zero-order correlations indicate a positive relationship.

The African students' output shows consistency in that both the beta weights and zero-order correlations are positive, but the relationship is not significant. Learning-efficacy in a multiple regression analysis contributed less than 1% of the variance in the model and has a zero-order correlation ranging between 0.069 to 0.071, indicating a very poor positive relationship with academic achievement and is only applicable to white students. Learning-efficacy was not a significant predictor of risk for withdrawal and thus has no predictive validity.

6.5.2.4. Construct validity

Construct validity is achieved when a test or questionnaire measures a proposed construct or trait that it sets out to measure (Gregory, 2000). Two statistical methods were used to determine construct validity, namely test homogeneity and factor analysis. Test homogeneity refers to the point-biserial correlation, or the correlation between the individual items and the total score. Tests that have internal consistency are regarded as being homogenous because the items are closely related to the total score of the test. The point-biserial correlation is frequently used to determine the internal consistency of an item and is used for both the item-reliability index and item-validity index (Gregory, 2000). A correlation of below 0.30 for an item is regarded as the cut-off point.

The point-biserial correlations for the items ranged between 0.28 and 0.85. Only one item had a correlation below 0.30, namely item number 44. Item 44 was deleted from further analysis based on the results of the factor analysis and scale reliability statistics, together with a number of other items. The deduction can be made that the ARQ has both good item reliability (internal consistency) and construct validity.

The second method of determining construct validity was with a factor analysis. The purpose of a factor analysis is to identify the minimum number of cluster or factors to account for the inter-correlations among items from a test (Gregory, 2000, p. 112). According to the factor analysis conducted with the sample from the faculty of Economic and Management Sciences, five clear factors were identified. The five factors were

named achievement motivation orientation, learning-efficiency, goal orientation, integration and support, and reading behaviour respectively. The five factors were then combined to develop two second-order factors, namely a motivational scale (Fa) and an integration and reading scale (Fb). The combined alphas for Fa is 0.87 and the scale explained 28.8% of the variance while the combined alphas for Fb is 0.61 and scale explained 28.6% of the variance. The overall alpha for the ARQ was 0.87.

Based on the test for homogeneity and the factor analysis of the test items, it can be concluded that the ARQ has good levels of construct validity.

6.5.3. Bias in Predictive Validity

Test bias in predictive validity occurs when a test does not predict future performance equally well for different populations (Gregory, 2000, p. 244). Test bias in predictive validity is usually associated with intelligence and ability tests, but will be discussed here because of the differentiation that was made on the multiple regression analysis for the white and African student samples. The regression analysis outputs for the two student sample groups were not similar and the 'criterion of homogeneous regressions' could not be achieved (Gregory, 2000, p. 244). According to this finding, it can be said that the ARQ is biased toward the African students because the ARQ is not able to predict academic success with near-identical accuracy. Sedlacek (2005) proposed that motivational constructs like self-efficacy, goal orientation and self-concept are more able to predict retention and academic achievement for African students than for white students.

Research by Rodgers and Summers (2008) contradicts the research of Sedlacek, because they indicate that motivational factors such as self-efficacy and goal setting are less predictive for African students than for white students. The adaptation process is different for African students due to the differences in the learning experiences these students face. A linear relationship, which is presumed in regression analysis, does not

apply to African students as it does for white, middle-class students. Goal orientation, consisting of effort or academic apathy, planning of study time by setting goals, and being methodical in one's behaviour, is not universally shared and is regarded as necessary in order to achieve academically.

6.6. CONCLUSION

The multiple regression analysis and multiway frequency analysis produced nine variables that were statistically significant in explaining risk for failure (academic success). The variables are M-score, race language, credits registered, goal orientation, learning-efficacy, gender, distance of school, reading behaviour and parental education at the University of Pretoria. The binary logistic regression analysis and the multiway frequency analysis produced four variables that were statistically significant in explaining risk for withdrawal. The variables are M-score, race language, reading behaviour and credits registered. In addition to the predictor variables in risk for withdrawal, academic achievement seems to have a high negative correlation with withdrawal behaviour, thus indicating that the higher a student's academic achievement, the lower the risk for withdrawal. The Academic Readiness Questionnaire in conclusion is regarded as a reliable measurement instrument. Its reliability increases when the scales of the ARQ are measured separately (unidimensional). The integration and support scale is less reliable than any of the other four scales. The items with low item-total correlations could have been removed during the analysis phase of the research to improve the internal reliability of the scale more (Field, 2005) and should be done in future. The ARQ has good face, content and construct validity. Predictive validity is low because only goal orientation, learning-efficacy and reading behaviour scales achieved predictive validity.