



# Impact of funding on academic performance: An exploration of two South African universities

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## Abstract

Empirical evidence on the relationship between student funding and academic performance is unclear. Some studies have found a positive relationship, some have suggested a negative one, while others maintain that there is no relationship between them. Acknowledging that a range of factors, other than funding, impact on student success, in this paper, we aim to contribute to a small, but emerging, body of literature on the relationship between student funding and academic performance, proxied by the average individual academic mark for the year. We applied descriptive and inferential statistics to a dataset of 29,619 students registered at two South African universities for the 2018 academic year. The results highlight that in an examination of the impact of being funded by the National Student Financial Aid Scheme (NSFAS) in a bivariate context, it is possible to find a negative relationship with performance. However, at an aggregate level and controlling for the impact of other variables, a positive (albeit weak) and statistically significant correlation between being NSFAS funded and average academic performance emerges.

**Keywords:** academic performance, student funding, South Africa, higher education, average individual scores

## Introduction

Given the massification of higher education (see various international examples such as Mohamedbhai, 2014; Mok & Neubauer, 2016; Varghese, 2015) and the growing diversity of student populations, it is of interest to better understand the factors that predict academic performance and success at university. In the South African context, this interest has intensified in recent years since both government subsidies to higher education institutions and the allocation of bursaries and/or loans to financially and academically deserving students from poor and working-class households, have grown steadily and remain a significant proportion of investment and Gross Domestic Product (GDP).<sup>1</sup>

There is a growing body of extant knowledge on the academic success (proxied by graduation and retention) of publicly funded students in comparison to self-funded ones (De Villiers et al., 2013; DHET, 2018, 2019). However, there exists a gap in understanding the relationship between funding and achievement (proxied by academic scores) in the South African context. As noted by Naidoo and McKay (2018, p. 160) “despite the extensive funding problems, there are significant gaps in the literature on student funding, bursary allocations, and bursaries in general with respect to South Africa.”

While acknowledging that a range of factors, other than funding, impact on student success, this gap in understanding does not offer a strong evidence base for policy. At a national level this militates against more proactive funding policymaking, and at an institutional level, against more targeted support mechanisms for at-risk so-called funded students. As noted by Alyahyan and Dustegor (2020), it is important to understand student success since this constitutes a key metric for the evaluation of institutional performance. Furthermore, better and earlier detection of students who might be at risk, along with instituting preventative measures can drastically improve success rates.

Thus, in this paper, we aim to contribute to addressing these gaps in understanding by evaluating NSFAS funding (which constitutes the biggest proportion of government funding of post-school education and training) as a predictor of academic performance (proxied by individual annual average scores), alongside the influence of other variables.

## Literature review

To adequately contextualise the contribution of this investigation, it is necessary first to understand extant knowledge on i) the predictors of academic performance at university, and ii) the link between public funding and academic performance at university.

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<sup>1</sup> The 2019 Budget speech maintained that “learning and culture receives the largest share of spending as Government continues to provide access to quality basic and higher education, develop skills, provide training and contribute to social cohesion. Fully subsidised education and training for the poor is government’s flagship higher education intervention. Over the medium-term government will spend R111.2 billion to ensure that 2.8 million deserving students from poor and working-class families obtain their qualifications at universities and TVET colleges” (Minister of Finance, Budget Speech, 20 February 2019).

## The predictors of academic performance at university

The literature that considers the predictors of academic performance or success at university covers a broad range of factors: language proficiency (Sothan, 2018); lecture attendance and study habits (Delaney et al., 2013); program type (Hamoud et al., 2018); class type (Mueen et al., 2016); semester period (Mesarić & Šebalj, 2016); student integration<sup>2</sup> (Becket et al., 2014); and self-efficacy<sup>3</sup> (McKenzie & Schweitzer, 2018), for example. A recent systematic review, however, usefully summarises predictors in the literature under five broad categories: 1) previous academic achievement; 2) student demographics; 3) student environment; 4) psychological; and 5) e-learning activity as the most commonly reported factors evaluated across countries. Of these, previous academic achievement and student demographics were found to be the most influential in predicting academic success (Alyahyan & Dustegor, 2020).

In this study we do not have access to data that will allow us to explore the impact of variables that could be categorised as psychological and as related to e-learning activity, so our literature review focuses on the main insights under the former three categories of predictors. The variables available allow an exploration of the relationship between the demographics of students, student environment, and academic performance at university. Furthermore, it is important to understand NSFAS funding as a proxy for socio-economic disadvantage, but also, to some extent, for levels of previous academic performance. Not only are these individuals from the most financially disadvantaged households in South Africa, but they tend to come from communities with poorer levels of schooling, achievement, and overall preparedness for university. As noted by Koen et al. (2006), in reference to South Africa, disadvantaged students face significant challenges in coping with the academic programme. Part of the problem lies in the fact that they often suffer from poor quality basic education which means that they enter university poorly prepared for advanced studies.

The literature dealing with previous academic performance as a predictor tends to focus on either high-school grades or university admissions tests as predictors. In the main, the literature has shown support for the relationship between matric score or high school grade and university performance (Adekitan & Salau, 2019; Garg, 2018; Hamoudet et al., 2018; Oshodiet et al., 2018).

However, some recent research in the South African context suggests, comparably, that university admissions tests might be better predictors of academic performance than matric scores. Investigating the predictors of academic performance of nursing students, Mthimunye et al., (2018) and Mthimunye and Daniels (2019) found that admission points, aggregate results in first year, and high school science and mathematics grades had the greatest predictive power, compared to demographic variables. Kotze and Massyn (2018), focusing on an adult education degree at a Business School in South Africa, found cognitive abilities

<sup>2</sup> Schreiber & Yu (2016, p. 157) caution that while engagement patterns can be reliable predictors of academic performance, in the South African context “the trends across race and gender suggest that engagement and academic performance remain differentiated along race and gender.”

<sup>3</sup> The complex interaction between performance, self-efficacy, motivational and cognitive variables have been highlighted as an area that requires more longitudinal research to unravel (Honicke & Broadbent, 2016).

(verbal and numerical reasoning) more consistent predictors of academic performance in comparison with personal competencies (coping with pressure, adapting to change, achieving personal goals, and working with people). Waldee and Cliff (2016) also found the pre-admissions test of learning potential to be a better predictor of the potential of students to cope with their programs of study than the results of the school-leaving test. Finally, Naidoo & McKay (2018) showed that in terms of student academic performance, Grade 12 National Senior Certificate results were a weak predictor of academic success, while grades weighted by module credits were a statistically better predictor of performance and throughput. Malope (n.d), focusing on students who are receiving financial aid at the University of Cape Town from five different faculties (commerce, science, law, humanities, and engineering and built environment) highlight that psychosocial factors (adjustment, amotivation, intrinsic motivation, identified regulation, intrinsic regulation, self-esteem, perceived stress, and full adjustment scale) did not explain any of the variation in academic performance and that performance at the end of the first year was a strong predictor of performance after three years.

In the main, therefore, while the literature has shown support for the relationship between previous academic performance (such as matric score or high school grade) and university performance, differences in predictive capacity and significance is evident across different studies and locations.

A broad range of literature covers the impact of what are known as student environment related predictors of performance ranging from field of study, accommodation, programme type, institutional type, and programme length for example (Adekitan & Salau, 2019; Mohamed & Waguih, 2017). The impact of demographic factors on academic performance at university is also a topic that demonstrates extreme divergence in the literature. Several studies indicate gender (Almarabeh, 2017; Garg, 2018), age (Hamoud et al., 2018), race/ethnicity (Ahmad et al., 2015), socioeconomic status (Mohamed & Waguih, 2017), and parental background or education (Hamoud et al., 2018) as important predictors, but, again, the strength and direction varies.

While acknowledging the separate impact of demographics and previous academic achievement as categories of predictors, it is important to recognise the correlation of these factors. For example, as shown by Miller and Birch (2007) the type of school from which students come is related to the socio-economic status of the family and greatly influences academic performance. Carlson (2006), in the American context, shows in this regard, that African American males from disadvantaged families will demonstrate poorer academic performance than white males, compounded by the fact that these students tend to come from communities with lower standards of schooling. Given the continued confluence of race and socio-economic status and its impact on education outcomes in South Africa (Kruss & Wildschut, 2015), it is likely that our analysis will find similar relationships.

## The link between funding and academic performance at university

Literature examining the relationship between funding and academic performance uses various proxies and this makes the comparison and clear interpretation of relationships problematic at times. Studies examining the impact on graduation and retention has found support for a positive relationship with government funding, whereas those looking at academic performance have had varied results. The studies considering academic success, tend to use average student results for the year of study, while another common measure is to look at the number of students who complete their studies in minimum time (McKay et al., 2018; Naidoo & McKay, 2018). Given that in the South African context, students have been shown to take longer to complete their studies, the latter approach is likely to result in an underestimation of the impact of funding on academic success. An important departure is the longitudinal approach<sup>4</sup> employed by Van der Berg (2017) which confirms an overwhelmingly positive impact of funding on student success, although students still tend to take longer to complete their studies.

Internationally (Berlanga et al., 2016; Harrison et al., 2018) and nationally (McKay et al., 2018; Mngomezulu et al., 2017; Naidoo & McKay, 2018), it has been acknowledged that the relationship between student funding and academic performance or success is unclear. In England there seems to be little evidence of a positive relationship between student funding and academic success, while in Germany the opposite was found to be the case (Glocker 2011; Harrison & Hatt 2012). In the US, Coonrod (2008) found a positive relationship between the financial aid (loans) amount and academic performance, while Kerkvliet and Nowell (2014) suggested the opposite. In South Africa Naidoo and McKay (2018) found no relationship between the amount received and performance.

South African literature has also presented mixed results on the relationship between funding and performance. Mngomezulu et al. (2017), in examining the narratives of students receiving government funding, exposed the social exclusion that funded students' experience, with clear negative implications for performance. As these scholars indicated, "[H]ow students negotiate alienating dilemmas of being socialised into university environments needs to be opened up for more rigorous enquiry (p. 144). This aligns with earlier findings of scholars who have argued that disadvantaged students fail not only because of financial issues, but also because of the other social and, possibly, psychological challenges they face that impact on their academic performance (Koen et al., 2006).

In sum then, while the overarching positive impact of NSFAS funding in the long term (in relation to graduation, throughput, and retention) has become a dominant narrative in the South African discourse (De Villiers et al., 2013; DHET, 2018, 2019), we know very little about the short to medium term impact as measured by performance in modules.<sup>5</sup> Not only does this have implications for facilitating more proactive policy making at a national level, it

<sup>4</sup> This study employed a tracer approach, which followed/tracked students for longer periods of time (for example n years) than would have been the case in a methodology focused on assessing completion in minimum time (on average between 3 and 4 years after enrolment depending on degree length).

<sup>5</sup> An individual academic score is also an indicator of the possibility of retention or graduation in minimum time.

also assists in proper and earlier identification of where support mechanisms are most usefully applied to ensure higher levels of success at university.

## Method

### Data and sample

In this study, we employed a cross-sectional research design. Data was obtained from two universities in South Africa. Based on the historical classification of universities given the legacy of the apartheid system, both universities are considered to be historically advantaged (HAI) and also part of the group of top research-intensive universities (CHET, 2011). Based on the University ranking of academic performance (URAP), the University of the Witwatersrand is ranked 2nd in South Africa and 316th in the world while Rhodes University is ranked 9th in South Africa and 1061st in the world (URAP, 2016).

The data used for this study contains records of a total of 29,637 actively registered undergraduate students in 2018 who are either South African citizens or South African permanent residents.

### Variables

#### *Dependent variables*

Academic performance (AP) is the dependent or outcome variable and it is proxied in this study by average annual individual score. The average annual individual score across all modules was generated by dividing the total individual score by the number of modules taken during the academic year. It is in continuous form. This variable is represented by AP (Academic Performance) in equations (i) and (ii).

#### *Independent variables*

In the multiple linear regression analysis, we used 17 independent variables. The first is gender which is a dummy predictor that is set to “0” for female and “1” for male. Mode of attendance is the mode through which students are registered which is indicated by a dummy “1” for full-time and “0” otherwise. “Field of study” is a four-level categorical variable (business and commerce; science, engineering and technology; humanities; and education). Each field is represented by a dummy variable in the analysis (e.g. business and commerce is coded as “1” and “0” if otherwise) for the analysis. Year of study was a variable developed by the research team and was calculated from the year of enrolment. Institution of enrolment is the last predicting variable, and it is represented by a dummy variable in the analysis as “1” if University of Witwatersrand and “0” if otherwise (Rhodes University).

The major independent variable in this study was the type of funding received by the student. This variable is represented by three dummy variables in the multiple regression analysis as “1” if a student was an NSFAS bursary recipient and “0” if otherwise, “1” if the student was a recipient of another bursary and “0” if otherwise, “1” if the student was self-funded and “0”

if otherwise. Importantly, while we focus on NSFAS funding as a predictor, as alluded to in our review of the literature, being NSFAS funded must be understood as a proxy for financial disadvantage that is associated with many other forms of disadvantage in South African society.

## Analytical techniques

We applied descriptive, inferential, and regression techniques in this analysis. We used measures of central tendency and standard deviations to describe the distribution of the sample. An Analysis of Variance (ANOVA) was carried out to test the differences or variance in the average academic scores broken down by demographic characteristics and funding status of students. We carried out Bivariate Pearson's Product-moment correlation to assess the relationship specifically between funding sources and academic performance. Multiple regressions were estimated to examine the magnitude of the impact of funding source and other factors on the level of academic performance. Below, we illustrate the mathematical representation of the hypothesized relationship between independent variables and academic performance in equations (i) and (ii)

- i.  $AP_i = \beta_0 + \sum_{i=1}^n \beta_i IV_i + \varepsilon_i$
- ii.  $AP_i = \beta_0 + \beta_1 Age_1 + \beta_2 Male_2 + \beta_3 Full - Time_3 + \beta_4 S, E \& T_4 + \beta_5 B \& M_5 + \beta_6 Humanities_6 + \beta_7 Education_7 + \beta_8 Year One_8 + \beta_9 Year Two_9 + \beta_{10} Year Three_{10} + \beta_{11} Year Four_{11} + \beta_{12} Year Five_{12} + \beta_{13} Year Six_{13} + \beta_{14} Self - Funded_{14} + \beta_{15} Other Funding_{15} + \beta_{16} NSFAS_{16} + \beta_{17} Institution_{17} + \varepsilon_i$

Note: Refer to Appendix A, Table A1, where variable names and descriptions are detailed.

## Results and discussion

### Descriptive features of the sample

Table 1 reports the descriptive statistics in frequencies and percentages of selected variables. On average, students in the sample are around 22 years of age. On average, Wits students perform better than Rhodes students (57% average score compared to 55%). In terms of gender, the majority of the sample was female (56%). Compared to the over-all sample, females are over-represented in the Rhodes sub-sample, whereas the female representation in the Wits sub-sample is consistent with the overall study sample.

**Table 1:** Summary of descriptive statistics of sample

	Total		Wits		Rhodes	
	Frequency	Percent	Frequency	Percent	Frequency	Percent
<b>Age</b>						
Mean	22		21.75		23.21	
Median	21		21		21	
Mode	20		20		21	

<b>Academic Performance</b>						
Mean	56.89		57.1		55.81	
Median	56.48		59		55.71	
<b>Gender</b>						
Male	12858	43.4	10987	44.5	1871	38
Female	16769	56.5	13711	55.5	3048	62
<b>Attendance Type</b>						
Full Time	27620	93.3	23127	93.6	4493	91.3
Otherwise	1999	6.6	1571	6.4	428	8.6
<b>Field of Study</b>						
Science, Engineering and Technology	13907	47.0	12684	51.4	1223	24.9
Business and Commerce	5083	17.2	4255	14.2	828	16.8
Humanities	7877	26.6	5603	22.7	2274	46.2
Education	2752	9.3	2156	8.7	596	12.1
<b>Year of Study</b>						
Year One	10478	35.4	8813	35.7	1665	33.8
Year Two	8005	27.0	6552	26.5	1453	29.5
Year Three	7935	26.8	6423	26.0	1512	30.7
Year Four	2572	8.7	2281	9.2	291	5.9
Year Five	323	1.1	323	1.3	-	-
Year Six	306	1.0	306	1.2	-	-
<b>Funding</b>						
Self-Funded	16926	57.1	14344	58.1	2582	52.3
NSFAS	8273	27.9	6487	26.3	1786	36.2
Others	6085	20.5	5923	24.0	162	3.3
<b>Institution</b>						
Witwatersrand	24698	83.3	-	-	-	-
Rhodes	4921	16.7	-	-	-	-
<b>Total</b>	<b>29619</b>	<b>100.0</b>	<b>24698</b>		<b>4921</b>	

Table 1 further reveals that almost the entire sample (93%) were full-time students, as well as the biggest proportion of the sample (35.7%) being constituted by first year students. This is largely consistent in the institutional sub-samples.

The biggest proportion of the sample comes from the science, engineering and technology (SET) field (47%), followed by students from the humanities (26%), business and commerce fields (17%) and the smallest proportion from the education field (9%). The Wits subsample distribution is largely consistent with this representation, whereas the largest majority of the Rhodes sub-sample came from the humanities field, followed by SET, business and commerce (B&C) and lastly education. SET students are over-represented in the Wits sub-sample and under-represented in the Rhodes sub-sample. The representation of students in the B&C fields in the sub-samples is similar to the total population. Students in humanities



are slightly under-represented in the Wits sub-sample, but quite substantially over-represented in the Rhodes sub-sample. While for education, the Wits sub-sample's proportional representation is largely consistent with the over-all sample, Rhodes is marginally over-represented.

The majority of the sample is self-funded (57%), followed by NSFAS funding beneficiaries (28%) and, lastly, those who receive funding through other sources (21%). The constitution of the Wits sub-sample is largely consistent with the overall sample in terms of funding source; it is only in the category of "other" funding that the Wits sub-sample is slightly over-represented in comparison to the overall sample. For the Rhodes sub-sample, however, self-funded students are under-represented (by 4.8%) and NSFAS funded students over-represented (by 8.3%), and those students receiving "other" forms of funding greatly under-represented in comparison to the overall sample.

### Determining differences in performance

In order to determine whether any mean differences exist in academic performance as a result of demographic factors, an ANOVA was used, and we present the results in Table 2. At an aggregate level, the results suggest a significant difference between all the variables examined and academic performance. It is only the difference based on gender that is impacted by funding source. In other words, all the selected variables play a significant role in average academic performance and it is only when funding source is taken into account that the impact of gender becomes statistically insignificant. The ANOVA also confirms a significant difference in mean academic performance based on institution (as alluded to in the descriptive analysis, with Wits students performing on average better than Rhodes students). (refer to Table 1 for the values of the mean for each).

**Table 2:** Comparative test of mean difference in academic performance by demographic characteristics

	Total	NSFAS Funded	Non-NSFAS Funded
Age	9.018*	3.727*	7.795*
Field of Study	437.694*	43.794*	183.009*
Gender	283.628*	106.334	180.713
Year of Study	437.964*	82.352*	306.876*
Contact Mode	203.397*	5.416*	242.567*
Institution	36.597*	17.912*	65.170*

Note: \* correlation is significant at the 0.01 level (2-tailed).

In this investigation, we probed further by looking more closely at funding source and academic performance, and this is presented in Table 3. Reflecting on the results in Table 3, it is clear that the relationship between all funding types and academic performance is very weak, although the strength of association is higher for self-funding and other funding type. The value of correlation coefficients ( $r$ ) was found to be positive and significant ( $p < 0.01$ ) for self-funding and other bursary types, and negative and significant for being NSFAS funded. In other words, this test found that there is a positive and significant relationship between

being self-funded or receiving other funding and academic performance, whereas the converse is true for being NSFAS funded. This relationship remains negative regardless of institution. The negative correlation between being NSFAS funded and academic performance remains largely consistent also across year of study (only in year 5 it is not significant). A similar trend is evident for being self-funded, with a significant and positive relationship remaining largely consistent across years (only in year 5 it is not significant). For being funded by another bursary type, the relationship is positive and statistically significant, except only for year 6. Furthermore, institutional differences exist with regard to the significance and direction of correlations. At institutional level, the correlations are mostly statistically significant at Wits, whereas there is mostly no significant relationship between year of study and funding source at Rhodes.

**Table 3:** Bivariate Pearson's product-moment correlation (r) between funding sources and academic performance

Funding Source	Academic performance among Undergraduate Students					
NSFAS	-0.094*					
Self-Funded	0.170*					
Others	0.200*					
Institution						
	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Total						
NSFAS	-0.043*	-0.052*	-0.067*	-0.087*	-0.078	-0.108***
Self-funded	0.199*	0.122*	0.130*	0.179*	0.051	0.140*
Other Bursary	0.090*	0.265*	0.211*	0.269*	0.187*	0.77
University of Witwatersrand						
NSFAS	-0.053*	-0.055*	-0.067*	-0.093*	-0.078	-0.108***
Self-funded	0.220*	0.133*	0.141*	0.170*	0.051	0.140**
Other Bursary	0.134*	0.332*	0.212*	0.262*	0.366*	0.198*
Rhodes University						
NSFAS	-0.039	-0.053*	-0.026	-0.040		
Self-Funded	0.053*	-0.039	0.036	-0.028		
Other Bursary	0.006	0.010	0.002	0.000		

\* correlation is significant at the 0.01 level (2-tailed).

The impact of funding and other factors, as well as the magnitude of that impact, on academic performance

In order to establish the impact of NSFAS funding in a multivariate context, as well as the magnitude of that impact on academic performance, multiple regression estimates were

carried out and we present this in Table 4. The results of the variance inflation factor (VIF) showed that multicollinearity was not detected, suggesting the models are well defined for analysis; this is so following the removal of variables “year 2” and “education field of study” in the total model (column 2). Likewise, variables “year 6” and “education field of study” were removed in each of the funding sources models (columns 3, 4, and 5) to prevent collinearity.

**Table 4:** Multiple regression estimates on determinants of academic performance (Disaggregated by total and funding sources)

Variables	Total	Funding Sources		
		NSFAS	Self-Funded	Other Funding
	$\beta$	$\beta$	B	$\beta$
(1)	(2)	(3)	(4)	(5)
(Constant)	52.101*	54.52*	70.96*	55.46*
Age	-0.136*	-0.38*	-0.13*	-0.38*
Gender (Male)	-2.316*	-2.27*	-1.64*	-1.77*
Full-Time	1.243*	13.79*	1.40*	4.06*
S, E & T	6.044*	3.71*	0.18	11.32*
B & C	2.461*	1.83*	-4.11*	8.83*
Humanities	5.187*	4.25*	-0.72**	10.75*
Year One	-4.196*	-10.06*	-13.83*	-9.86*
Year Two	-	-6.23**	-11.92*	2.69***
Year Three	2.017*	-4.20	-9.48*	1.97**
Year Four	4.688*	0.24	-6.38*	5.27*
Year Five	4.681*	5.40	0.64	2.57**
Year Six	2.815*	-	-	-
Self-Funded	4.549*	-	-	-
Others	7.623*	-	-	-
NSFAS Bursary	0.575*	-	-	-
Institution (Wits)	-1.212*	-0.92*	2.58*	6.28*
F	367.919	61.55	154.06	149.69
Sig	0.000	0.000	0.000	0.000

\*, \*\*, \*\*\* indicate significance at 1%, 5% and 10%

S, E & T means Science, Engineering and Technology fields of study

B & C means business and commerce fields of study

From the table, it can be inferred that each of the model estimates presented as significant, with p-values of zero. The analysis reveals that the impact of the independent variables on the

level of academic performance is almost similar for both the total sample in column 2 and each of the funding models (column 3, 4, and 5).

### *Age*

Overall, age is found to be statistically significant and negatively ( $p > 0.05$ ) related to academic performance at an aggregate level, with a unit increase in age reducing academic performance by 0.14 percentage points. The effect of age is least pronounced for self-funded students and the same for NSFAS- and students funded by other sources. Although some studies (Mlambo, 2011; Sothan, 2019), found the age of a student does not influence academic performance, or that older students perform slightly better (Clifton 1997; Richardson, 1994), in this study the results are in line with more recent contributions that suggest that younger students perform on average better than older students (Alhajraf & Alasfour, 2014; Da Wan & Cheo 2012; Nyikahadzo et al., 2013).

### *Gender*

The impact of gender (being male) is found to be statistically significant and negatively associated with average performance. Being a male student reduces academic performance by 2.27 percent, 1.64 percent, and 1.77 percent, for NSFAS funded, self-funded, and students receiving other funding respectively. It is noteworthy that this effect is most pronounced for NSFAS funded students.

Thus, consistent with most research, this study found that female students are likely to perform better on average than male students (Jackman & Murrain-Webb, 2019; Kolster & Kaiser, 2015;). While there is some research that has suggested that the gender difference in performance might be explained by other factors, such as self-efficacy (Pirmohamed et al., 2017). In South Africa, this finding is consistently supported (see, for example, Van Broekhuizen & Spaull, 2017, who refer to this as the “Martha Effect”).

### *Participation type*

In the main, the literature suggests that full-time study is positively associated with academic performance (Yanbarisova, 2015). The results of our analysis support such findings. At an aggregate level, we found that being full-time has a statistically significant and positive impact on average academic performance. Furthermore, the positive impact of this factor is quite significant for NSFAS funded students, increasing performance by 13.79 percent. Considering this result against all other variables for NSFAS funded students, it is noteworthy that this variable has the biggest positive impact on average academic performance.

### *Field of study*

Considering the field of study variable, it is evident that being enrolled in the business and commerce field is related to lower levels of academic performance in comparison to being enrolled in any of the other fields of study.

The field of study findings are also largely consistent with other studies that have found performance in commerce and related fields to be lower than others (see, for example, Masui et al., 2014). We found that being in the SET field increases performance the most in comparison to other fields. Those receiving funding from other sources have consistently better academic performance on average, regardless of field of study.

#### *Year of study*

The results indicate that being in year 1 consistently and significantly negatively impacts on average academic performance, regardless of funding source. The effect remains negative, but less pronounced in year 2, with those students funded by other sources already showing a positive change. Overall, as year of study increases, so does average academic performance. This is consistent with the literature that suggests the initial transition into university is the most difficult for students and as they become more capable over time there is a positive impact on performance. Consequently, an extensive amount of literature focuses particularly on first-year experience and performance (Zandenet al., 2018) as well as on the impact of student integration or engagement with the university as a predictor of performance (Beck et al., 2014; McKenzie & Schwietzer, 2018).

#### *Funding source*

While it remains positive to find a moderate and significant relationship between NSFAS funding and academic performance, the results show that NSFAS funded students ( $\beta=0.57$ ;  $p > 0.05$ ) on average perform more poorly than those students receiving funding from Other sources ( $\beta=7.62$ ;  $p > 0.05$ ) and self-funded ( $\beta=4.54$ ;  $p > 0.05$ ) students. This finding is in line with assertions of scholars such as Koen et al. (2006) and Thiele et al. (2016) that students from disadvantaged backgrounds can expect to perform less well academically than other students. The fact that students receiving funding from Other sources tend to perform better overall must be carefully interpreted as the section on limitations will make clear. The result could be explained by the fact that most other forms of funding in the South African context are merit-based (academic requirements tend to be higher) and/or benefit from focused support in specific areas of practice (see, for example, Naidoo and McKay, 2018, as well as the provisions for the Funsu Lushaka bursary (DoE, 2017).

#### *Institution*

Finally, we reflect on the results for the institution variable, which highlights the interplay between institution and funding source. Here we find that the likelihood of NSFAS funded students having a higher or increased academic performance is reduced by 0.92 percent as a result of studying at Wits University. It is important to note that while there is a negative implication for the average academic performance of NSFAS funded students at Wits, for students with other funding or who are self-funded, the likelihood of having higher grades increases. This aligns with the insights of others that the institution of study matters for the outcomes of different social groups in South Africa (Wildschut et al., 2019).

## Limitations

One limitation of this study is that the results are confined to only two contact historically advantaged institutions, both classified as research-intensive universities in the South African higher education system. The fact that the one ranks lower on both South African and international ranking systems, might offer some comparative insights. However, further research on more universities across more locations as well as on rankings in terms of quality and overall institutional performance would contribute to more robust analysis in this regard.

It also bears noting that while the NSFAS funding variable is a clear indication of financial and socio-economic disadvantage, it is possible that some disadvantaged students could have fallen into the “Other” funding category as well if their performance was meritorious and in line with more selective academic eligibility criteria associated with other funders. This points to the importance of gathering a household income variable for all students to facilitate improved analysis. Thus, in considering results in relation to the students receiving funding through “Other sources” we must bear this in mind. However, data on the household income of all students applying for university is not currently consistently collected.

## Conclusion

This study focused on academic performance, proxied by average scores, among undergraduate students enrolled in two historically advantaged public universities in South Africa in 2018. The analysis investigated and demonstrated empirically the effect of funding on academic performance in attempting to provide policy direction in two areas: 1) the impact of student demographics; and 2) the impact of student environment, alongside funding source, on academic performance in South Africa.

The demographic related (age, gender, and funding source) results confirm the clear disadvantage with which NSFAS funded students enter university in terms of the implication for academic performance. The study confirmed the negative correlation between being male and average academic performance at an aggregate level and, further, that this negative effect is most pronounced for NSFAS funded students. Considering this result alongside the indications of other work that has found that male and African students tend to enter into education and training programmes later than white males (Kruss & Wildschut, 2015), this is potentially important for policy in pointing to the more extensive support that might be required for disadvantaged male students to enable them to cope academically in the university environment.

The student environment related (study type, field of study, year of study, and institution) results confirm the importance of full-time study for disadvantaged students, especially considered in the light of the fact that this variable has the biggest impact on average performance of NSFAS funded students. For self-funded students, the year of study plays the biggest role and for students funded through other sources, field of study has the greatest impact.

The study, at an aggregate level, also confirmed that average performance declined as year of study increased, but, since the results do not vary too much by funding source, the extent to which this is impacted by financial disadvantage is not clear. The institution result suggests that *where* a disadvantaged student studies matters for their average academic performance, especially if we consider that the impact on average performance is positive for both other and self-funded students. However, this finding needs to be considered with caution since the sample was limited to only two universities. These findings suggest a need for further investigation to explicate more clearly the impact of being disadvantaged at specific institutions across a bigger and more representative sample of the South African university system.

In conclusion, therefore, although much of this paper concentrates on outlining and contrasting specifically NSFAS funded students and their academic performance in relation to students funded through other means, the results illustrate the complex dynamics between and among funding, field of study, year of study, gender, and institution in students' academic performance journeys and the absolute importance of juxtaposing the impact of funding alongside other influences. This supports assertions of other research (Burke et al., 2017; Honicke and Broadbent, 2016) that examination of the relationships between a range of key independent variables and academic performance, in a multi-variate context, is crucial in the South African higher education context. This kind of understanding and the growing of the evidence base on these fronts, can only be of value to more effective and nuanced policy making and intervention in the critical area of funding for higher education.

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## Appendix A

**Table A1:** Summary of variables

<b>Variable</b>	<b>Description</b>	<b>Type of Variable</b>
Academic Performance	Grade, average score for the 2018 academic year	Continuous
Gender	Gender of student (0 = Female, 1 = Male)	Categorical/ Nominal
Age	Age of student as at the end of 2018	Continuous
Mode of attendance	Mode through which student attend classes. (1= External/Special; 2= Full Time; 3= Part Time)	Categorical
Field of Study	Field of study which student is enrolled in. (1= Science; Engineering and Technology; 2= Business & Commerce; 3= Humanities; 4= Education)	Categorical
Year of study	Total number of years that have been spent in the university (1= year 1; 2= year 2; 3= year 3; 4= year 4; 5= year 5; 6= year 6)	Categorical
Institution	Name of Institution where student is enrolled. (1= University of Witwatersrand, 0= Rhodes University)	Nominal
NSFAS Funded	If student is funded by NSFAS (0= No; 1= Yes)	Nominal
Other Funding	If student is not funded by NSFAS but has other internal or external funding sources (0= No; 1= Yes)	Nominal
Self-funded	If student academic study is self-funded (0= No; 1= Yes)	Nominal