

A scientometric assessment of the field of Psychology in South Africa

A final draft report submitted by:

Johann Mouton, Milandr  van Lill, Nelius Boshoff, Jaco
Blanckenberg, Graeme Mehl and Herman Redelinghuys

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2. Acronyms




CAGR	Compound Average Annual Growth Rate
CESM	Classification of Subject Educational Matter
CoE	Centre of Excellence
CPUT	Cape Peninsula University of Technology
CREST	Centre for Research on Evaluation, Science and Technology
CUT	Central University of Technology
DHET	Department of Higher Education and Training
DSI	Department of Science and Innovation
DUT	Durban University of Technology
FTE	Full-time Equivalent
HEMIS	Higher Education Management Information System
IBSS	International Bibliography of the Social Sciences
NMU	Nelson Mandela University
NRF	National Research Foundation
NWU	North-West University
ROA	Rest of Africa
ROW	Rest of World
RU	Rhodes University
SAK	South African Knowledgebase
SPU	Sol Plaatje University
SMU	Sefako Makgatho Health Science University
SU	Stellenbosch University
TUT	Tshwane University of Technology
UCT	University of Cape Town
UFH	University of Fort Hare
UFS	University of Free State
UJ	University of Johannesburg
UKZN	University of KwaZulu-Natal
UL	University of Limpopo
UMP	University of Mpumalanga
UNISA	University of South Africa
UNIZULU	University of Zululand
UP	University of Pretoria
UWC	University of the Western Cape
Wits	University of the Witwatersrand
WoS	Web of Science

3. Executive Summary


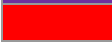



The aim of the scientometric studies is to provide academics and scientists in the field as well as science and research managers and relevant policy-makers and decision-makers with a high-level, standardized framework against which the strengths as well as the weaknesses and vulnerabilities of the selected basic science disciplines can be monitored. Based on the first round of studies of the natural sciences in 2017 and the subsequent studies of the social sciences and humanities in 2019, a benchmarking framework could be developed. This framework assesses the disciplines in terms of four key dimensions: investment (funding) of research in the field, the academic staff capacity in the field, the trends in student enrolments and graduations in the field and the research publication performance of the field. In this report, we present the results of the most recent analyses of the 84 indicators that are currently in the framework. In each report we report in detail on the trends between 2000 (sometimes 2005) and 2020 on each indicator. The summary findings are underpinned by more than 80 individual graphs and tables.

Given the very rich and comprehensive detail presented in this report, we have developed a **Field Benchmarking Dashboard** that presents, in a more summarised and visual manner, an indication of the current status (strengths and vulnerabilities) of the field. This overview informs a brief narrative that highlights the more likely future trends in the field as well as areas where interventions may be needed to either strengthen or expand the field as well as interventions that may be required to correct for possible weakening of the field or some aspect thereof. The dashboard includes the dynamic indicators of the field framework as these provide insight into the trends (positive or negative) in the recent past.


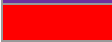



Legend for trends in **numbers**

Colour	Description
	Decline in absolute numbers over reporting period
	No significant decline or increase (stagnation)
	Increase in absolute numbers over reporting period

Legend for **percentage point increase or decline**

Colour	Description
	Decline of more than 10 percentage points
	Decline between 3 and 10 percentage points
	No significant change (between -3 and +3 percentage points)
	Increase between 3 and 10 percentage points
	Substantial increase of more than 10 percentage points

Legend for trends as measured in increases or decreased in rates of growth (**CAGR-values**)

Colour	Description
	Exceptional negative growth where CAGR-value is less than -10%
	Negative growth of more than -3% between 2000 and 2020
	No significant decline or increase – CAGR between -3% and +3%
	Significant positive growth: CAGR 3%+
	Exceptional growth where CAGR-value is more than 10%

Investment in research: Grant-holders

Indicator	2005	2010	2015	2020	2005 - 2010	2010 - 2020	2005 - 2020	Sparkline
Number of grant-holders	39	70	134	56				
Rate of growth in the number of grant-holders				2.4%				
Female grant-holders as a share of all grant-holders	63%	51%	52%	75%				
Rate of growth in the number of female grant-holders				3.6%				
Black grant-holders as a share of all grant-holders	26%	31%	33%	56%				
Rate of growth in the number of black grant-holders				7.8%				

Investment in research: Grant values

Indicator	2005	2010	2015	2020	2005 - 2010	2010 - 2020	2005 - 2020	Sparkline
Total value of individual grants	R4,200,918m	R5,711,393m	R31,424,692m	R13,687,627m				
Rate of growth in the total value of individual grants					8.2%			
Total value of grants for women	R1,612,549	R2,261,254	R19,157,692	R9,661,861				
Rate of growth in the total value of grants for women					12.7%			
Total value of grants for black scholars	R691,051	R1,821,109	R6,843,542	R8,076,114				
Rate of growth in the total value of grants for black scholars					17.8%			

Academic staff capacity

Indicator	2000	2005	2010	2015	2020	2000 - 2010	2010 - 2020	2000 - 2020	Sparkline
Sum of permanent instructional research staff (FTE)	343	388	233	207	385				
Rate of growth in permanent instructional/research staff FTE					0.6%				
Percentage of staff with a Doctoral qualification	36%	33%	42%	50%	56%				
Difference in % of staff with a Doctoral qualification					20.0%				

Academic staff diversity

Indicator	2000	2005	2010	2015	2020	2000 - 2010	2010 - 2020	2000 - 2020	Sparkline
Percentage of female staff	49%	52%	59%	58%	64%				
Change in percentage of female staff						15%			
Percentage of black South African staff	37%	38%	40%	42%	57%				
Difference in percentage of black South African staff						20%			

Trends in Doctoral enrolments and graduates

Indicator	2000	2005	2010	2015	2020	2000 - 2010	2010 - 2020	2000 - 2020	Sparkline
Number of total Doctoral enrolments	271	501	509	779	786				
Rate of growth in the number of total enrolments					5.5%				
Number of new Doctoral enrolments	95	137	130	355	274				
Rate of growth in the number of new Doctoral enrolments					5.4%				
Number of Doctoral graduates	44	68	60	98	131				
Rate of growth in Doctoral graduates					5.6%				
Average age at commencement of Doctoral studies	37.9	37.8	37.9	39.0	39.0				
Change in the average age at commencement of Doctoral studies					1.1 years				
Average time-to-degree of Doctoral studies	4.9	4.4	5.8	4.6	5.8				
Change in average time-to-degree of Doctoral studies					0.9 years				
Average age at graduation of Doctoral students	42.3	41.3	40.9	42.6	43.8				
Change in the average age at graduation of Doctoral students					1.5 years				





Doctoral enrolments: Demographic trends

Indicator	2000	2005	2010	2015	2020	2000 - 2010	2010 - 2020	2000 - 2020	Sparkline
Percentage of female Doctoral enrolments of total enrolments	63%	65%	67%	77%	75%				
Rate of growth in the number of female Doctoral enrolments					5.3%				
Percentage of black Doctoral enrolments of South African enrolments	22%	32%	39%	45%	54%				
Rate of growth in the number of black Doctoral enrolments					9.3%				
Percentage of South African Doctoral enrolments	97%	92%	89%	80%	80%				
Rate of growth in the number of South African Doctoral enrolments					4.4%				

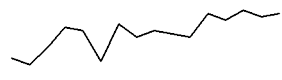
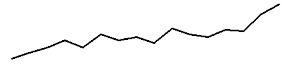
Doctoral graduates: Demographic trends

Indicator	2000	2005	2010	2015	2020	2000 - 2010	2010 - 2020	2000 - 2020	Sparkline
Percentage of female Doctoral graduates of total graduates	79%	76%	73%	82%	70%				
Rate of growth in the number of female Doctoral graduates					3.8%				
Percentage of black Doctoral graduates of South African graduates	19%	17%	25%	31%	50%				
Rate of growth in the number of black Doctoral graduates					9.6%				
Percentage of South African Doctoral graduates	95%	93%	83%	80%	76%				
Rate of growth in the number of South African Doctoral graduates					4.4%				

Publications in SA Knowledgebase

Indicator	2005	2010	2015	2020	2005 - 2010	2010 - 2020	2005 - 2020	Sparkline
Number of articles	242	487	828	1 404				
Rate of growth in the number of articles					12.4%			
Number of contributing authors	306	575	1 150	2 049				
Rate of growth in the number of contributing authors					13.5%			

Demographics of publishing authors

Indicator	2005	2010	2015	2020	2005 - 2010	2010 - 2020	2005 - 2020	Sparkline
Percentage of university female authors	41%	40%	47%	54%				
Rate of growth in the number of university female authors				17.7%				
Percentage of university black authors (South African)	13%	30%	30%	51%				
Rate of growth in the number of university black authors				26.5%				

Indicators of global standing and citation impact of publications

Indicator	2000	2005	2010	2015	2020	2000 - 2010	2010 - 2020	2000 - 2020	Sparkline
Total number of SA articles in WoS	91	166	300	454	584	Green			
Rate of growth in the number of South African articles in WoS						9.7%		Green	
World share of WoS articles	0.4%	0.6%	0.6%	0.8%	0.9%	Yellow	Green	Green	
Change in world share (2000 to 2020)						0.5%		Yellow	
World rank position in WoS	20	19	21	21	23	Yellow	Red	Red	
Change in the world rank position						-3		Red	
Percentage of WoS articles in the top 1% of highly cited papers	0.0%	0.0%	1.1%	0.2%	1.1%	Yellow			
Change in the percentage of WoS articles in the top 1% of highly cited papers						1.1%		Green	
Percentage of WoS articles in the top 5% of highly cited papers	3.9%	3.0%	7.6%	3.0%	4.4%	Green	Red	Yellow	
Change in the percentage of WoS articles in the top 5% of highly cited papers						0.5%		Yellow	
Percentage of WoS articles in the top 10% of highly cited papers	3.9%	6.8%	10.9%	7.7%	10.2%	Green	Yellow	Green	

Indicator	2000	2005	2010	2015	2020	2000 - 2010	2010 - 2020	2000 - 2020	Sparkline
Change in the percentage of WoS articles in the top 10% of highly cited papers					6.3%				

Salient points



We identify the most positive salient trends as those where there is a sustained and consistent improvement in the value of the underlying indicators. Our discussion is organised by the dimensions of the scientometric assessment.

- In terms of research funding from the NRF we see the overall increases in the number of grant-holders and grant values for most of the reporting period. The decline in numbers of grant-holders since 2019 is a general trend that affected most scientific fields, but it is pronounced in the field of Psychology. A positive trend is the sustained growth in the grant-values between 2005 and 2020. The increased participation of women, and black academics in Psychology (number of individual grants and grant values) is noteworthy.
- The increase of 20 percentage points in the share of academics in Philosophy with a doctorate to 56% is a positive development. This compares well with the average percentage of staff with doctorate at all universities in 2021 at 48%.
- We find that academic staff capacity in Psychology has become more inclusive of the designated groups. This is true both as far as gender is concerned where the percentage of female staff increased with 15 percentage points from to 64% in 2020, as well as race where the percentage of black staff increased by 20 percentage points to 57 % in 2020.
- The demand for Doctoral studies in Psychology has continued to grow with sustained increases in the number of total and new Doctoral enrolments at 5.5% and 5.4% respectively. Not surprisingly, the increase in new and overall Doctoral enrolments, has translated in a sustained growth in the number of Doctoral graduates in Psychology reaching 131 in 2020.
- The overall demographics of Doctoral enrolments and graduates in Psychology is positive. The number of female Doctoral enrolments has increased by 12 percentage points to 75% in 2020 whilst a similar trend is evident as far as race is concerned with the number of black Doctoral enrolments increasing by 32 percentage points to constitute 54% of all Psychology enrolments in 2020. These positive trends are mirrored when we look at Doctoral graduates with more women (70% in 2020) and black graduates (50% in 2020) in the field of Psychology.
- The research publication output of Psychology academics and students reveals a very positive picture: the number of articles produced as recorded in SA Knowledgebase increased to 1 404 in 2020 at an annual growth rate of 12.4% as did the number of contributing authors (from 306 in 2005 to 2 049 in 2020). This means that the field has managed to broaden its active publishing base through the inclusion of post-graduate students, post-Doctoral fellows and visiting scholars.
- The positive trends in publication output are also evidenced by positive trends in transformation with an increase in the contribution of women authors (from 41% in 2005 to 54% in 2020) and especially by black authors (13% in 2005 to 51% in 2020).
- The global standing of South African psychologists as measured by their publications in the ^{CA}Web of Science is overwhelmingly positive. The total number of articles has increased at an annual growth rate of 9.7% to 584 in 2020 which has translated into an increased world share of 0.8% in 2020. Articles in Psychology's share in the top 1% highly cited papers increased to 1.1%, in the top 5% to 4.4% and in the top 10% highly cited papers to 10.2%.



We list areas of concern as ‘red flag’ areas where there is either a consistently negative trends in the value of underlying indicators or, in some cases, a more recent decline in such values after a longer period of growth. We also include under this heading, instances where there is – against all expectations – no improvement of positive change.

- A possible area of concern in Psychology is the academic pipeline of Doctoral students. We see that the average at commencement of studies increased with 1.1 year to 39 years in 2020. This means that the majority of new Doctoral students are not eligible for NRF-funding. At the same time the average time-to-degree increased to 5.8 years and the average age at graduation to 43.8 years. This means that Doctoral students in Psychology are more likely to study part-time towards their Doctoral qualifications and entering the Doctoral pipeline at a later stage.
 - Although we see that there has been substantial growth in the number of articles published in the WoS, the field of Psychology has not managed to improve its world rank position where the field of Psychology fell three positions to 23rd position in 2020.
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PART 1: MAIN REPORT

4. Introduction

The aim of the study has been to undertake a scientometric assessment of the performance of selected basic disciplines in South Africa, of which Psychology is one. Scientific disciplines are complex ‘objects’ and differ in multiple ways from each other. A deep and detailed assessment of the performance of a discipline is not an easy undertaking. Ideally, one would combine quantitative and qualitative methodologies to arrive at such an assessment and, in the best-case scenario, such an assessment would be informed both by insider and outsider accounts of the strengths and weaknesses regarding the performance of the field.

Our approach has been predominantly quantitative (scientometrics as the quantitative measurement of science systems). The request by the DSI was for a predominantly quantitative approach that would be based on the selection of appropriate indicators for the selected fields. This approach resulted in the development of a ‘dashboard’ of 89 indicators that aim to cover four dimensions of the performance of a scientific field. We describe these dimensions and the choice of indicators in detail below.

It is important to emphasise that the indicators do not presume to make any general or comprehensive statement on the state and quality of Psychology as a discipline. All indicators have shortcomings, and this scientometric assessment of the performance of one such discipline in South Africa is no exception. However, the weaknesses of science indicators are also their strength. As Barr (2001, p. 13) would argue, although science indicators “cannot make claims for truth”, they do “have the unique capability of generating significant debates through the criticism they stir, which can make them socially robust”. It is therefore hoped that our set of indicators will generate informed criticism, as well as positive reflection, in order for new and refined indicators to be constructed with input from all relevant stakeholders. A socially robust assessment of the state and performance of a discipline is a joint effort. This scientometric assessment of Psychology aims to provide a crucial input into such an endeavour.

4.1. The main assessment dimensions and their indicators

Four main dimensions of the performance of Psychology as a field have been included in our assessment of the discipline. The choice of these dimensions is in line with good practice in scientometric studies, but also takes into consideration the availability of appropriate data sources. For each of the main dimensions we include a list of performance indicators.

4.1.1. Investment in research

The first dimension aims to produce an estimate of the available funding for Psychology research in South Africa. For this purpose, we were given access to NRF-funding data of grant-holders, for the period 2005 to 2020. We are aware that there may be other public and private sources of funding for Psychology. However, these databases are neither centrally housed nor necessarily accessible. Our decision to confine this dimension to the research funding data from the NRF has the advantage that it is readily available (under a data sharing agreement) and also consistent in terms of data fields. As far as NRF data is concerned, it is furthermore important to note that only grant-holder funding is reported here and not free-standing scholarship funding. We include four (4) state indicators under this dimension and four (4) dynamic indicators.

State indicators

The state indicators that we used are:

1. the number of grant-holders;
2. female grant-holders as a share of all grant-holders;
3. black grant-holders as a share of all grant-holders; and
4. the rate of growth in the total value of individual grants.

Dynamic indicators

The dynamic indicators that we used are:

1. the rate of growth in the number of grant-holders;
2. the rate of growth in the number of female grant-holders;
3. the rate of growth in the number of black grant-holders; and
4. the rate of growth in the total value of individual grants

The inclusion of these indicators allowed us not only to assess the size and magnitude of the monetary value of grants and changes over time, but also whether the investment has become more inclusive over time to benefit more female and black researchers than before.

4.1.2. Staff capacity and diversity

The second dimension included in this assessment concerns the academic staff capacity in the country to produce knowledge, teach and supervise postgraduate students; in other words, the academic pipeline of future researchers and academics in Psychology. We include seven (7) state and twelve (12) dynamic indicators under this dimension. Data for these indicators are sourced from the Higher Education Management Information System (HEMIS) for the period 2000 to 2020. In order to calculate the staff capacity per discipline, we use the FTE (full-time equivalent) values assigned to individual staff members in HEMIS. This means that we sum the proportional time allocated to each CESM category (in this case Psychology) for each individual. The result is that the FTE values of these indicators invariably are fractions.

State indicators

The state indicators that we use are:

1. sum FTE of permanent instructional/research staff;
2. the percentage of staff FTE with a Doctoral qualification;
3. the ratio of Doctoral enrolments to staff FTE with a Doctoral qualification;
4. the percentage of female staff FTE;
5. the percentage of South African black (black African, Indian/Asian, Coloured) FTE;
6. the percentage South African staff FTE;
7. the percentage of instructional/research staff FTE 40 years and younger.

Dynamic indicators

The dynamic indicators that we used are:

1. the rate of growth in permanent instructional/research staff FTE;
2. the change in the percentage of staff with a Doctoral qualification;
3. the rate of growth in staff with a Doctoral qualification;
4. the change in the ratio of Doctoral enrolments per supervisor;
5. the change in the percentage of female staff FTE;
6. the rate of growth in female staff FTE;
7. the change in the percentage of black South African staff FTE;
8. the rate of growth in black South African staff FTE;
9. the change in the percentage of South African staff FTE;
10. the rate of growth in South African staff FTE;
11. the change in the percentage of staff 40 years and younger; and
12. the rate of growth in staff 40 years and younger.

4.1.3. The academic pipeline

Considering the strategic interest of the country in building the next generation of researchers and academics, this dimension focuses on the production of Doctoral students in Psychology. The indicators that were selected cover both sub-dimensions of quantity (the numbers of enrolments and graduates), efficiency (time-to-degree), as well as transformation (gender and race) and internationalisation (nationality). We include twelve (12) state indicators and nineteen (19) dynamic indicators. Data for these indicators were sourced from HEMIS for the period 2000 to 2020.

State indicators

The state indicators that we used are:

1. the number of total enrolments;
2. the number of new enrolments;
3. the number of graduates;
4. average time-to-degree;
5. the percentage of female students of total enrolments;
6. the percentage of black students of total enrolments;
7. the percentage of South African students of total enrolments;
8. the average age at commencement of Doctoral studies;
9. the percentage of female students of total graduates;
10. the percentage of black students of total graduates;
11. the percentage of South African students of total graduates; and
12. average age at graduation.

Dynamic indicators

The dynamic indicators that we used are:

1. the rate of growth in the number of total enrolments;
2. the rate of growth in the number of new enrolments;
3. the rate of growth in the number of graduates;

4. the change in average time-to-degree;
5. the change in the percentage of female enrolments;
6. the rate of growth in the number of female enrolments;
7. the change in the percentage of black enrolments;
8. the rate of growth in the number of black enrolments;
9. the change in the percentage of South African enrolments;
10. the rate of growth in the number of South African enrolments;
11. the change in the average age at commencement of Doctoral studies;
12. the change in the percentage of female students of total graduates;
13. the rate of growth in the number of female graduates;
14. the change in the percentage of black students of total graduates;
15. the rate of growth in the number of black graduates;
16. the change in the percentage of South African students of total graduates;
17. the rate of growth in the number of South African graduates;
18. the change in the average age at graduation; and
19. Conversion rates from one degree programme to the next.

4.1.4. Research

Various dimensions of the research performance of Psychology as a scholarly field of knowledge production were assessed by a set of indicators (see below) which can be grouped into the broad categories of: research production or output, transformation of the human resource base for research in the field (female and black), and research (citation) impact. Two data sets were used for these analyses. SA Knowledgebase at CREST was used for analyses related to university research output and research transformation, and the Web of Science (^{CA}WoS) for analyses related to global performance and citation impact. Results are reported for the years 2000 to 2020.

State indicators

The state indicators that we used are

1. the number of university authors;
2. the percentage of university female authors;
3. the percentage of university black authors;
4. the percentage of university authors younger than 40 years;
5. the number of articles by university authors;
6. the percentage of university articles in WoS journals;
7. the total number of SA articles in WoS;
8. the world share of WoS articles;
9. world rank position in WoS;
10. the percentage of WoS articles in top 1% of highly cited papers;
11. the percentage of WoS articles in top 5% of highly cited papers; and
12. the percentage of WoS articles in top 10% of highly cited papers.

Dynamic indicators

The dynamic indicators that we used are:

1. the rate of growth in the number of university authors;
2. the change in the percentage of university female authors
3. the rate of growth in the number of university female authors;

4. the change in the percentage of university black authors;
5. the rate of growth in the number of university black authors;
6. the change in the percentage of university authors younger than 40 years;
7. the rate of growth in the number of university authors younger than 40 years;
8. the rate of growth in the number of articles by university authors;
9. the change in the percentage of university articles in WoS journals;
10. the rate of growth in the number of university articles in WoS journals;
11. the rate of growth of all SA articles in WoS;
12. the change in world share;
13. the change in world rank position;
14. the change in the percentage of WoS articles in top 1% of highly cited papers;
15. the change in the percentage of WoS articles in top 5% of highly cited papers; and
16. the change in the percentage of WoS articles in top 10% of highly cited papers.

4.2. Data and Methods

In compiling this report, four sources of data were used: the funding database of the National Research Foundation (NRF), the academic staff and student data from the HEMIS database of the Department of Higher Education and Training (DHET), SA Knowledgebase at CREST which contains the article output of university researchers, and the raw publication data CREST's version of the WoS database under a license with Clarivate Analytics. Each of these is discussed below.

4.2.1. NRF Funding database

The NRF provided the grant-holder data for the period 2005 to 2020. Two existing variables in the database aided in the development of an address-based field classification of NRF grant-holders. The first of these contains the centre and departmental affiliations of grant-holders at the time of their application ("*NRF Department_Phoenix*"). The second variable contains similar information for each grant-holder, but as provided by them when they report on their grants ("*NRF Department_Submission_Progress Report*"). By taking into account information from both variables, the discipline reported on here was 'constructed'. In cases where the two variables contained missing information or provided conflicting information for a single grant-holder, alternative sources were consulted. These were the available address information for publication authors in SA Knowledgebase, and the websites of South African universities that list the names of academic staff in departments in the relevant discipline.

All monetary values were adjusted for inflation based on the Consumer Price Index (CPI) as released by Statistics South Africa, and by using 2021 as the base year for inflation.

4.2.2. HEMIS database

The analysis of human resources (academic staff and students) is based on the classification of disciplines as outlined in the CESM (Classification of Educational Subject Matter) framework. The CESM Classification of Educational Subject Matter (CESM) has changed three times over the past two decades. In the Technical Appendix we give a detailed breakdown of the disciplinary definitions used to identify the human capabilities in Psychology as well as the specific HEMIS and CESM codes used in our analyses. We also provide a glossary of the indicators used throughout the report.

4.2.3. Publication databases

SA Knowledgebase by CREST, Stellenbosch University, is a comprehensive database of research publications produced by the South African universities in compliance with the DHET's Research Publishing Framework. CREST received the annual individual records that are submitted under a data sharing agreement with DHET. The data covers for categories of publications (articles, books, book chapters and published conference proceedings) that are submitted to the DHET for subsidy every year. The database also includes the demographics of authors (gender, race, age and institution) as well as journal source information. Relevant authors in Psychology were identified based on the available departmental affiliations of authors in SA Knowledgebase, as well as by sourcing the names of academic staff in the field from the university websites and incorporating that information into SA Knowledgebase.

In addition to the analysis of data in SA Knowledgebase, we also include analyses of the performance of Psychology as reflected in the ^{CA}Web of Science. These analyses include more comparative results related to research collaborations, citation impact and publications by journal quartile and subject category.

5. Main findings

5.1. Investment in research

We present the results of our analysis of the NRF investment in Psychology under two headings: the profile of grant-holders in the field, and the grant values awarded to grant-holders in the field.

5.1.1. Grant-holders

The number of grant-holders in Psychology increased from 39 in 2005 to 134 in 2015, after which it fell again to 56 in 2020. The underlying data shows that between 2013 and 2020 eight grants were associated with an NRF Research Chair or the DSI-NRF Centre of Excellence programme. Concerning gender representation, the shares of female grant-holders are above 50% in all four reporting years, with the highest figure recorded for 2020 (75%). The trend for black representation is also positive, as the shares of black grant-holders increased with each reporting year, to reach a peak of 56% in 2020. It is important to note that for both the race and gender analysis, only South African nationals were considered (where the latter was operationalised as grant-holders born in South Africa). All growth rates in the respective period, from 2005 to 2020, are positive (for all grant-holders, female grant-holders and black grant-holders).

Table 1: Indicators of NRF-investment in research (grant-holders)

Indicator category	Indicator	2005	2010	2015	2020
State indicator	Number of grant-holders	39	70	134	56
Dynamic indicator	Rate of growth (%) in number of grant-holders (CAGR) (2005 to 2020)		2.4%		
State indicator	Female grant-holders as a share of all grant-holders (South African nationals only)	63%	51%	52%	75%
Dynamic indicator	Rate of growth in the number of female grant-holders (CAGR) (2005 to 2020)		3.6%		
State indicator	Black grant-holders as a share of all grant-holders (South African nationals only)	26%	31%	33%	56%
Dynamic indicator	Rate of growth in the number of black grant-holders (CAGR) (2005 to 2020)		7.8%		

5.1.2. Grant values

An analysis of grant values shows positive growth (8.2%) for the overall funding amounts in the period 2005–2020. The year 2015 was not only an outlier year in terms of the number of grant-holders (see previous table), but (logically so) also in terms of total award value. The significantly higher grant amount in 2015 can be partially explained by a CoE grant to a Chair in Psychology in the period 2014-2019. Since the chair is a white woman, this also explains the

outlier in 2015 in the total value of grants for women. Finally, the changes over time in the funding shares of black grant-holders are positive, with an overall growth rate of 17.8%.

Table 2: Indicators of NRF-investment in research (grant values)

Indicator category	Indicator	2005	2010	2015	2020
State indicator	Total value of individual grants	R4,200,918	R5,711,393	R31,424,692	R13,687,627
Dynamic indicator	Rate of growth in the total value of individual grants (CAGR) (2005 to 2020)		8.2%		
State indicator	Total value of grants for women (SA nationals only)	R1,612,549	R2,261,254	R19,157,692	R9,661,861
Dynamic indicator	Rate of growth in the total value of grants for women (CAGR) (2005 to 2020)		12.7%		
State indicator	Total value of grants for black scholars (SA nationals only)	R691,051	R1,821,109	R6,843,542	R8,076,114
Dynamic indicator	Rate of growth in the total value of grants for black scholars (CAGR) (2005 to 2020)		17.8%		

5.2. Staff capacity and diversity

Our analysis of the human resources capacity in the field of Psychology is based on the HEMIS database of DHET for the period 2000 to 2020. We present the results of our analysis under two headings: staff capacity (instructional and research staff FTE) in the field, and the staff diversity profile (gender, race, nationality, and age). The detailed analysis for staff capacity and diversity can be found in Part 2 of this report. The trends and patterns are presented in several figures and tables.

5.2.1. Staff capacity

In the table below we report on indicators measuring staff capacity for selected years in Psychology.

When looking at the capacity of university staff in Psychology, we see that the count of permanent instructional/research staff remained steady with an increase from 343 in 2000 to 385 in 2020. In Appendix 2 we report on the impact of the reclassification of the HEMIS CESM codes on the data trends reported across the disciplines, but notwithstanding these explanations we report negative growth rates in the staff capacity for both the periods 2000 to 2020 and 2010 to 2020.

When we look at the percentage of staff with a Doctoral qualification, we see that the percentage of staff with PhDs increased substantially by 20% from 36% in 2000 to 56% in 2020. The ratio of Doctoral students per staff with a PhD (a measure of supervisory capacity) increased significantly from 2.2 to 3.7 over this period. This means that the supervisory burden of Doctoral students has increased in the field of Psychology as a result of increasing numbers of Doctoral enrolments and decreasing (or stagnating) staff capacity.

Table 3: Indicators of staff capacity

Indicator category	Indicator	2000	2005	2010	2015	2020
State indicator	Sum FTE of instructional/research staff	343	388	233	207	385
State indicator	Total headcount of instructional/research staff	545	729	450	446	659
Dynamic indicator	Rate of growth (%) in staff FTE (CAGR) (2000 to 2020)			0.6%		
Dynamic indicator	Rate of growth (%) in staff FTE (CAGR) (2010 to 2020)			5.2%		
State indicator	Percentage of staff FTE with a Doctoral qualification	36%	33%	42%	50%	56%
Dynamic indicator	Change in the percentage of staff with a PhD (2000 to 2020)			20%		
Dynamic indicator	Rate of growth (%) in staff FTE with a PhD (CAGR) (2000 to 2020)			2.8%		
Dynamic indicator	Rate of growth (%) in staff FTE with a PhD (CAGR) (2010 to 2020)			8.2%		
State indicator	Ratio of Doctoral enrolments to staff FTE with a Doctoral qualification	2.2	3.9	5.2	7.5	3.7
Dynamic indicator	Change in the ratio of Doctoral enrolments to staff with a Doctoral qualification (2000 to 2020)			1.5		

5.2.2. Staff diversity

In the table below we summarise the main indicators on staff diversity in Psychology for selected years. Over the recorded period, we see that the percentage of female staff in Psychology increased with 15% from 49% in 2000 to 64% in 2020, with an annual average growth rate of 2%.

We see a large percentage shift among black¹ staff where in 2020 the percentage of black staff constituted 57% of all South African instructional/research staff with a significant increase from 37% in 2000. The percentage of South African staff members remained fairly stable with a slight increase of 1% during the period analysed. When we look at the age profile of academic staff, we see that in 2020 40% of staff was younger than 40 years, but there has been a decline of -13% in the percentage younger staff between 2000 and 2020.

¹ Here we include all South African staff who are classified in HEMIS as black African, Indian and Coloured/Asian.

Table 4: Indicators of staff diversity

Indicator category	Indicator	2000	2005	2010	2015	2020
State indicator	Percentage of female staff FTE	49%	52%	59%	58%	64%
Dynamic indicator	Change in the percentage of female staff FTE			15%		
Dynamic indicator	Rate of growth (%) in female staff FTE (CAGR) (2000 to 2020)			2.0%		
State indicator	Percentage of black staff (AIC) FTE (South African staff)	37%	38%	40%	42%	57%
Dynamic indicator	Change in the percentage of black staff			20%		
Dynamic indicator	Rate of growth (%) in black staff FTE (CAGR) (2000 to 2020)			2.7%		
State indicator	Percentage of staff FTE from South Africa	93%	93%	95%	97%	94%
Dynamic indicator	Change in the percentage of staff from South Africa			1%		
Dynamic indicator	Rate of growth (%) in staff FTE from South Africa (CAGR) (2000 to 2020)			0.6%		
State indicator	Percentage of staff younger than 40 years	53%	42%	44%	36%	40%
Dynamic indicator	Change in the percentage of staff younger than 40 years			-13%		
Dynamic indicator	Rate of growth in staff younger than 40 years (CAGR) (2000 to 2020)			-0.7%		

5.3. The academic pipeline

The HEMIS database of DHET for the period 2000 to 2020 also informed the analysis of the academic pipeline in Psychology. In this section results are presented for Doctoral students only, under three headings: general trends in Doctoral enrolments and graduates, the demographics of enrolled Doctoral students, and the demographics of Doctoral graduates. The detailed analysis for the academic pipeline can be found in Part 2 of this report where the trends and patterns are presented in a number of figures and tables.

5.3.1. General trends in Doctoral enrolments and graduates

In the table below we summarise the general trends in Doctoral enrolments and graduates in Psychology.

When we look at the growth of Doctoral enrolments in Psychology, we see that there has been a steady increase between 2000 and 2020 in both total enrolments, at an annual average growth rate of 5.5%, and new (or first-time) enrolments, at an annual average growth rate of 5.4%. However, given the change in the HEMIS CESM classifications of disciplinary fields, the inclusion and exclusion of sub fields in the field of Psychology (as explained in the Appendix

2), impacts on the data trends presented below. We therefore also report on the growth of enrolments from 2010 onward and see increased growth of 4.4% for total enrolments and 7.7% for new enrolments.

In terms of graduates, the growth (5.6 between 2000 and 2020 and 8.1% between 2010 and 2020) was marginally higher than those for total and new enrolments which points to an efficient system of Doctoral throughput.

However, when we look at the average time-to-degree of Doctoral graduates we see that the average time-to-completion increased with 0.9 years to 5.8 years in 2020. The average age at commencement for Doctoral students in Psychology in 2020 was 39 years, while the average age at graduation for the same year was 43.8 years. We also see that the average age at graduation increased slightly (from 42.3 years in 2000 to 43.8 years in 2020).

Table 5: Indicators of future research capacity (Doctoral enrolments and graduates)

Indicator category	Indicator	2000	2005	2010	2015	2020
State indicator	Number of total Doctoral enrolments	271	501	509	779	786
Dynamic indicator	Rate of growth (%) in the number of total enrolments (CAGR) (2000 to 2020)			5.5%		
Dynamic indicator	Rate of growth (%) in the number of total enrolments (CAGR) (2010 to 2020)			4.4%		
State indicator	Number of new Doctoral enrolments	95	137	130	355	274
Dynamic indicator	Rate of growth (%) in the number of new Doctoral enrolments (CAGR) (2000 to 2020)			5.4%		
Dynamic indicator	Rate of growth (%) in the number of new Doctoral enrolments (CAGR) (2010 to 2020)			7.7%		
State indicator	Number of Doctoral graduates	44	68	60	98	131
Dynamic indicator	Rate of growth (%) in Doctoral graduates (CAGR) (2000 to 2020)			5.6%		
Dynamic indicator	Rate of growth (%) in Doctoral graduates (CAGR) (2010 to 2020)			8.1%		
State indicator	Average age at commencement of Doctoral studies	37.9	37.8	37.9	39.0	39.0
Dynamic indicator	Change in the average age at commencement of Doctoral studies (2000 to 2020)			1.1 years		
State indicator	Average time-to-degree of Doctoral studies	4.9	4.4	5.8	4.6	5.8
Dynamic indicator	Change in average time-to-degree of Doctoral studies (2000 to 2020)			0.9 years		
State indicator	Average age at graduation of Doctoral students	42.3	41.3	40.9	42.6	43.8
Dynamic indicator	Change in the average age at graduation of Doctoral students (2000 to 2020)			1.5 years		

5.3.2. Demographics of enrolled Doctoral students

Turning to the demographics of Doctoral enrolments, we see that in 2020, 63% of Doctoral enrolments was female. The number of female enrolments increased steadily since 2000 at an average annual growth rate of 12%. Over the same period the number of black (black African, Indian/Asian and Coloured) enrolments grew more rapidly at 9.3% where the percentage of black enrolments of South African Doctoral enrolments increased to 54% in 2020. We see that the percentage of South African students has decreased markedly between 2000 and 2020 to 80%. This is driven by increasing numbers of international students, particularly from the African continent, who are pursuing Doctoral studies in Psychology at South African universities. However, in recent years we do find that this trend is declining with the percentage of African enrolments in Psychology steadily declining from 2014/2015 onward.

Table 6: Demographics of Doctoral enrolments

Indicator category	Indicator	2000	2005	2010	2015	2020
State indicator	Percentage of female Doctoral enrolments of total enrolments	63%	65%	67%	77%	75%
Dynamic indicator	Change in the percentage of female Doctoral enrolments			12%		
Dynamic indicator	Rate of growth (%) in the number of female Doctoral enrolments (CAGR) (2000 to 2020)			5.3%		
State indicator	Percentage of black Doctoral enrolments (AIC) of South African enrolments	22%	32%	39%	45%	54%
Dynamic indicator	Change in the percentage of black Doctoral enrolments			32%		
Dynamic indicator	Rate of growth (%) in the number of black staff Doctoral enrolments (CAGR) (2000 to 2020)			9.3%		
State indicator	Percentage of South African Doctoral enrolments	97%	92%	89%	80%	80%
Dynamic indicator	Change in the percentage of South African Doctoral enrolments			-17%		
Dynamic indicator	Rate of growth (%) in the number of South African Doctoral enrolments (CAGR) (2000 to 2020)			4.4%		

5.3.3. Demographics of Doctoral graduates

When we look at the demographic profile of Doctoral graduates we see the share of female graduates in Psychology decreased somewhat over the period analysed with 70% of graduates in 2020 reported as female. Once again we see that the percentage of South African black graduates increased with 31% at a growth rate of 9.1% to 50% in 2020. Similar to what was observed for the enrolment data we see that the percentage of South African graduates decreased substantially between 2000 and 2020, but increased again from 2010 onward, where in 2020, 76% of Doctoral graduates in Psychology were of South African nationality.

Table 7: Demographics of Doctoral graduates

Indicator category	Indicator	2000	2005	2010	2015	2020
State indicator	Percentage of female graduates of total graduates	79%	76%	73%	82%	70%
Dynamic indicator	Change in the percentage of female Doctoral graduates			-9%		
Dynamic indicator	Rate of growth (%) in the number of female Doctoral graduates (CAGR) (2000 to 2020)			3.8%		
State indicator	Percentage of black Doctoral graduates (AIC) of South African graduates	19%	17%	25%	31%	50%
Dynamic indicator	Change in the percentage of black Doctoral graduates			31%		
Dynamic indicator	Rate of growth (%) in the number of black Doctoral graduates (CAGR) (2000 to 2020)			9.6%		
State indicator	Percentage of South African Doctoral graduates	95%	93%	83%	80%	76%
Dynamic indicator	Change in the percentage of South African Doctoral graduates			-19%		
Dynamic indicator	Rate of growth (%) in the number of South African Doctoral graduates (CAGR) (2000 to 2020)			4.4%		

5.4. Research

We have analysed the research ‘performance’ of Psychology in terms of three dimensions: the volume of research output, the transformation of research production as reflected in the author demographics, and the global standing and citation visibility or impact of research. The detailed analysis for research outputs and performance can be found in Part 2 of this report where we present the trends and patterns in a number of figures and tables.

5.4.1. Volume of research output

Based on *SA Knowledgebase*, the number of Psychology articles by university authors and number of contributing authors over the period 2005 to 2020 are presented in Table 5. The results show a steady and substantial increase in the number of articles (full paper count) published over this period. It is also of interest to know that the ‘productive human resources capacity’ that authored these papers, increased at a higher rate than the number of articles. The most likely explanation for this can be found in the increasing contribution that post-graduate students and post-Doctoral fellows are making to knowledge production in most academic fields at SA universities.

Table 8: Number of articles in the field of Psychology and the number of authors who produced these

Indicator category	Indicator	2005	2010	2015	2020
State indicator	Number of articles	242	487	828	1,404
Dynamic indicator	Rate of growth in the number of articles		12.4%		
State indicator	Number of contributing authors	306	575	1,150	2,049
Dynamic indicator	Rate of growth in the number of contributing authors		13.5%		

5.4.2. Author demographics

We have selected three indicators to assess to what extent the field of Psychology research has transformed over the 20-year period, namely, the gender, race, nationality and age of Psychology authors as captured in SA Knowledgebase.

Table 9: Demographics of authors

Indicator category	Indicator	2005	2010	2015	2020
State indicator	Percentage of university female authors	41%	40%	47%	54%
Dynamic indicator	Change in the percentage of university female authors		13%		
Dynamic indicator	Rate of growth (%) in the number of university female authors (CAGR) (2005 to 2020)		17.7%		
State indicator	Percentage of South African authors	91%	89%	76%	74%
Dynamic indicator	Change in the percentage of South African authors		-17%		
Dynamic indicator	Rate of growth (%) in the number of South African authors (2005 to 2020)		15.7%		
State indicator	Percentage of university black authors (South African)	13%	30%	30%	51%
Dynamic indicator	Change in the percentage of university black authors		38%		
Dynamic indicator	Rate of growth (%) in the number of university black authors (CAGR) (2005 to 2020)		26.5%		
State indicator	Percentage of university authors younger than 40 years	29%	20%	29%	31%
Dynamic indicator	Change in the percentage of university authors younger than 40 years (2005 to 2020)		2%		
Dynamic indicator	Rate of growth in the number of authors younger than 40 years		18.6%		

5.4.3. Global standing and citation visibility

The most basic measure of the South African performance in the field of Psychology is the number of publications (articles and review articles) being produced per year. In the table below we see that the field of Psychology increased its output in the WoS from 91 publications in 2000 to 584 in 2020. This has translated into an increased world share, from 0.4% to 0.9%. Psychology, however, declined in its world rank from being in the 20th position in 2000 to the 23rd position in 2020. It is important to note that the indicators presented in the table below are calculated for all South African articles (and review articles) in journals that belong to the subject category of Psychology. Thus, the authors of these articles could be from departments and centres outside the field of Psychology, but have been included in this specific analysis based on the fact that they had published in journals classified as belonging to Psychology.

The visibility of science is partially captured by looking at the number of times research publications are referenced ('cited') in the publications of other researchers. Citation practices differ vastly across fields though, making it impossible to compare numbers of citations across fields. The indicators that we present here report on the percentage of Psychology articles in the top 1%, 5% and 10% of highly cited Psychology papers in the world. The results reveal a positive picture: the share of Psychology articles published in the top 1% of highly cited papers marginally increased over time (from no share in 2000 to 1.14% in 2020). The increase in the shares of articles in the top 5% is also positive (from 3.88% to 4.38%), as well as the share in the top 10% of highly cited papers (from 3.88% to 10.23%).

Table 10: Indicators for global standing and citation visibility

Indicator category	Indicator	2000	2005	2010	2015	2020
State indicator	Total number of SA articles in WoS	91	166	300	454	584
Dynamic indicator	Rate of growth (%) in the number of South African articles in WoS (CAGR) (2000 to 2020)			9.7%		
State indicator	World share of WoS articles	0.4%	0.6%	0.6%	0.8%	0.9%
Dynamic indicator	Change in world share (2000 to 2020)			0.5%		
State indicator	World rank position in WoS	20	19	21	21	23
Dynamic indicator	Change in the world rank position			-3		
State indicator	Percentage of WoS articles in top 1% of highly cited papers	0.00%	0.00%	1.09%	0.23%	1.14%
Dynamic indicator	Change in the percentage of WoS articles in the top 1% of highly cited papers (2000 to 2020)			1.1%		
State indicator	Percentage of WoS articles in top 5% of highly cited papers	3.88%	3.01%	7.61%	3.03%	4.38%
Dynamic indicator	Change in the percentage of WoS articles in the top 5% of highly cited papers (2000 to 2020)			0.5%		
State indicator	Percentage of WoS articles in top 10% of highly cited papers	3.88%	6.77%	10.87%	7.69%	10.23%
Dynamic indicator	Change in the percentage of WoS articles in the top 10% of highly cited papers (2000 to 2020)			6.3%		

PART 2: DETAILED GRAPHS AND TABLES

6. NRF grant-holders and grant values

Table 11: Number of grant-holders and grants in Psychology, and the total grant value, by year: 2005 – 2020

Year	Number of grant-holders	Number of grants	Total grant value
2005	39	46	R4 200 918
2006	50	57	R4 155 081
2007	38	42	R2 888 641
2008	50	56	R3 638 290
2009	54	63	R4 570 016
2010	70	83	R5 711 393
2011	77	85	R5 630 660
2012	74	81	R5 361 297
2013	95	105	R8 810 285
2014	117	143	R23 659 827
2015	134	173	R31 424 692
2016	145	189	R31 483 972
2017	147	182	R22 475 136
2018	140	164	R16 929 568
2019	77	84	R15 306 394
2020	56	62	R13 687 627

Figure 6-1: Number of grant-holders in Psychology by year, broken down in terms of whether grant holders are SA-born or not: 2005 – 2020

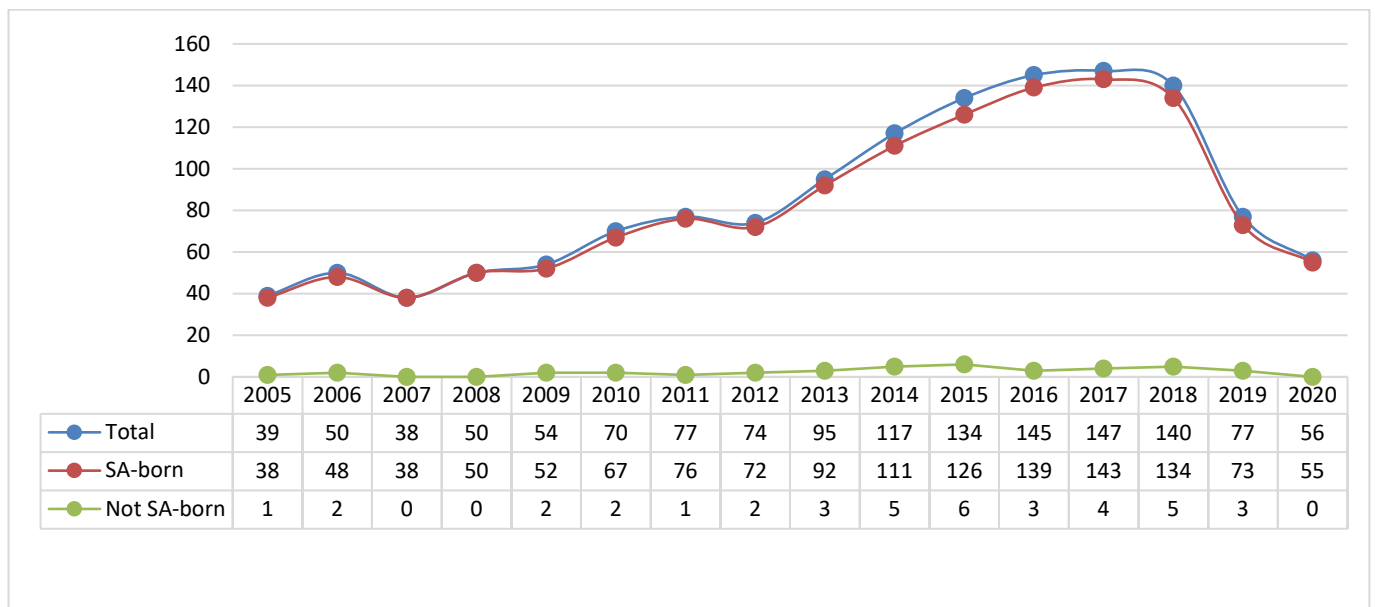


Table 12: Profile of grant-holders and grant values in Psychology by year and gender of grant-holder (SA-born only): 2005 – 2020

Year	Grant-holders (number)		Gant-holders (percentage)		Total grant values (ZAR)		Total grant values (percentage)		Average grant value per grant-holder	
	Female	Male	Female	Male	Female	Male	Female	Male	Female	Male
2005	24	14	63	37	R1 612 549	R2 520 126	39	61	R67 190	R180 009
2006	27	21	56	44	R2 041 734	R2 052 111	50	50	R75 620	R97 720
2007	22	16	58	42	R1 406 799	R1 481 842	49	51	R63 945	R92 615
2008	29	21	58	42	R1 780 078	R1 858 212	49	51	R61 382	R88 486
2009	31	21	60	40	R1 941 746	R2 432 136	44	56	R62 637	R115 816
2010	34	33	51	49	R2 261 254	R3 255 178	41	59	R66 507	R98 642
2011	36	40	47	53	R2 142 231	R3 005 013	42	58	R59 506	R75 125
2012	33	39	46	54	R2 421 672	R2 665 121	48	52	R73 384	R68 336
2013	48	44	52	48	R4 081 564	R4 575 203	47	53	R85 033	R103 982
2014	57	54	51	49	R14 185 162	R7 142 111	67	33	R248 862	R132 261
2015	65	61	52	48	R19 157 692	R8 478 566	69	31	R294 734	R138 993
2016	76	63	55	45	R20 795 853	R10 129 335	67	33	R273 630	R160 783
2017	85	58	59	41	R10 207 256	R11 631 950	47	53	R120 085	R200 551
2018	78	56	58	42	R8 208 279	R8 350 465	50	50	R105 234	R149 115
2019	45	28	62	38	R8 209 119	R6 852 206	55	45	R182 425	R244 722
2020	41	14	75	25	R9 661 861	R3 913 521	71	29	R235 655	R279 537
Total	--	--	--	--	R110 114 849	R80 343 097	58	42	--	--

Table 13: Profile of grant-holders and grant values in Psychology by year and race of grant-holder (SA-born only): 2005 – 2020

Year	Grant-holders (number)		Gant-holders (percentage)		Total grant values (ZAR)		Total grant values (percentage)		Average grant value per grant-holder	
	Black	White	Black	White	Black	White	Black	White	Black	White
2005	10	28	26	74	R691 051	R3 441 624	17	83	R69 105	R122 915
2006	11	37	23	77	R438 172	R3 655 673	11	89	R39 834	R98 802
2007	7	31	18	82	R277 884	R2 610 757	10	90	R39 698	R84 218
2008	13	37	26	74	R410 027	R3 228 263	11	89	R31 541	R87 250
2009	14	38	27	73	R687 485	R3 686 397	16	84	R49 106	R97 010
2010	21	46	31	69	R1 821 109	R3 695 323	33	67	R86 719	R80 333
2011	22	53	29	71	R1 383 228	R3 764 016	27	73	R62 874	R71 019
2012	16	56	22	78	R944 009	R4 142 784	19	81	R59 001	R73 978
2013	28	64	30	70	R2 650 211	R6 006 556	31	69	R94 650	R93 852
2014	39	72	35	65	R4 848 837	R16 478 437	23	77	R124 329	R228 867
2015	41	85	33	67	R6 843 542	R20 792 717	25	75	R166 916	R244 620
2016	49	90	35	65	R8 903 823	R22 021 366	29	71	R181 711	R244 682
2017	47	96	33	67	R10 065 527	R11 773 679	46	54	R214 160	R122 642
2018	52	82	39	61	R9 505 159	R7 053 584	57	43	R182 792	R86 019
2019	38	35	52	48	R8 601 461	R6 459 864	57	43	R226 354	R184 568
2020	31	24	56	44	R8 076 114	R5 499 268	59	41	R260 520	R229 136
Total	--	--	--	--	R66 147 640	R124 310 306	35	65	--	--

Table 14: Profile of grant-holders and grant values in Psychology by year and age of grant-holder: 2005 – 2020

Year	Grant-holders (number)		Gant-holders (percentage)		Total grant values (ZAR)		Total grant values (percentage)		Average grant value per grant-holder	
	<40	≥40	<40	≥40	<40	≥40	<40	≥40	<40	≥40
2005	13	26	33	67	R554 984	R3 645 934	13	87	R42 691	R140 228
2006	14	36	28	72	R791 179	R3 363 902	19	81	R56 513	R93 442
2007	11	27	29	71	R578 269	R2 310 371	20	80	R52 570	R85 569
2008	12	38	24	76	R442 386	R3 195 903	12	88	R36 866	R84 103
2009	15	39	28	72	R817 513	R3 752 503	18	82	R54 501	R96 218
2010	16	54	23	77	R1 397 366	R4 314 028	24	76	R87 335	R79 889
2011	13	64	17	83	R805 371	R4 825 289	14	86	R61 952	R75 395
2012	12	62	16	84	R587 155	R4 774 142	11	89	R48 930	R77 002
2013	17	78	18	82	R904 554	R7 905 731	10	90	R53 209	R101 356
2014	21	95	18	82	R1 999 916	R21 640 911	8	92	R95 234	R227 799
2015	30	104	22	78	R2 450 369	R28 974 324	8	92	R81 679	R278 599
2016	30	113	21	79	R3 184 388	R28 249 584	10	90	R106 146	R249 996
2017	28	119	19	81	R2 679 380	R19 795 755	12	88	R95 692	R166 351
2018	24	115	17	83	R2 612 726	R14 016 843	16	84	R108 864	R121 886
2019	22	55	29	71	R2 520 396	R12 785 997	16	84	R114 563	R232 473
2020	15	40	27	73	R1 453 839	R12 205 274	11	89	R96 923	R305 132
Total	--	--	--	--	R23 779 792	R175 756 492	12	88	--	--

Table 15: Number of grant-holders and grants in Psychology, and the total grant value, by organisation: 2005 – 2020

Organisation	Number of grant-holders	Number of grants	Total grant value
University of the Witwatersrand	27	54	R36 275 921
Stellenbosch University	36	93	R23 568 282
University of Cape Town	31	79	R19 735 082
North-West University	30	87	R19 547 419
Rhodes University	11	25	R18 174 594
University of Johannesburg	22	41	R17 209 032
University of KwaZulu-Natal	17	36	R13 612 219
University of Pretoria	25	59	R12 946 863
University of the Western Cape	27	54	R12 349 791
University of South Africa	29	49	R9 294 026
University of Zululand	5	11	R4 494 746
University of the Free State	17	28	R3 168 187
University of Limpopo	8	17	R2 422 554
Nelson Mandela University	8	12	R2 019 073
Direct	4	5	R1 421 910
University of Venda	3	6	R761 842
Human Sciences Research Council (HSRC)	5	8	R712 085
University of Fort Hare	4	4	R699 781
McGregor Museum	1	2	R580 806
South African Medical Research Council (MRC)	2	4	R362 913
Central University of Technology	2	7	R275 956
Durban University of Technology	2	2	R128 634
Sefako Makgatho Health Sciences University	1	1	R85 000
PSYSSA	2	2	R44 732
University of Limpopo	2	2	R42 349

Table 16: Number of grant-holders and grants in Psychology, and the total grant value, by funding category: 2005 – 2020

Funding category	Number of grant-holders	Number of grants	Total grant value
SA Research Chairs	6	6	R29 017 415
CoE Grants	3	2	R28 525 000
Incentive Funding for Rated Researchers	114	189	R26 872 635
Thuthuka	50	65	R14 503 692
Competitive Programme for Rated Researchers	22	26	R14 395 617
Community Engagement Programme	8	10	R10 882 497
Human and Social Dynamics in Development	11	13	R7 808 785
Competitive Support for Unrated Researchers	14	14	R5 951 711
Women in Research	17	31	R5 303 752
Technology and Human Resources for Industry Programme (Thrip)	1	2	R5 180 000
International Science and Technology Agreements	12	16	R4 690 691
Blue Skies Research Programme	3	6	R3 797 701

Funding category	Number of grant-holders	Number of grants	Total grant value
Indigenous Knowledge Systems	3	13	R3 730 124
DST-NRF Conference Fund	5	5	R3 466 254
S&F - Collaborative Postgraduate Training	2	2	R3 096 794
Distinct South African Research Opportunities	15	19	R3 026 144
Black Academics Advancement Programme	9	9	R2 777 048
Knowledge Interchange and Collaboration	79	107	R2 563 308
Sabbatical Grants to Complete Doctoral Degrees	20	20	R2 507 994
Researchers in Training	22	30	R2 301 987
S&F - Research Career Awards	1	1	R2 250 000
Economic Growth and International Competitiveness	6	12	R2 087 288
S&F - DSI / NRF Innovation Postdoctoral Fellowships	3	3	R1 653 502
S&F - Scholarships & Fellowships Programme	5	5	R1 578 195
Education Research in South Africa	3	3	R1 415 907
S&F - Scarce Skills Postdoctoral Fellowships	1	1	R978 000
Education and Challenges for Change	5	6	R905 366
IRG - Sweden / South Africa Research Cooperation Programme	1	1	R899 630
Rediba	3	4	R835 747
Unlocking the Future	1	2	R799 145
IRG - Flemish / South Africa Research Cooperation Programme	1	1	R744 287
IRG - Russian Foundation for Basic Research / NRF Research Cooperation Programme	2	2	R656 542
Research Development Grants for Y-Rated Researchers	3	3	R544 200
University Research Development Programme	2	2	R542 774
NP - Improving Academic Qualifications	4	4	R487 967
Evaluation and Rating	14	14	R406 264
International Council of Scientific Unions	4	9	R356 624
Development Grant for KFD	7	7	R355 610
NP - Support for Woman & Young Researchers	1	1	R300 000
International Liaison	2	3	R290 000
Institutional Research Development Programme	1	1	R252 673
IRG - UK / South Africa Researcher Links Grants for Travel	6	7	R218 448
S&F - Part time Doctoral Scholarships	2	2	R200 000
NRF - European Research Council Partnership	1	1	R197 477
Information and Communication Technology	1	1	R166 800
Research Information Management System Implementation Grants	1	1	R150 000
S&F - Innovation Masters Scholarships	1	1	R90 000
S&F - Extended support for scholarships and fellowships	1	1	R80 000
Education Research Audit	3	3	R72 768
IRG - France / South Africa Research Cooperation Programme	1	1	R19 435

7. Staff capacity

In the figure below, we report on the total sum FTE of permanent instructional/research staff in Psychology. We see that there has been a steady increase between 2000 and 2009 after which there is a sharp decline. This is due to the reclassification of the CESM categories. We explain the impact of the reclassification in detail in the Technical Appendix.

We see a sharp increase again from 2017 to 2018. When we look at the breakdown of staff FTE by institutions, we see that there is an increase in staff FTE between 2017 and 2018 for a number of institutions.

Figure 7-1: Total number of staff in Psychology by year: 2000 - 2020

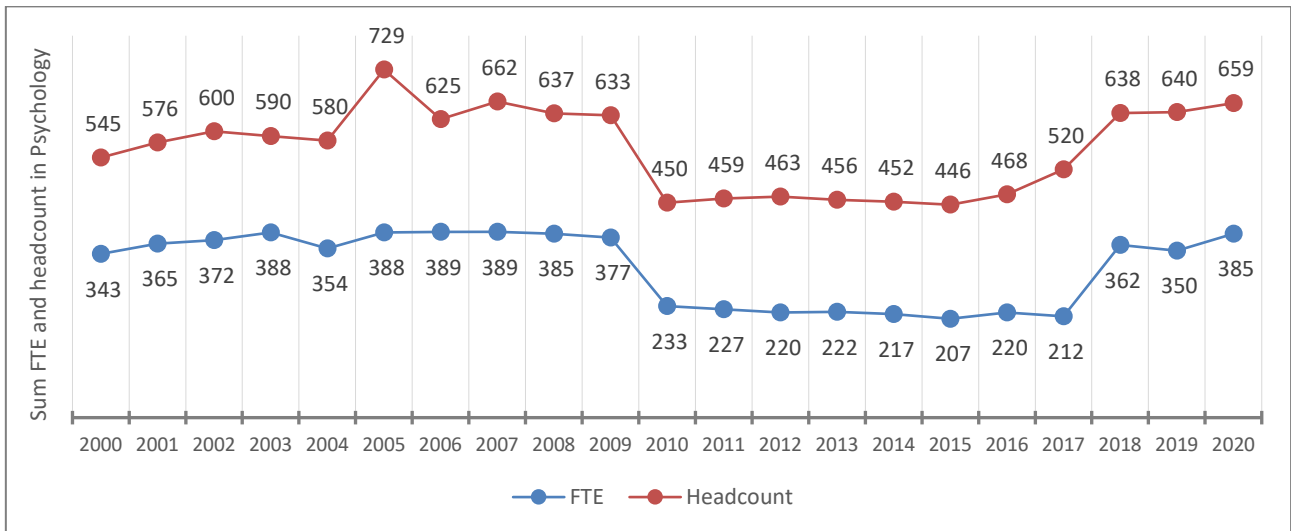


Figure 7-2: Percentage of staff with a Doctoral qualification in Psychology by year: 2000 - 2020

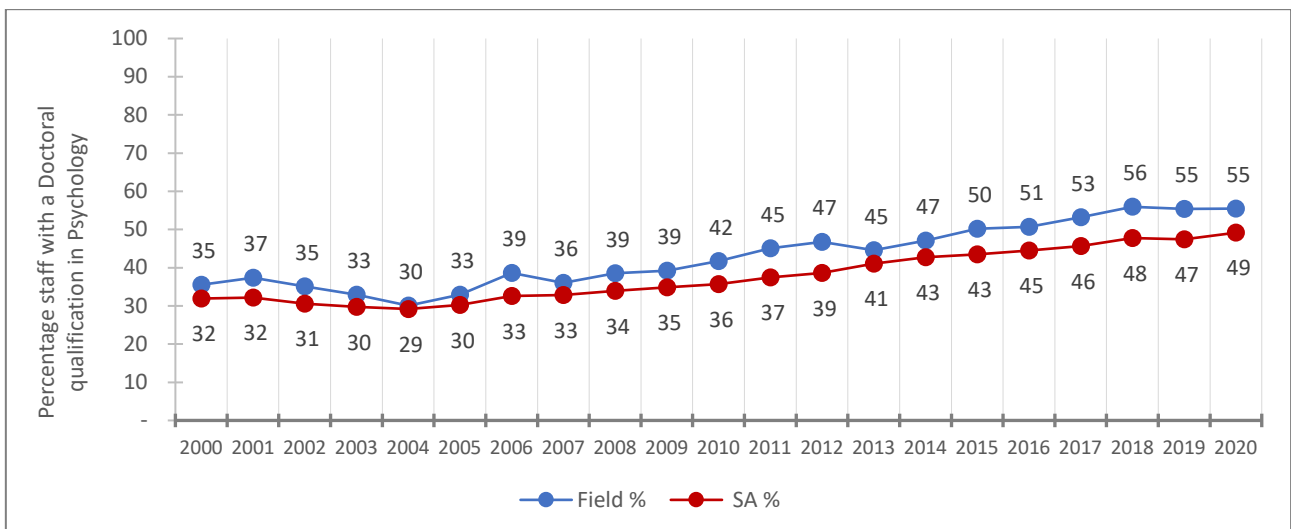


Figure 7-3: Percentage of staff in Psychology by rank and year: 2000 - 2020

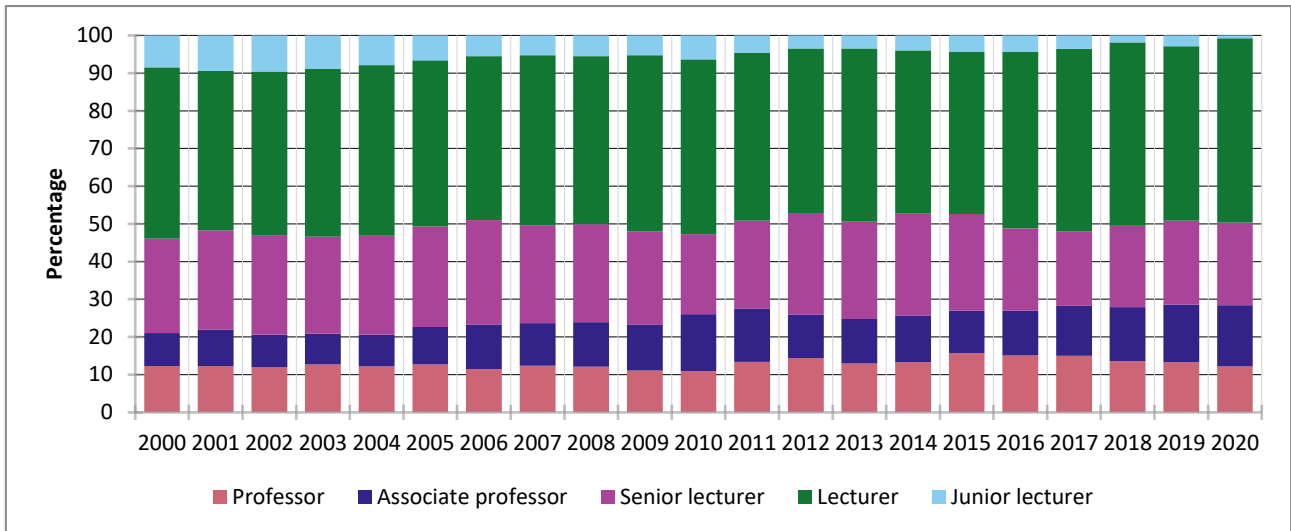


Table 17: Sum of staff FTE per university in Psychology

University	Metric	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
CPUT	Headcount	11	5	10	8	8	7	9	15	7	10	4	3	3	3	2	1		1	1	1	1
	FTE	2.2	1.5	2.9	2.1	2.9	2.1	2.6	5.2	2.4	2.8	0.5	0.4	0.4	0.5	0.2	0.2		0.2	0.2	0.2	0.2
CUT	Headcount	8	9	7	4	8	11	10	9	8	9	3	3	4	3	5	3	4	4	4	3	3
	FTE	2.1	2.4	2.0	1.1	3.5	3.9	3.1	3.4	2.8	1.7	0.8	1.1	1.1	0.6	0.9	0.8	0.8	0.8	0.8	0.8	0.8
DUT	Headcount	7	3	11	6	9	10	12	13	7	10	5	6	5	4	4	5	4	5	7	4	16
	FTE	0.7	0.5	3.8	1.6	2.5	2.7	3.3	3.3	2.3	3.4	1.3	1.0	0.7	0.6	0.8	0.9	0.5	1.4	1.4	0.5	6.8
MUT	Headcount	1	1	1	2	2	2	2	2	2	2		1	1	2	1	1	1			4	4
	FTE	1.0	0.1	0.2	0.5	0.6	0.4	0.5	0.6	0.6	0.6		0.6	0.3	1.1	0.2	0.2	0.2			0.5	0.9
NMU	Headcount	21	21	21	20	29	31	19	22	19	20	14	13	17	18	17	17	17	17	16	21	22
	FTE	8.6	9.7	9.2	10.8	14.8	12.7	9.1	10.7	9.2	8.1	6.6	6.3	7.6	8.8	8.5	8.0	8.7	8.8	9.8	12.4	13.4
NWU	Headcount	24	33	36	33	35	111	38	50	47	49	73	89	90	87	88	100	97	94	101	86	101
	FTE	15.1	23.9	24.2	23.7	18.1	34.5	34.9	26.3	32.1	31.1	30.0	36.4	34.6	36.9	39.1	37.2	35.6	35.4	45.9	44.2	50.9
RU	Headcount	15	21	22	20	14	14	14	14	13	14	6	4	4	5	3	3	4	3	19	18	20
	FTE	9.3	17.4	18.1	16.4	11.4	11.3	11.9	12.4	9.5	11.0	4.1	1.6	2.0	2.9	2.1	1.9	1.8	2.0	15.5	15.3	16.1
SMU	Headcount																	7	7	22	25	24
	FTE																	4.1	3.6	16.0	18.4	17.8
SPU	Headcount																					1
	FTE																					0.5
SU	Headcount		29	29	31	31	33	29	26	30	27	9	10	11	13	13	13	13	13	36	33	41
	FTE		22.5	22.1	24.5	22.8	25.0	23.5	21.8	22.1	23.1	7.1	8.4	9.3	11.0	10.9	10.7	10.7	10.5	28.8	26.0	29.6
TUT	Headcount	30	8	7	9	11	10	11	15	15	16	3	2	2	2	2	2	1	1	4	4	2
	FTE	21.9	1.5	1.5	1.9	3.2	3.7	3.0	5.2	5.0	6.5	1.4	1.2	1.2	1.2	1.2	1.0	1.0	1.0	3.9	3.2	2.0
UCT	Headcount	13	10	11	11	14	13	15	45	47	51	6	22	20	22	24	25	26	25	27	25	24
	FTE	9.9	8.2	7.3	7.4	9.0	7.5	14.5	15.1	14.8	16.4	5.2	6.8	7.1	7.2	8.3	8.5	8.4	7.6	14.6	15.2	14.6
UFH	Headcount	7	6	9	9	18	17	19	16	17	20	7	5	6	8	8	5	6	3	12	11	10
	FTE	6.0	5.2	6.6	7.2	15.1	15.0	16.3	15.7	15.7	14.9	5.6	3.6	5.1	6.8	6.2	4.0	5.1	2.8	11.1	10.1	9.3
UFS	Headcount	28	35	30	28		32	37	39	36	36	26	29	25	27	28	15	20	33	41	41	39
	FTE	19.0	24.3	18.3	19.6		20.9	23.7	23.0	25.0	28.0	20.4	24.1	20.8	14.7	14.4	9.7	12.9	18.3	25.3	22.5	22.5
UJ	Headcount	35	37	39	39	47	57	49	45	44	36	43	40	44	38	36	38	43	39	43	48	54
	FTE	22.9	19.8	21.0	22.7	28.2	33.7	26.1	25.6	28.2	22.8	29.6	22.9	25.6	19.9	17.3	20.7	21.9	22.1	30.6	38.0	43.3
UKZN	Headcount	56	69	64	67	76	70	83	84	86	62	43	44	49	33	41	39	37	32	37	30	37
	FTE	39.9	37.6	37.6	40.6	40.8	45.2	47.2	51.0	47.8	38.3	16.3	21.9	24.9	18.8	19.9	18.8	17.2	13.0	27.2	23.1	27.5
UL	Headcount	36	32	32	29	27	25	23	25	29	25	16	17	16	15	14	10	10	11	16	15	16
	FTE	18.2	22.5	22.9	21.5	20.5	17.5	15.8	16.3	21.6	19.8	10.9	13.6	12.1	11.1	11.0	4.6	4.6	5.1	11.8	9.9	12.0
UM	Headcount																					2
	FTE																					0.7
UNISA	Headcount	73	76	79	80	81	86	99	87	74	87	30	63	60	62	61	63	65	117	94	118	91
	FTE	51.1	52.9	53.0	56.4	56.8	54.6	58.6	56.2	49.1	49.8	15.2	36.3	30.1	32.0	33.9	36.6	39.7	33.3	29.6	24.6	27.4
UNIVEN	Headcount	14	14	11	11	10	13	12	14	14	15	17	4	6	6	7	7	10	12	13	13	10

	FTE	8.0	8.4	7.9	9.4	8.9	9.6	10.1	11.0	13.1	12.9	14.0	2.4	3.9	3.2	4.0	3.8	5.5	5.2	9.0	9.0	7.1
UNIZULU	Headcount	14	13	11	8	7	7	10	10	13	13	10	12	12	8	6	6	7	8	8	8	7
	FTE	12.0	10.1	7.7	5.7	5.1	5.0	6.8	6.8	8.8	8.4	3.8	4.4	3.4	2.6	2.4	2.4	3.1	3.5	6.4	6.4	5.6
UP	Headcount	16	17	26	27	33	31	31	28	23	26	46	48	40	46	46	45	42	40	38	38	39
	FTE	10.6	11.5	15.9	18.1	22.8	20.3	20.6	18.2	15.5	17.6	16.0	13.4	9.5	17.8	13.8	13.9	12.0	10.7	11.0	11.0	15.5
UWC	Headcount	28	28	31	32	46	37	24	33	33	33	18	22	23	31	24	24	30	27	30	28	29
	FTE	24.9	24.9	28.4	28.3	32.7	26.1	19.2	24.0	24.8	23.9	8.5	13.5	12.5	17.4	14.0	15.6	18.6	17.3	27.0	25.5	27.0
Vista	Headcount	53	48	41	40																	
	FTE	31.2	26.6	24.9	31.1																	
VUT	Headcount	4	6	8	12	8	10	8	6	5	4	3	3	3	3	1	2	2	5	5	5	3
	FTE	0.9	1.5	1.7	2.0	1.3	1.7	1.2	1.5	0.8	0.8	0.6	0.7	0.8	1.0	0.8	0.9	0.9	1.2	1.7	1.7	0.6
WITS	Headcount	46	40	50	52	54	86	57	49	54	55	53	11	11	11	10	11	11	12	52	50	52
	FTE	26.1	23.0	25.9	27.7	25.7	24.6	26.7	25.0	25.7	26.6	26.0	0.2	0.2	0.2	0.1	0.1	0.1	1.1	26.0	24.7	24.6
WSU	Headcount	5	15	14	12	12	16	14	15	14	13	15	8	11	9	11	11	11	11	11	9	12
	FTE	1.6	8.6	8.9	7.4	7.7	10.0	10.7	10.6	8.6	8.6	9.9	6.3	7.3	5.4	7.1	7.0	7.1	7.1	7.5	6.0	8.2

In the table above we report on the data as submitted by the various institutions to the DHET. We see that for some institutions and some years we see some fluctuation. In the Technical Appendix we report on some of the problems with the HEMIS data and, especially the reclassification of the CESM framework which in some cases explain the fluctuations. We have tried as far as possible to correct any glaring errors in the data submitted and to explain fluctuations where explanations are evident, but verifying historical data has not been possible.

We see lower numbers of staff FTE reported by SU, UCT, RU and UFH for the years 2010 to 2017 which is a similar trend observed for WITS where we see missing or incorrect data reported for the periods 2011 to 2017. These trends therefore impact on the total staff FTE in Psychology where we see lower staff FTE reported for these years.

8. Staff diversity

Here we look at the trends in staff diversity between 2000 and 2020.

Figure 8-1: Percentage of staff in Psychology by gender and year: 2000 - 2020

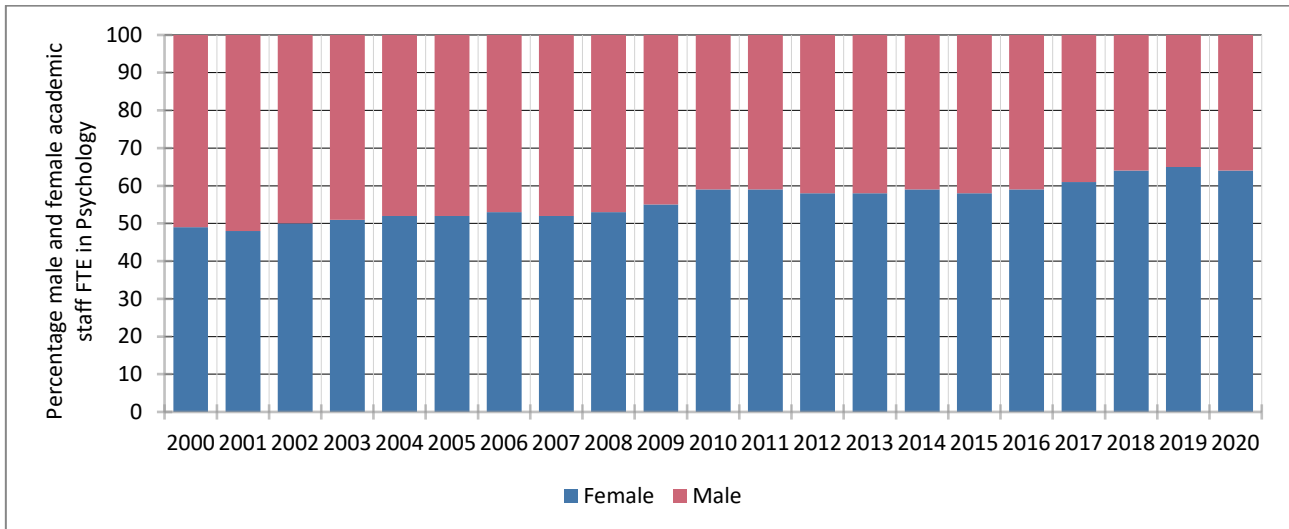


Figure 8-2: Percentage of staff in Psychology by race and year: 2000 - 2020

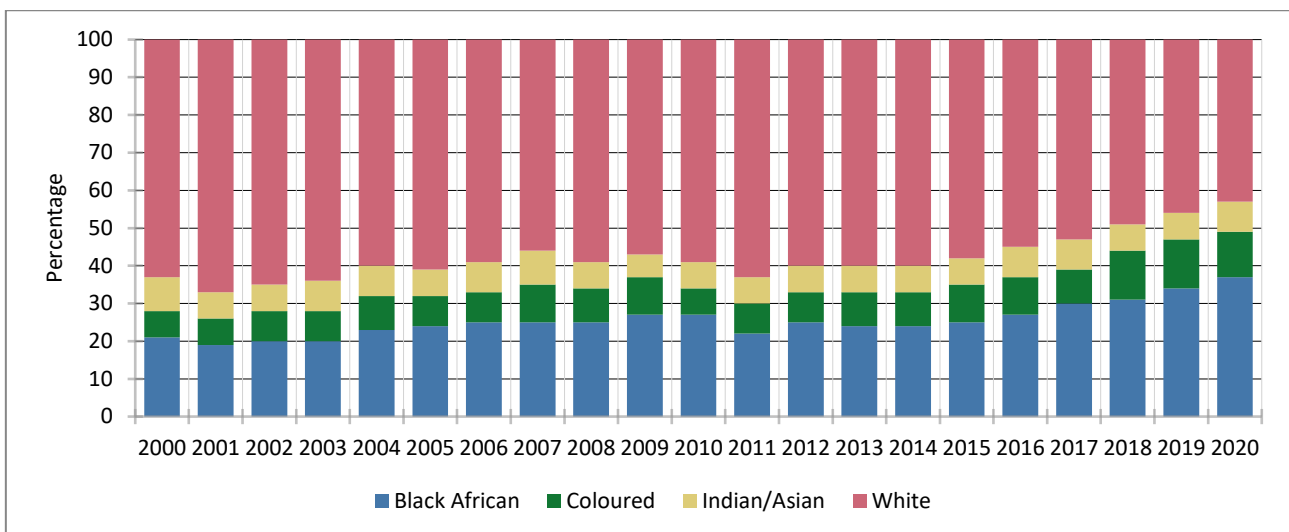


Figure 8-3: Percentage of staff in Psychology by nationality and year: 2000 - 2020

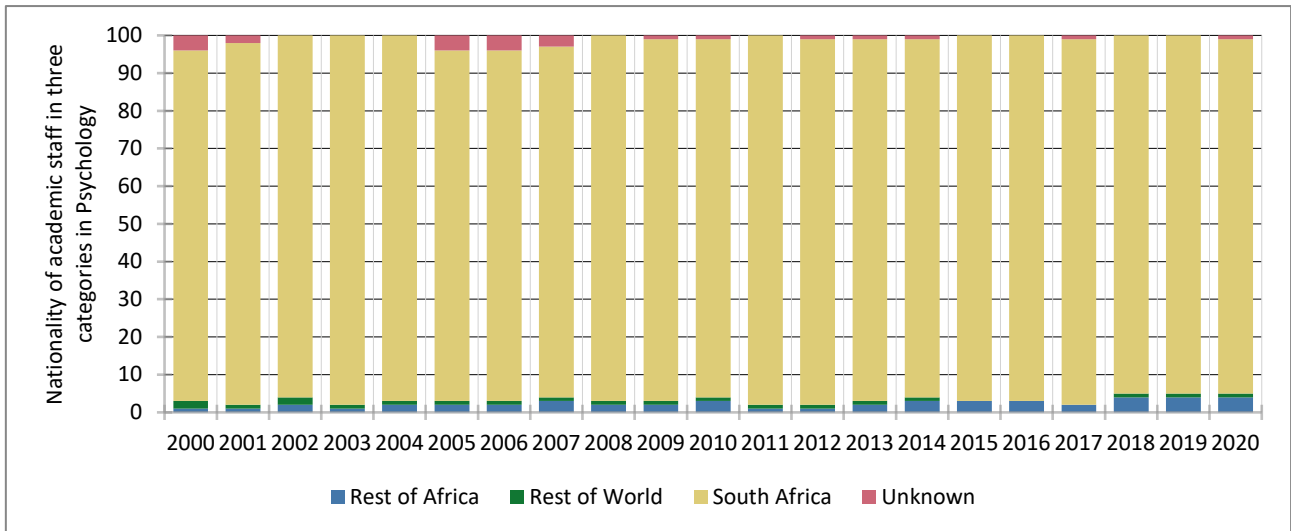


Figure 8-4: Percentage of staff in Psychology by age (two categories) and year: 2000 - 2020

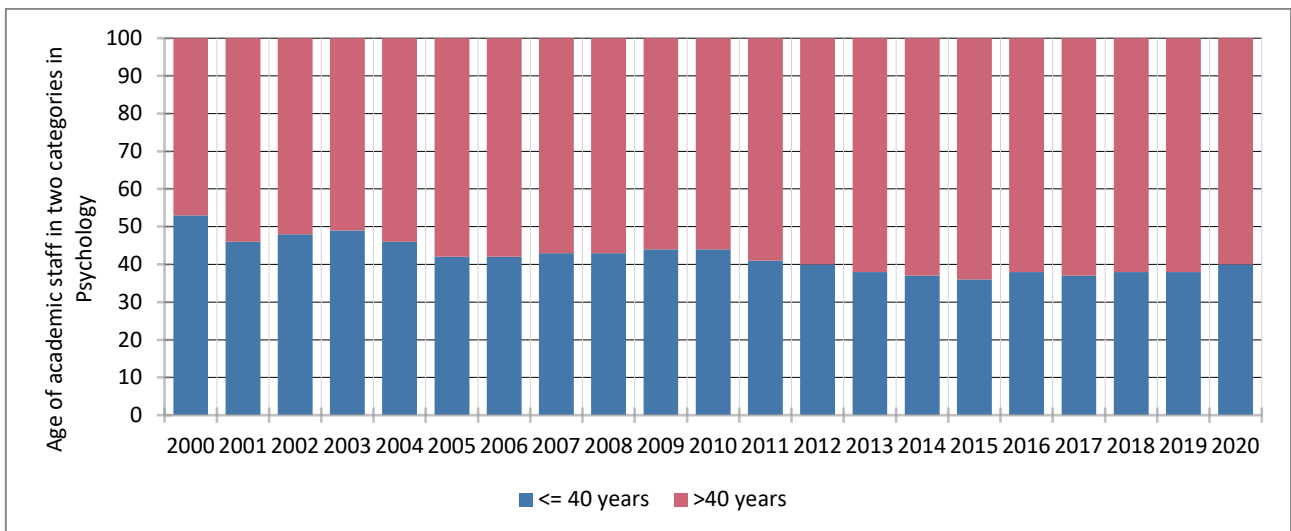
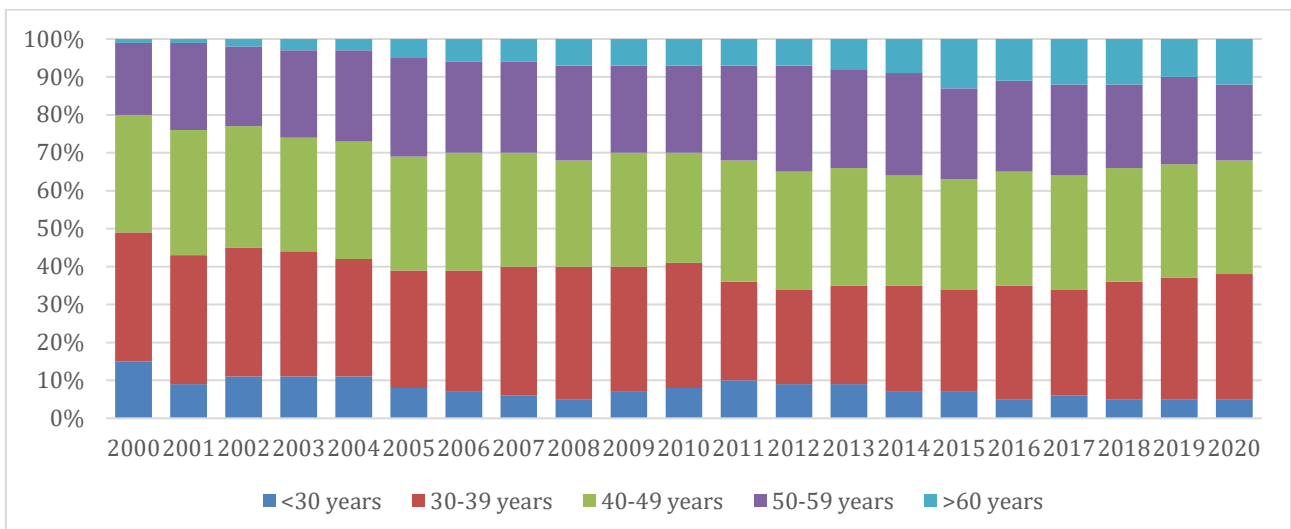


Figure 8-5: Percentage of staff in Psychology by age (five categories) and year: 2000 - 2020



9. Academic pipeline

9.1. Honours students

9.1.1. Enrolments

Figure 9-1: Number of total Honours enrolments in Psychology by year: 2000 - 2020

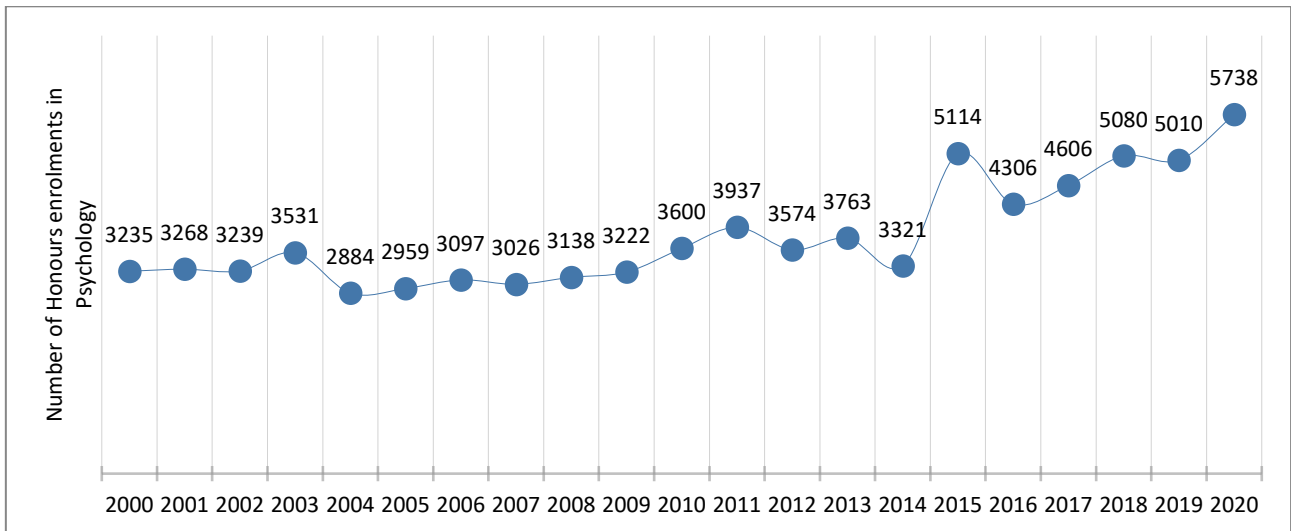
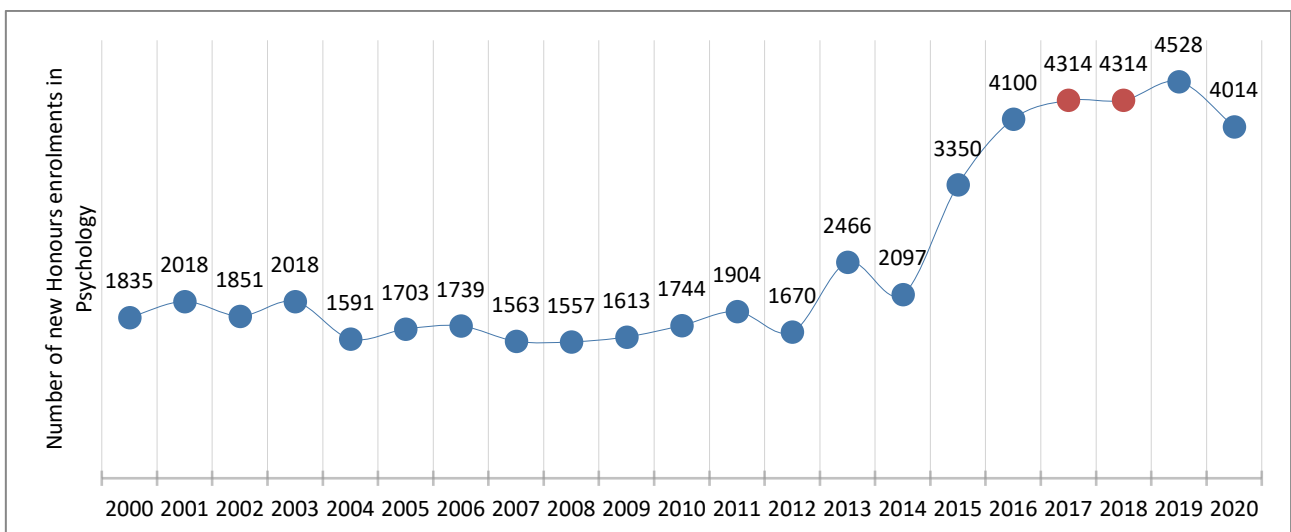


Figure 9-2: Number of new Honours enrolments in Psychology by year: 2000 - 2020²



² Due to missing data reported for UNISA in 2017 and 2018 we have imputed data for these years for the entire system.

Figure 9-3: Percentage of total Honours enrolments in Psychology by gender and year: 2000 - 2020

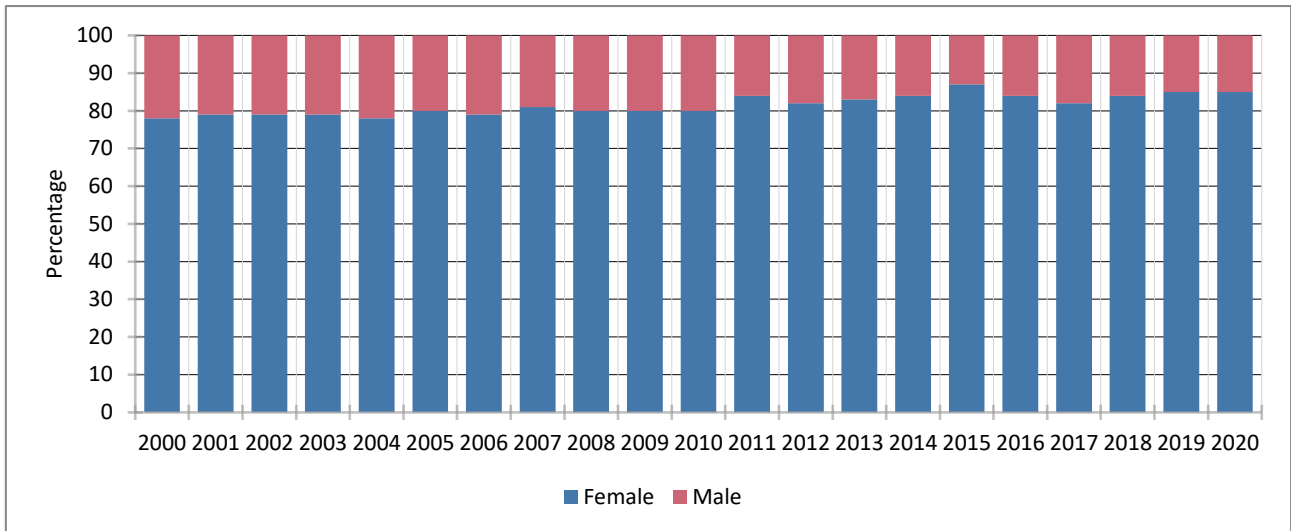


Figure 9-4: Percentage of total Honours enrolments in Psychology by race and year: 2000 - 2020

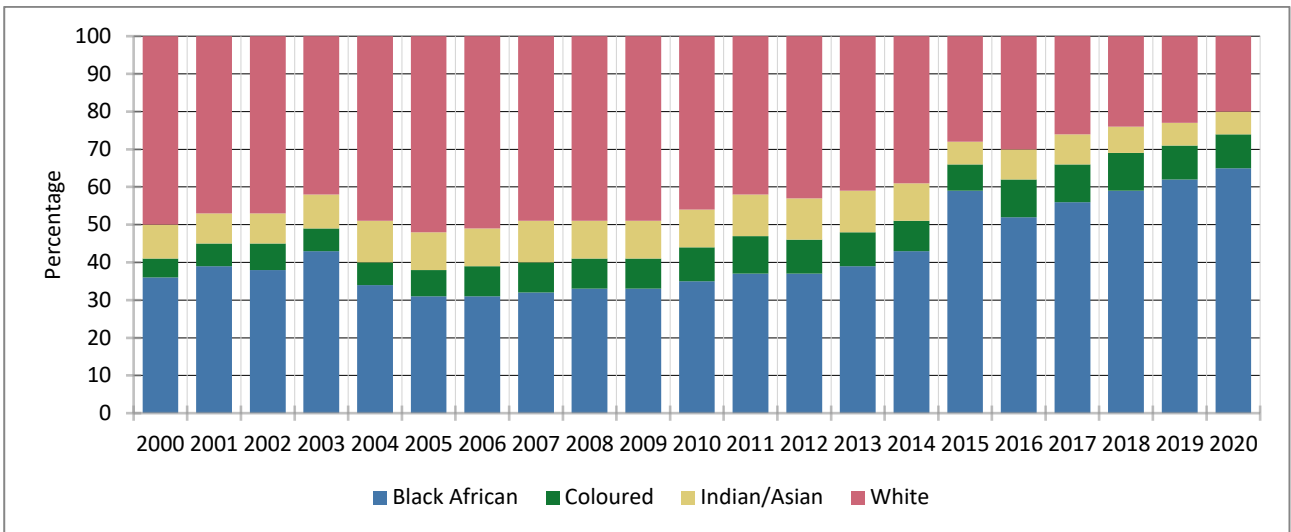


Figure 9-5: Percentage of total Honours enrolments in Psychology by nationality and year: 2000 - 2020

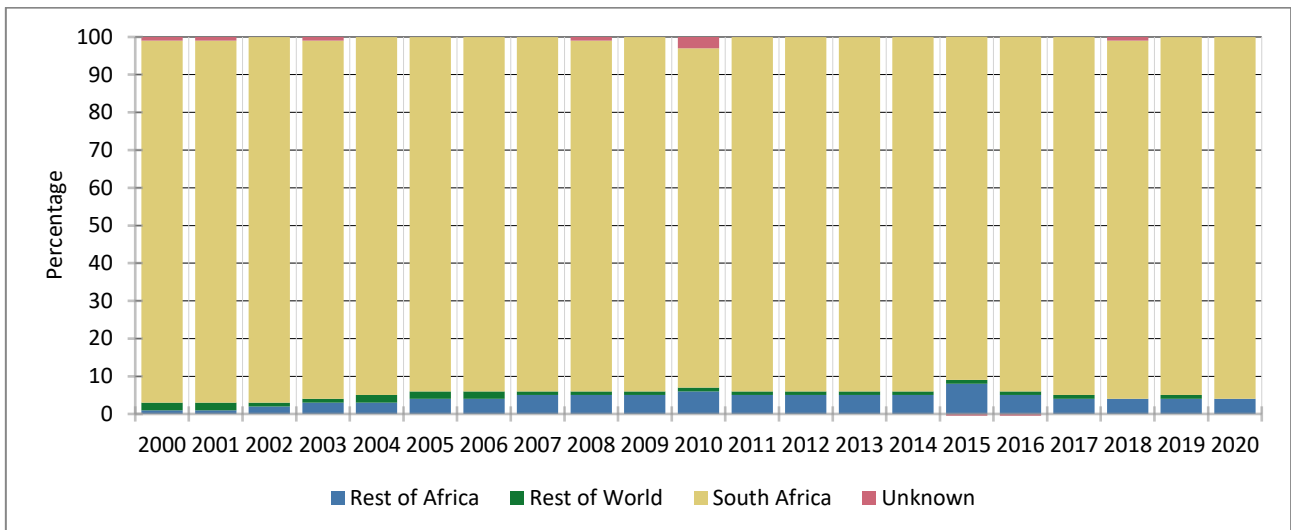
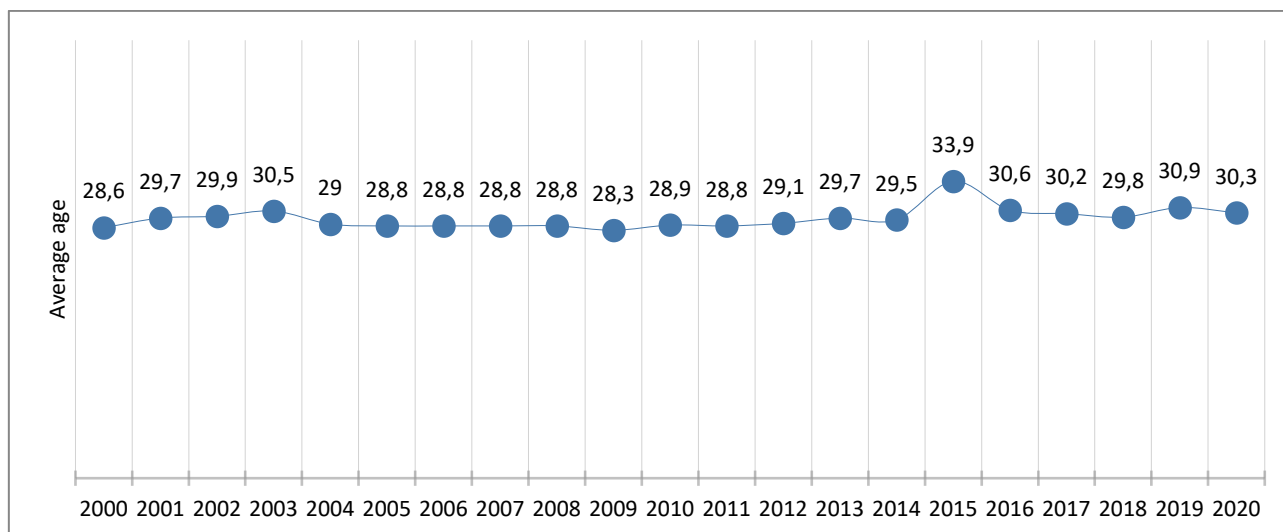


Figure 9-6: Average age of Honours students in Psychology at commencement of studies by year: 2000 - 2020



The boxplot below illustrates the distribution of the age at commencement of Honours enrolments. The black horizontal line represents the median age, whilst the red dot indicates the mean age for the respective years. The median enrolment age fluctuated somewhat between 25 and 31 years over the reported period. In 2020 the median age was 27 years while the mean was slightly higher at 30.3 years. The range, as illustrated by the whiskers in the plot below, shows that in 2020, students were between the ages of 21 and 50 when enrolling for their Honours studies in Psychology.

Figure 9-7: Distribution of Honours enrolments' commencement age

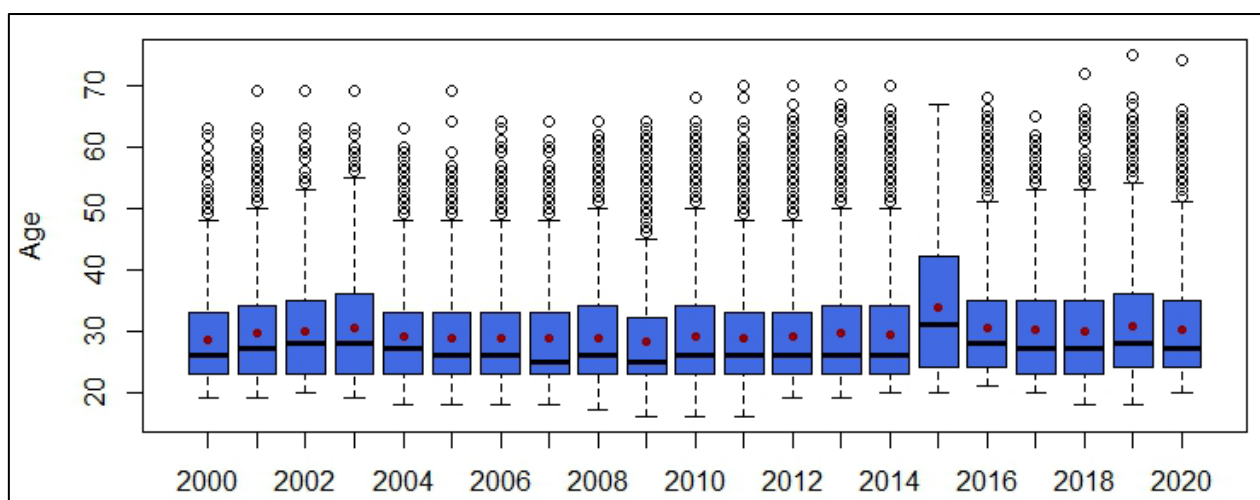


Table 18: Number of Honours enrolments per university in Psychology

University	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
NMU	41	62	56	40	17	106	94	68	63	78	44	60	57	48	50	41	49	55	63	63	74
NWU	181	108	101	145	213	197	222	201	219	201	95	83	88	94	86	1,873	163	131	98	100	78
RU	39	43	33	45	27	26	33	43	32	27	31	31	37	40	45	54	59	46	51	54	51
SU	133	102	107	87	79	84	53	53	39	33	202	66	57	62	68	59	33	33	40	37	37
UCT	41	40	33	44	40	62	58	63	63	78	85	84	60	74	67	73	61	79	73	82	67
UFH	6	13	23	19	58	53	83	82	75	73	63	55	62	71	85	66	87	108	145	104	141
UFS	123	459	480	699	91	101	70	131	136	119	174	155	109	55	40	75	57	50	52	83	71
UJ	308	190	211	239	211	265	224	143	99	122	97	127	120	94	114	111	130	120	141	140	146
UKZN	177	131	123	118	114	81	73	66	72	59	73	75	141	262	269	307	422	335	196	265	172
UL	71	44	63	50	45	40	24	40	50	51	35	60	59	40	40	23	18	48	46	57	57
UNISA	1,702	1,671	1,679	1,701	1,712	1,630	1,858	1,862	2,029	2,160	2,383	2,803	2,460	2,554	2,093	2,070	2,834	3,187	3,707	3,576	4,325
UNIVEN	5	19	8	15	19	14	16	13	11	9	17	11	17	22	26	23	41	34	28	29	31
UNIZULU	34	31	27	18	20	14	17	23	14	8	15	23	8	5	4	6			22	2	13
UP	97	70	61	88	86	100	90	85	83	71	88	81	69	83	82	90	89	98	114	97	94
UWC	103	146	116	100	87	113	98	82	76	67	94	111	103	113	90	82	123	144	150	144	146
Vista	105	64	49	53																	
WITS	50	57	59	55	48	60	67	61	66	52	80	74	78	89	112	129	122	117	132	147	190
WSU	19	18	10	15	17	13	17	10	11	14	24	38	49	57	50	10					14
SMU																22	18	21	22	30	31

9.1.2. Graduates

Figure 9-8: Number of Honours graduates in Psychology by year: 2000 - 2020

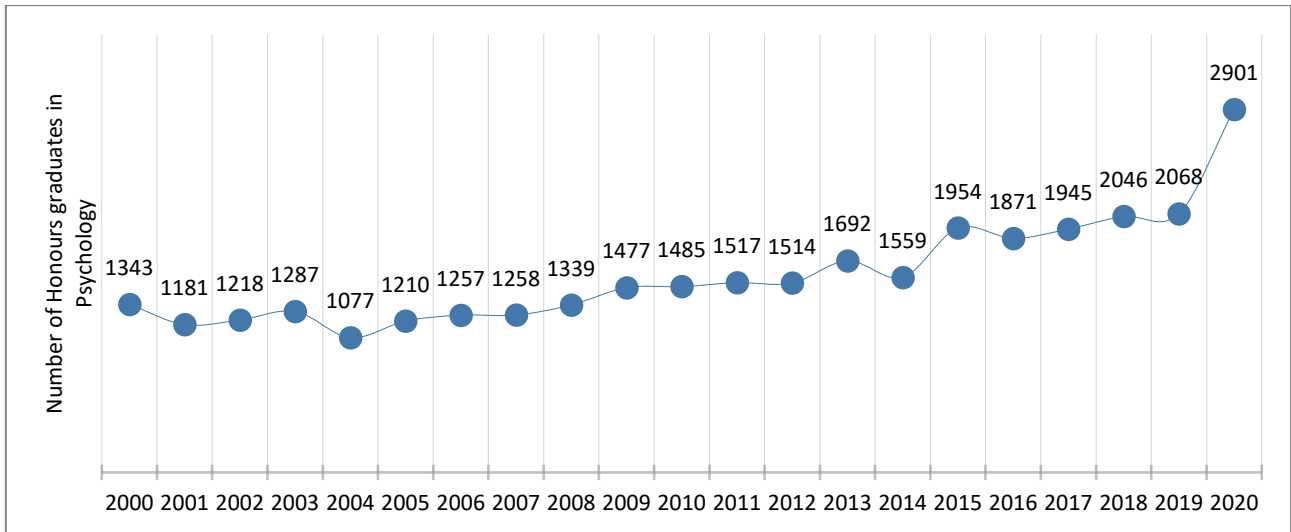


Figure 9-9: Percentage of Honours graduates in Psychology by gender and year: 2000 - 2020

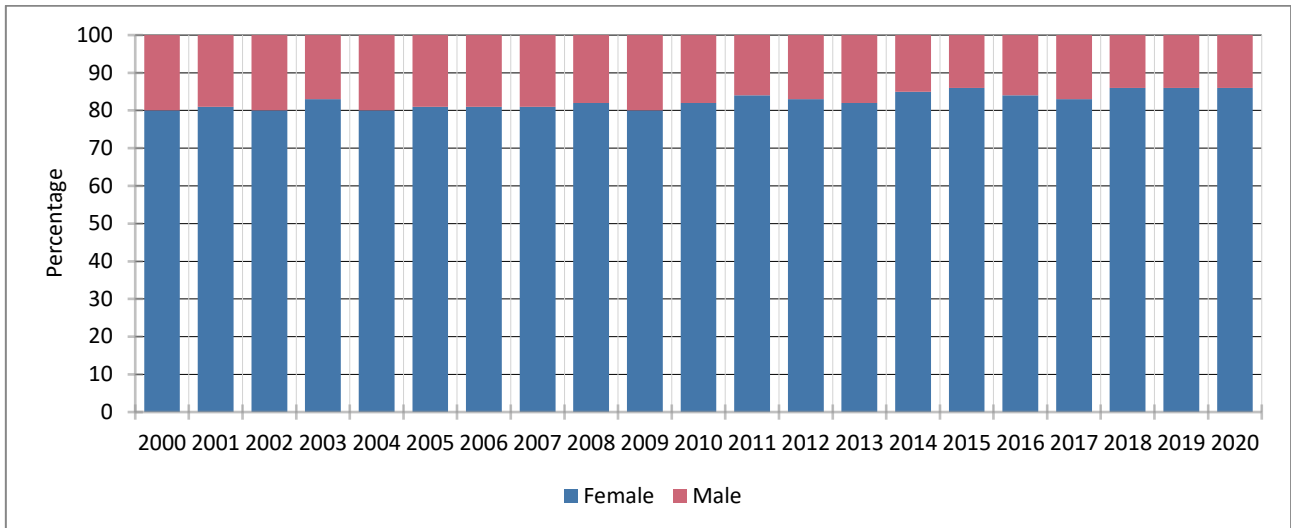


Figure 9-10: Percentage of Honours graduates in Psychology by race and year: 2000 - 2020

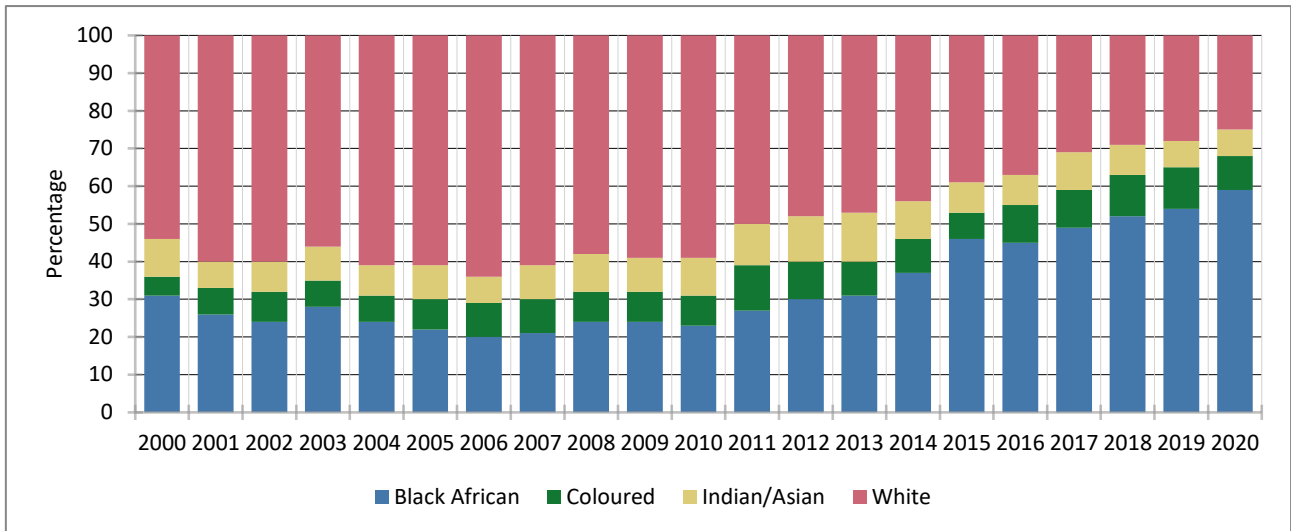


Figure 9-11: Percentage of Honours graduates in Psychology by nationality and year: 2000 - 2020

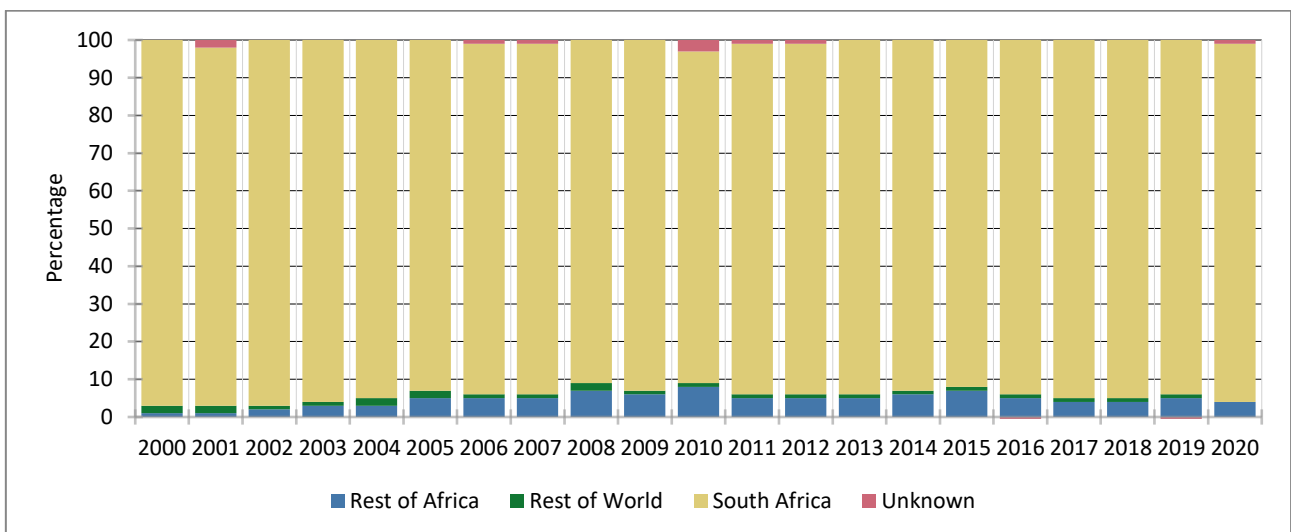
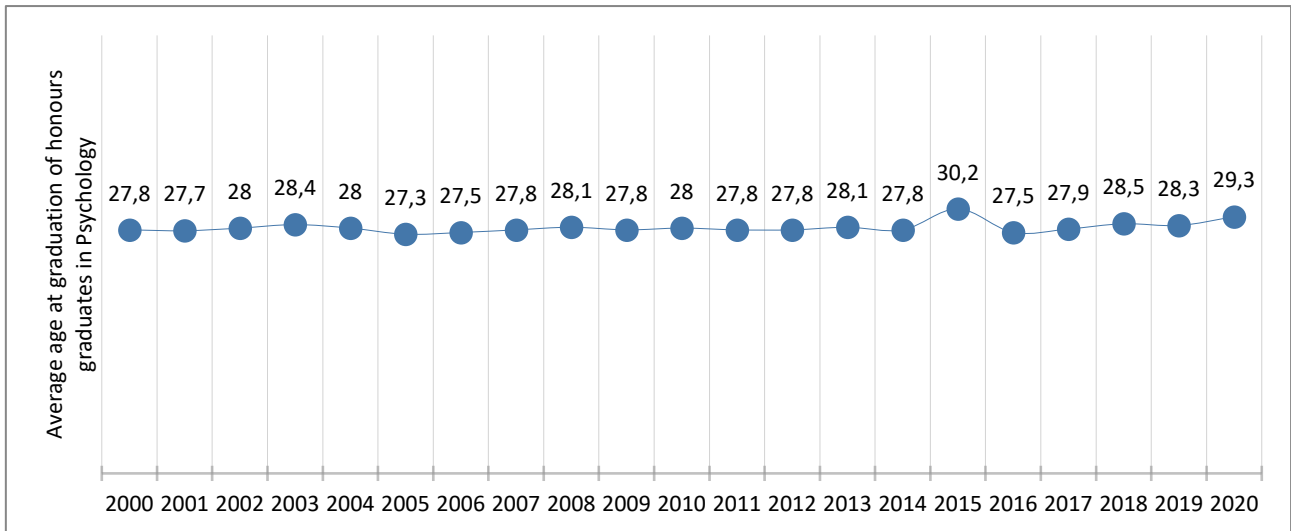


Figure 9-12: Average age at graduation of Honours students in Psychology by year: 2000 – 2020



The boxplot below illustrates the distribution of the age at graduation of Honours students. The black horizontal line represents the median age, whilst the red dot indicates the mean age for the respective years. There has been a slightly variation in the median graduation age of Honours students (between 24 and 26) over the reported period. In 2020 the median graduation age was 26 while the mean was slightly higher at 29.3 years. The large range, as illustrated by the whiskers in the plot below, shows that in 2020, Honours students in Psychology complete their studies between the ages of 20 and 48 years.

Figure 9-13: Distribution of Honours students' graduation age

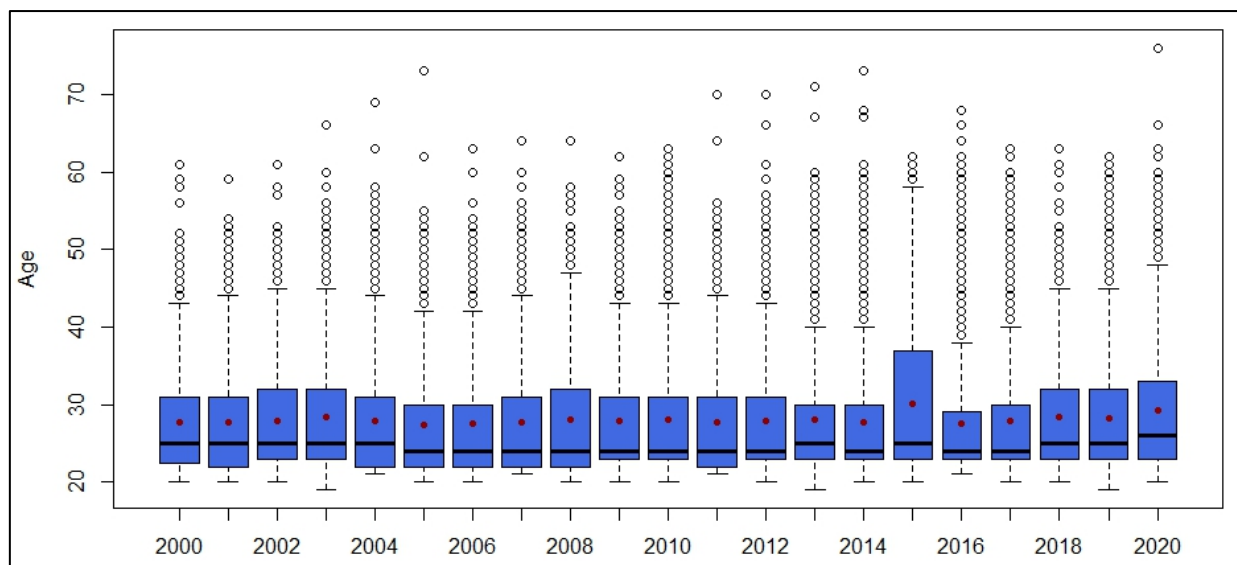
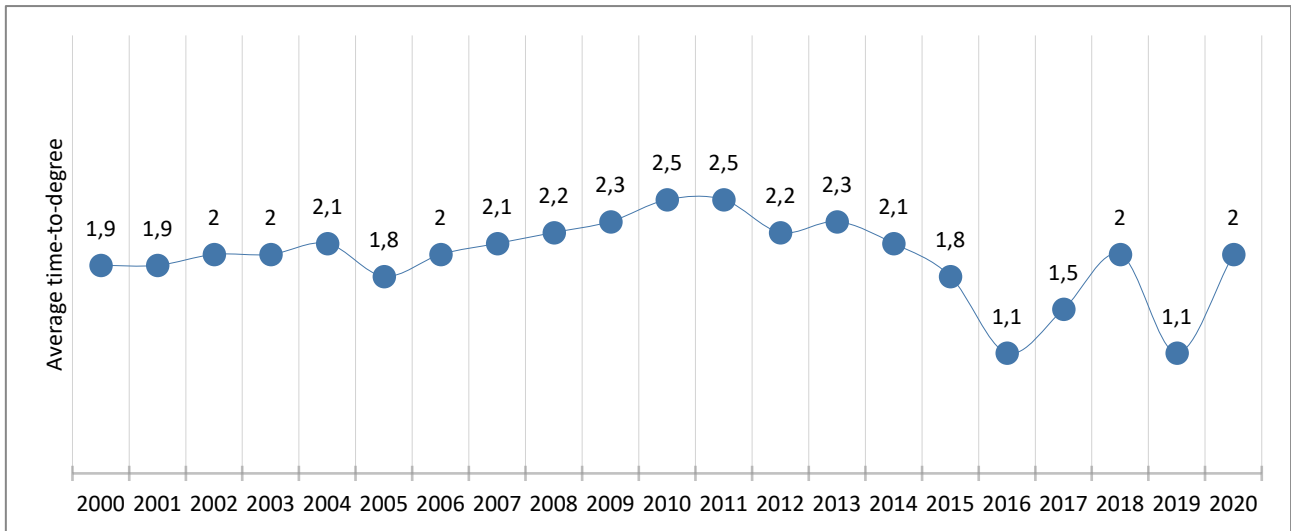


Table 19: Number of Honours graduates per university in Psychology

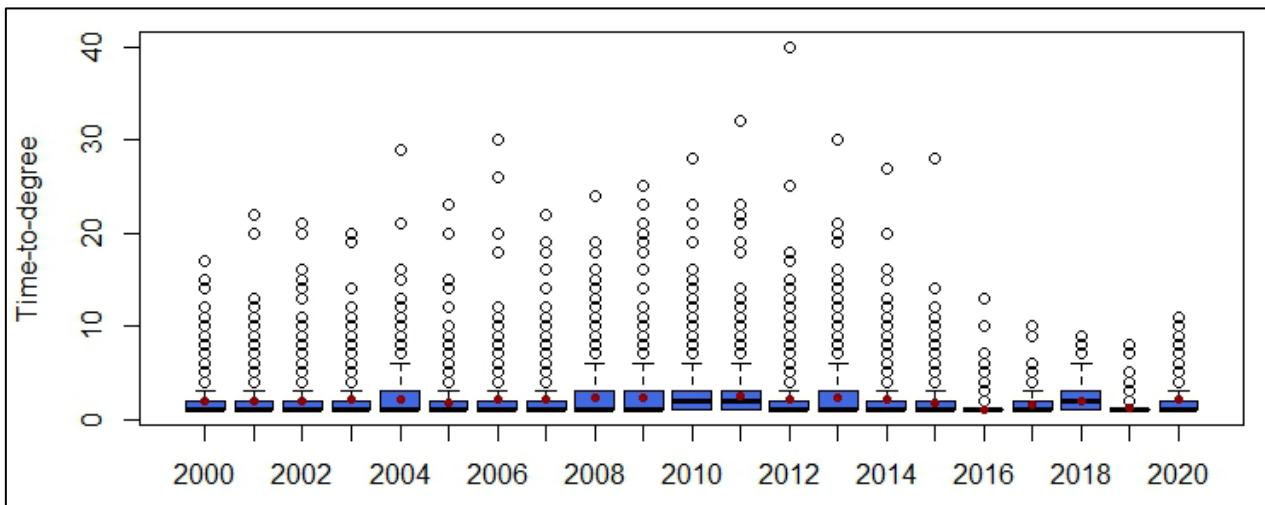
University	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
NMU	15	38	40	14	14	75	77	48	41	56	33	48	47	34	42	33	45	52	54	53	70
NWU	89	52	56	87	131	107	153	118	131	168	72	70	70	79	77	457	97	103	84	71	74
RU	30	31	23	39	27	26	33	41	32	26	29	30	35	38	44	52	56	46	46	53	44
SU	108	88	93	75	64	72	52	47	36	32	106	61	50	54	63	55	33	32	40	37	36
UCT	39	39	33	44	38	62	55	63	62	78	80	83	59	73	66	72	59	75	68	74	63
UFH	2	8	14	12	13	33	39	44	45	43	39	37	37	39	58	50	47	64	98	5	63
UFS	67	119	71	157	29	53	25	74	75	70	102	91	76	46	34	56	37	35	30	74	50
UJ	156	112	115	158	123	154	142	122	79	90	84	113	104	79	97	89	110	99	127	126	131
UKZN	139	92	83	79	67	60	62	55	59	45	69	69	127	216	207	236	353	282	164	219	147
UL	60	12	33	30	31	33	19	27	38	38	17	41	57	36	40	23	14	43	40	50	54
UNISA	395	354	406	402	363	297	394	427	533	666	651	616	653	752	560	529	722	804	923	992	1,843
UNIVEN	4	11	6	10	10	3	10	10	10		7	4	4	5	15	8	15	14	10	3	7
UNIZULU	12	7	14	4	8	4	3	9	6	2	1	18	1	3	4	6		19	2	12	
UP	78	64	51	61	63	92	76	76	73	62	72	68	52	72	66	79	74	82	103	85	73
UWC	53	63	81	51	49	79	55	40	50	47	46	91	67	90	68	66	81	95	106	95	96
Vista	44	28	37	11																	
WITS	49	56	57	51	43	58	60	57	66	52	76	70	66	73	97	117	111	101	115	101	113
WSU	3	7	5	2	4	2	2		3	2	1	7	9	3	21	4					
SMU																22	17	18	19	28	25

Figure 9-14: Average time-to-degree of Honours graduates in Psychology by year: 2000 - 2020



The boxplot below illustrates the distribution of the time-to-degree of Honours students. The black horizontal line represents the median, whilst the red dot indicates the mean time-to-degree for the respective years. The median time-to-degree has remained consistent at 1 year over the period analysed while the mean has varied slightly between 1 and 2 years. The small range, as illustrated between the whiskers in the plot below, shows that in 2020, Honours students in Psychology took between 1 and 3 years to complete their studies.

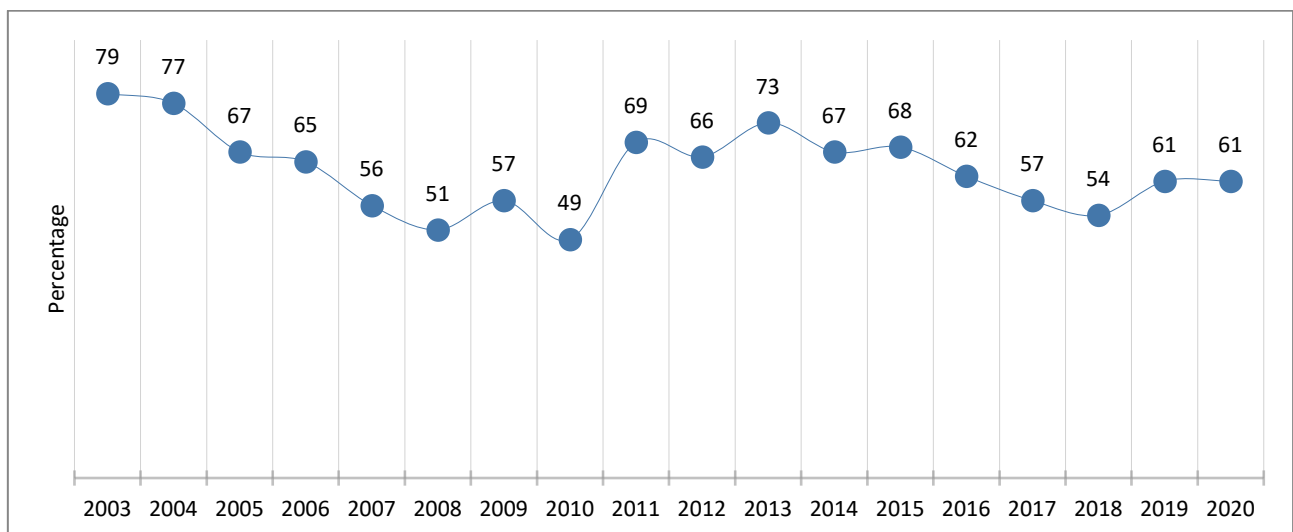
Figure 9-15: Distribution of Honours students' time-to-degree



A conversion rate is an indicator which measures the ‘flow’ of postgraduate students from one degree programme to another qualification. It is important to note that this indicator is not cohort-based. This is a simple measurement of the percentage new enrolments in a given year divided by the average number of graduates in the previous three years. In the figure below we report on the conversion rates of Honours studies to Masters studies in Psychology: in other words, at what rate do Honours students convert to Masters studies in general and without tracking students specifically? Given the fluctuating (and often small) numbers of graduates and enrolments across years we report on at three-year average conversion rate (for details on the calculation of this indicator refer to Appendix 2).

In the figure below we see that in Psychology, the conversion rate for 2003 was 79% and in 2020 this percentage was 61%. However, we see some fluctuations between years, but generally the conversion rate to Masters studies in Psychology is low with a small number of Masters students enrolling than who are graduating at a Honours level.

Figure 9-16: Conversion rates from Honours to Masters studies in Psychology by year: 2000 - 2020³



³ Due to errors in the data reported for UNISA in 2017 and 2018 we have excluded UNISA from our calculation of the conversion rate.

9.2. Masters students

9.2.1. Enrolments

Figure 9-17: Number of total Masters enrolments in Psychology by year: 2000 - 2020

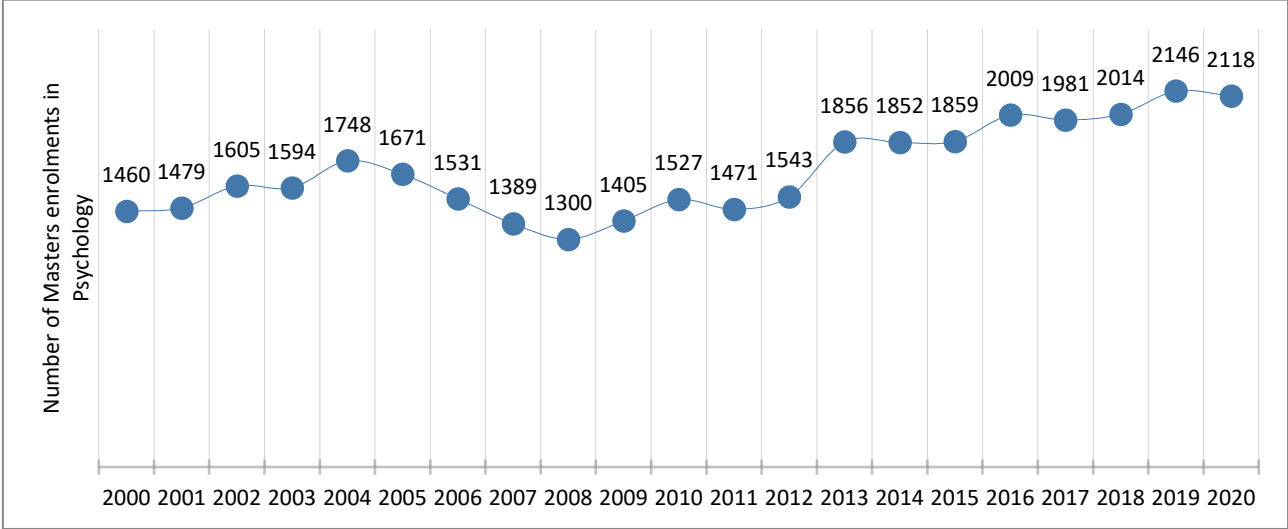
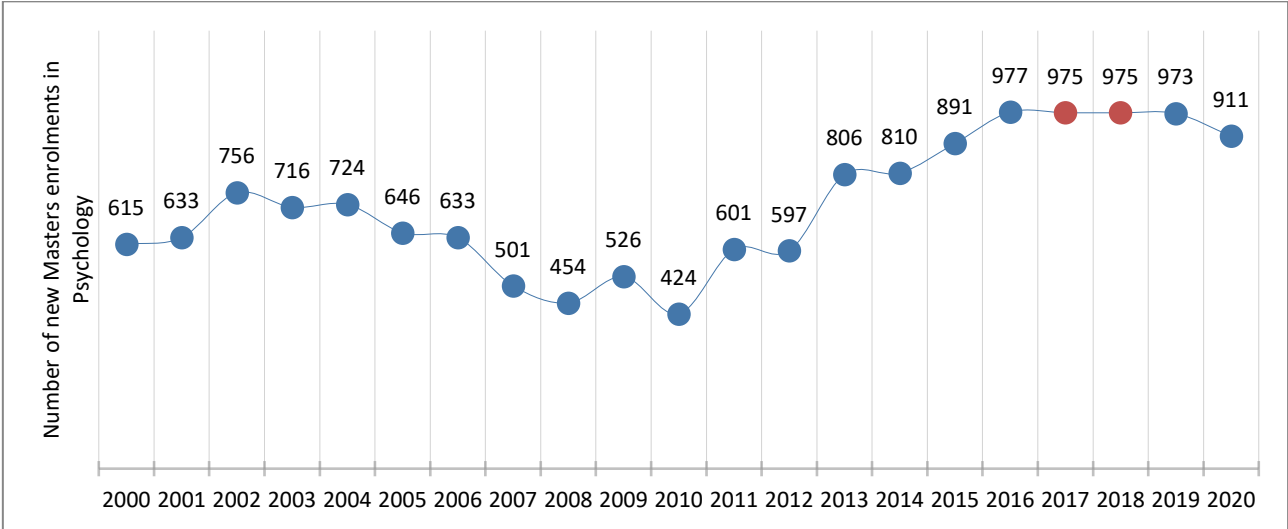


Figure 9-18: Number of new Masters enrolments in Psychology by year: 2000 - 2020⁴



⁴ Due to missing data reported for UNISA in 2017 and 2018 we have imputed data for these years for the entire system..

Figure 9-19: Percentage of total Masters enrolments in Psychology by gender and year: 2000 - 2020

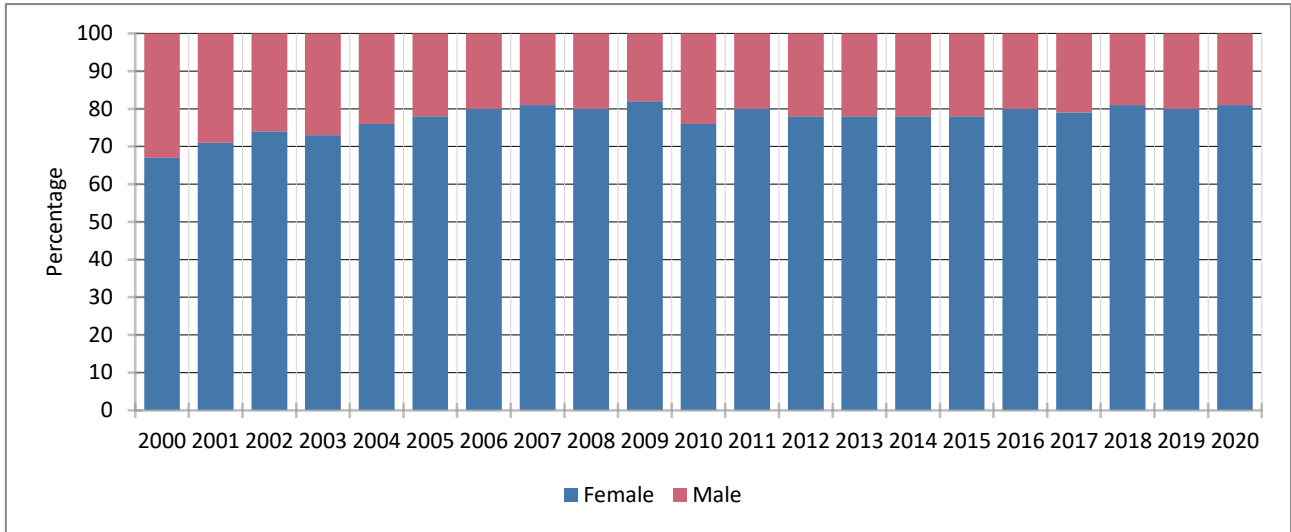


Figure 9-20: Percentage of total Masters enrolments in Psychology by race and year: 2000 - 2020

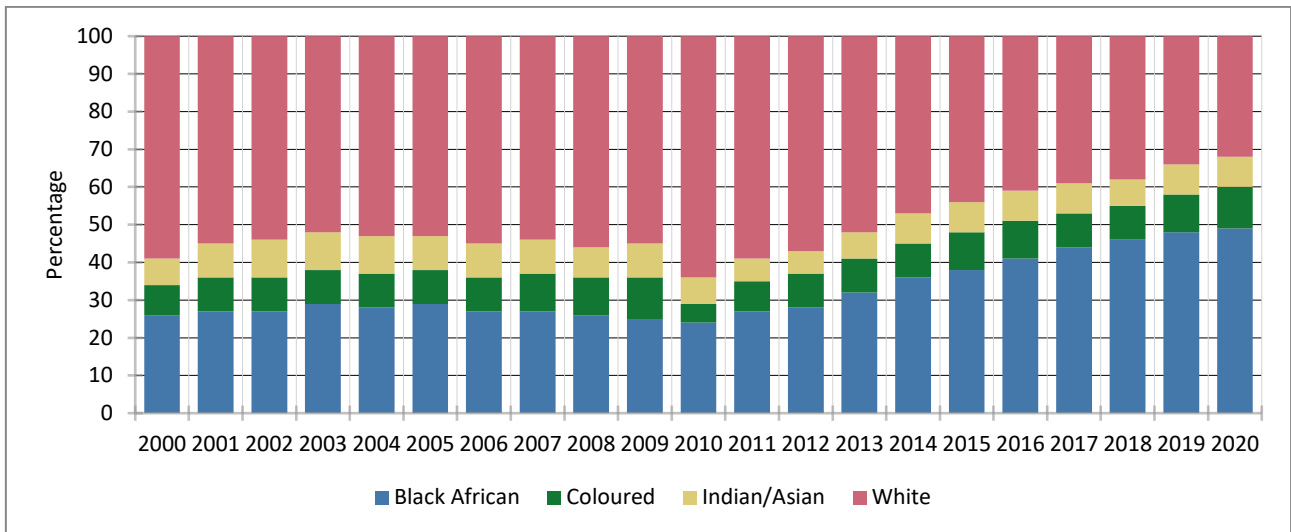


Figure 9-21: Percentage of total Masters enrolments in Psychology by nationality and year: 2000 - 2020

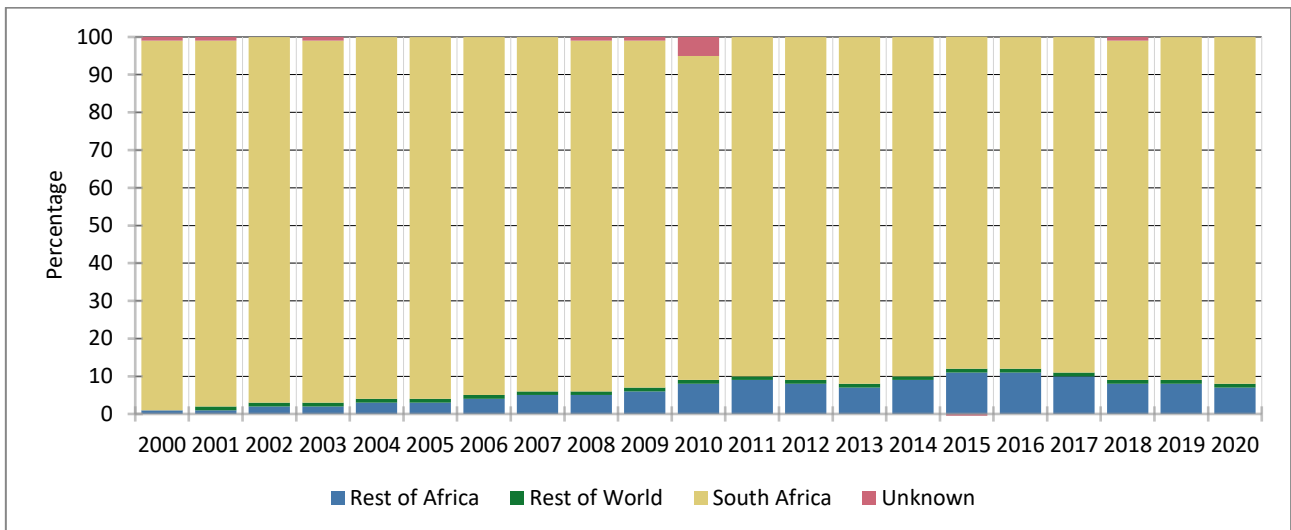
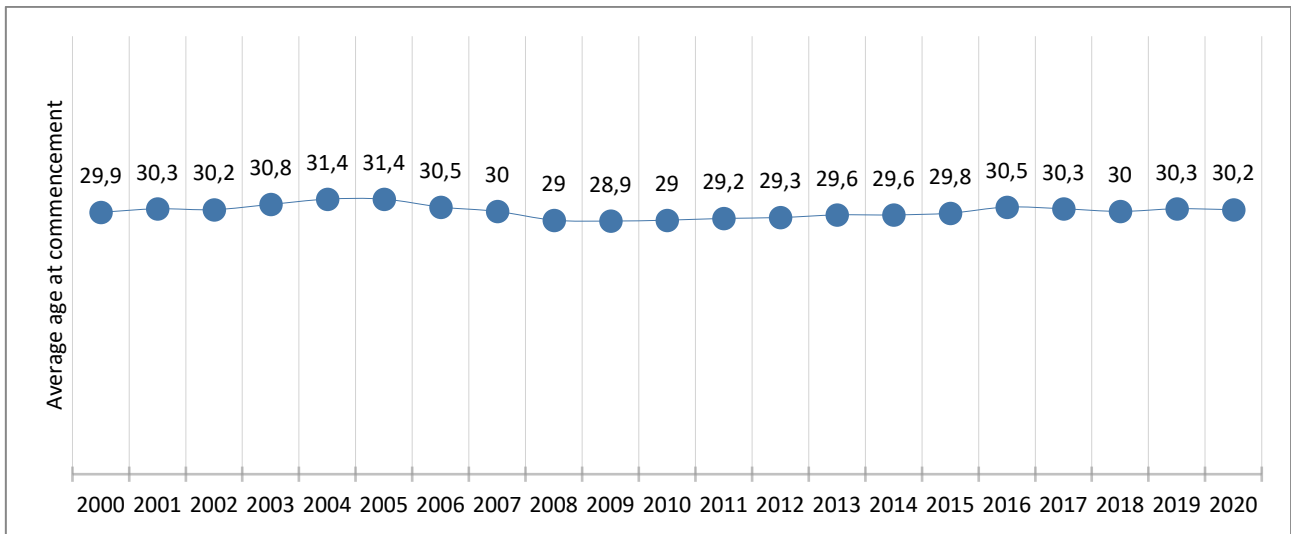


Figure 9-22: Average age of Masters students at commencement of studies in Psychology by year: 2000 - 2020



The boxplot below illustrates the distribution of the age at commencement of Masters enrolments. The black horizontal line represents the median age, whilst the red dot indicates the mean age for the respective years. The median enrolment age fluctuated slightly between 26 and 29 years over the reported period. In 2020 the median age was 27 years while the mean was slightly higher at 30.2 years. The range, as illustrated by the whiskers in the plot below, shows that in 2020, students were between the ages of 20 and 45 when enrolling for their Masters studies in Psychology.

Figure 9-23: Distribution of Masters enrolments' commencement age

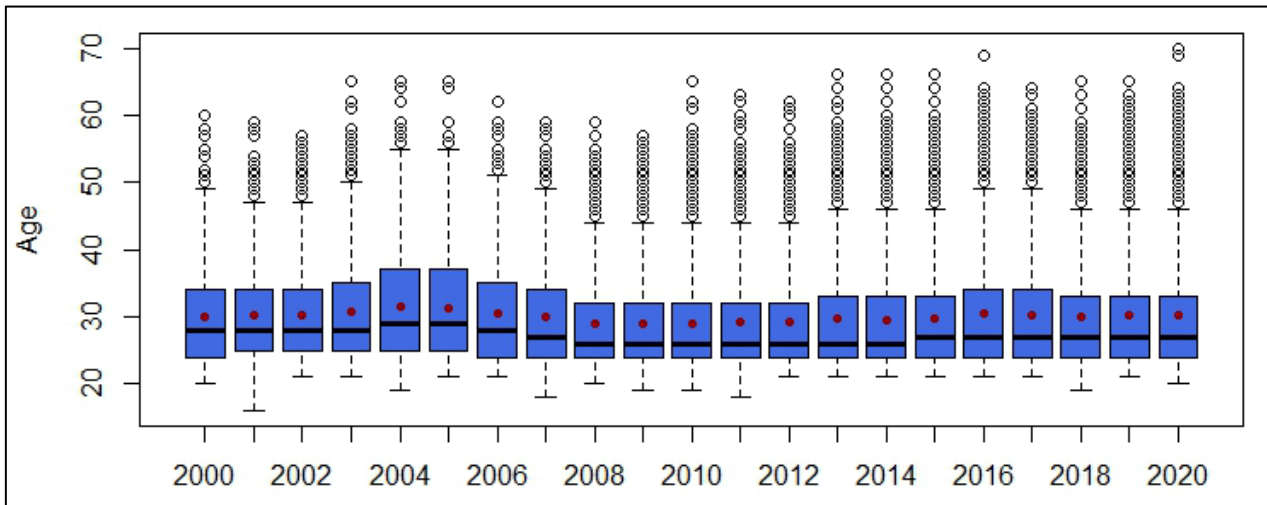


Table 20: Number of Masters enrolments per university in Psychology

University	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
NMU	22	42	65	16	42	65	70	35	29	26	57	50	58	61	53	59	64	74	81	73	59
NWU	130	111	142	144	141	155	165	138	128	123	102	214	217	210	182	156	139	143	155	189	174
RU	8	48	59	54	44	37	32	31	38	40	41	31	38	47	39	47	56	55	54	52	53
SU	148	146	165	189	242	228	62	63	55	63	90	110	140	144	150	159	147	142	138	150	150
UCT	73	74	72	29	24	24	65	74	71	74	77	73	62	80	83	89	109	114	143	156	174
UFH	19	12	20	28	36	33	39	48	32	34	105	96	92	107	141	143	147	97	108	109	71
UFS	93	114	88	108	91	82	71	67	63	59	45	38	36	61	72	21	48	59	77	99	82
UJ	259	162	124	123	89	72	65	66	103	95	142	90	95	98	97	96	115	116	126	136	159
UKZN	174	189	218	219	231	214	165	179	163	199	155	144	134	230	221	257	286	321	314	295	243
UL	68	70	83	83	74	80	80	94	96	95	88	88	94	103	111	57	43	37	41	50	46
UNISA	155	163	146	161	293	328	320	219	132	211	238	193	208	293	293	253	285	264	240	285	323
UNIVEN	6	10	20	14	12	10	8	4	3	8	4	6	6	16	16	13	20	20	13	23	11
UNIZULU	13	24	30	26	27	30	27	20	30	34	33	34	29	25	32	24	18	14	3		
UP	86	85	117	96	125	128	117	109	106	102	154	126	126	147	102	157	151	154	156	151	159
UWC	93	103	118	138	127	96	98	93	98	96	70	59	79	96	104	105	112	114	117	121	137
Vista	5	14	25	36																	
WITS	106	107	113	129	150	85	145	143	148	143	121	114	123	127	144	166	210	199	197	204	216
WSU	2	5		1		3	1	6	5	3	5	5	6	11	12						9
CUT						1	1														
SMU																57	59	58	51	53	52

9.2.2. Graduates

Figure 9-24: Number of Masters graduates in Psychology by year: 2000 - 2020

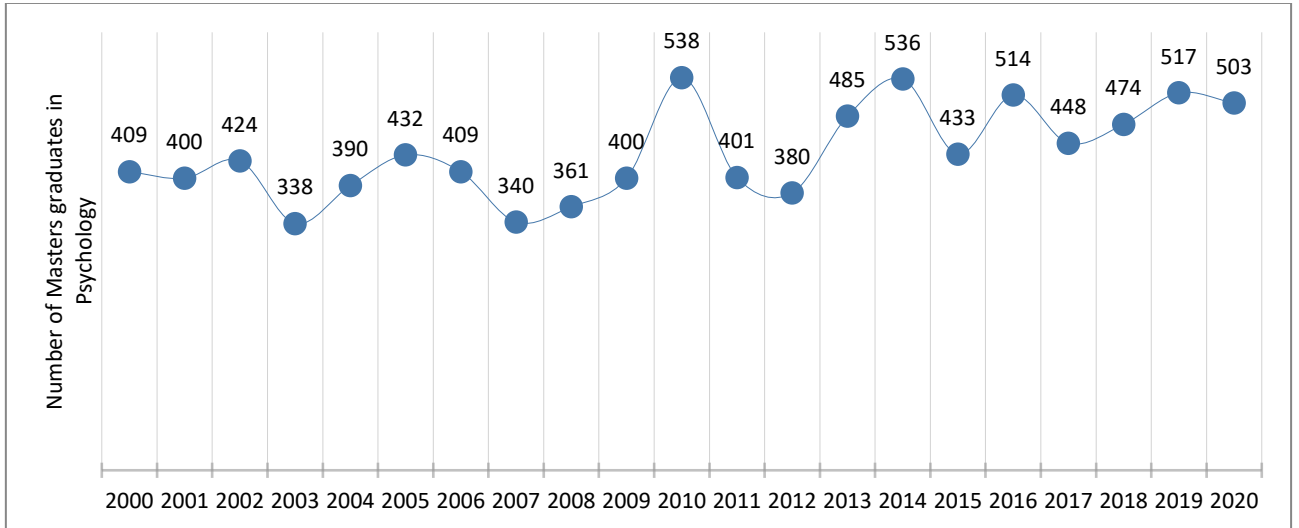


Figure 9-25: Percentage of Masters graduates in Psychology by gender and year: 2000 - 2020

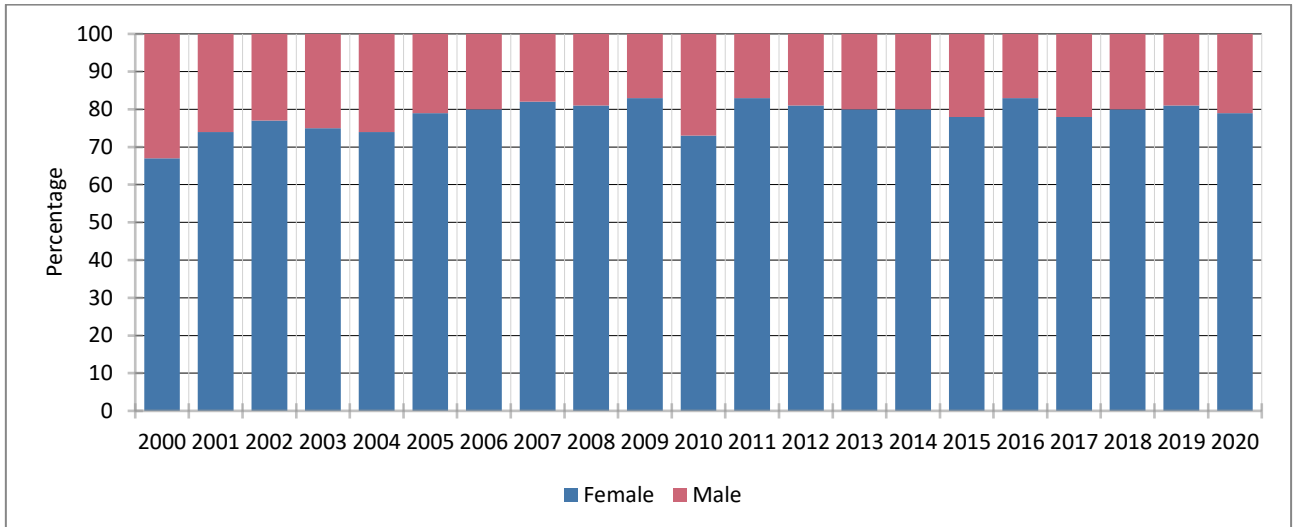


Figure 9-26: Percentage of Masters graduates in Psychology by race and year: 2000 - 2020

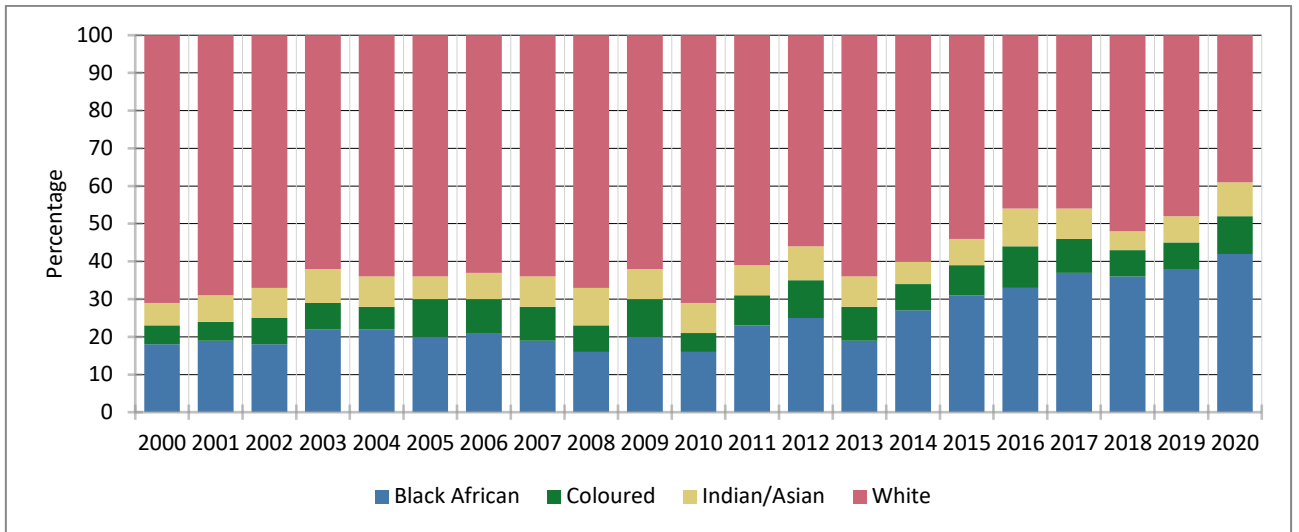


Figure 9-27: Percentage of Masters graduates in Psychology by nationality and year: 2000 - 2020

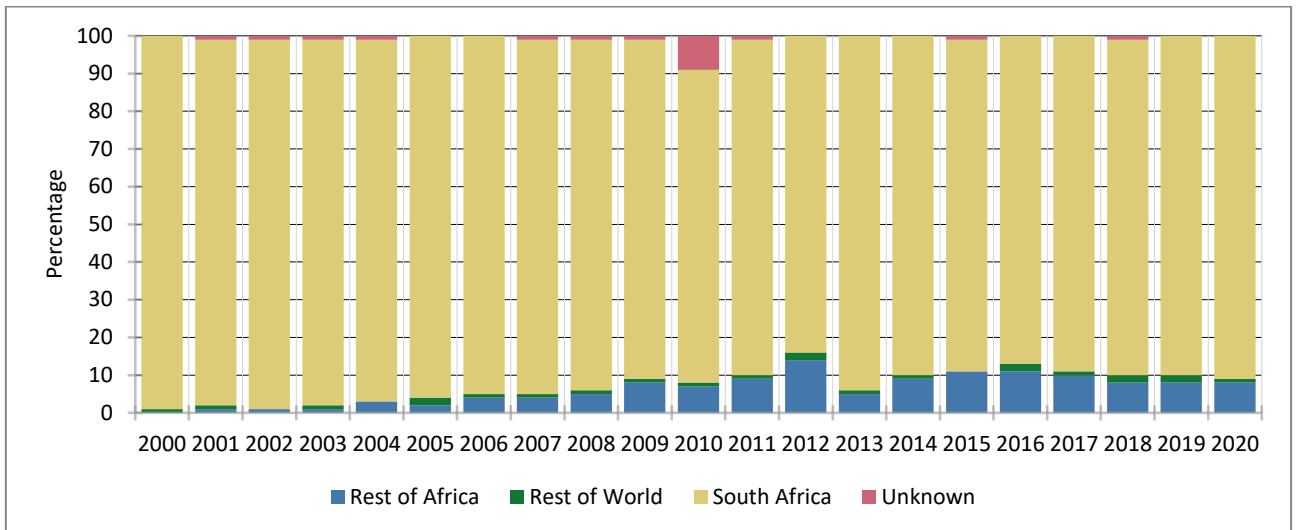
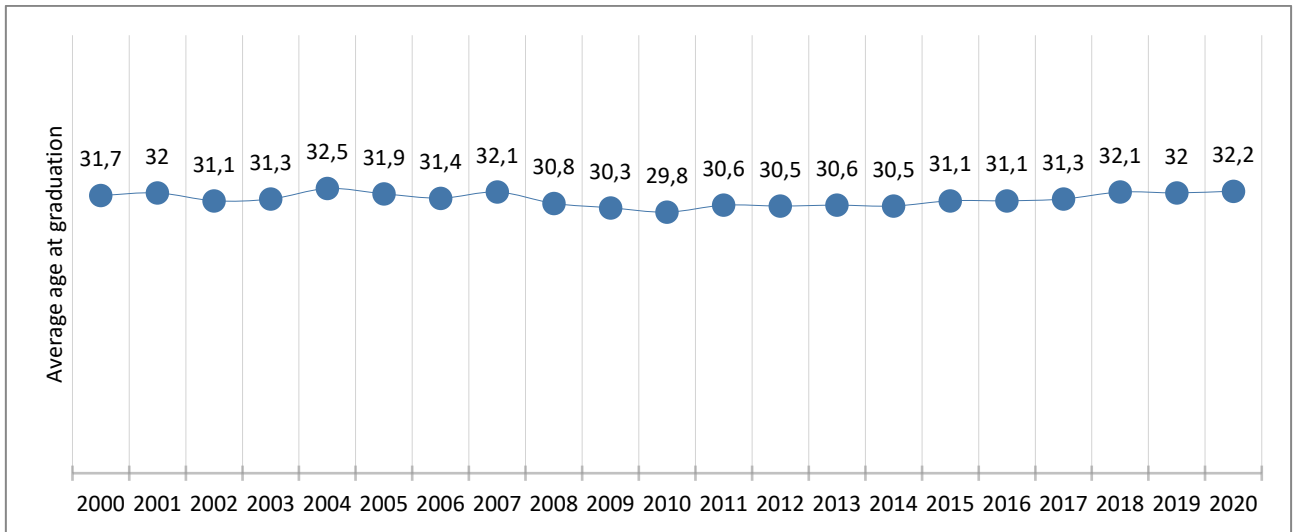


Figure 9-28: Average age at graduation of Masters students in Psychology by year: 2000 – 2020



The boxplot below illustrates the distribution of the age at graduation of Masters students. The black horizontal line represents the median age, whilst the red dot indicates the mean age for the respective years. There has been some variation in the median graduation age of Masters students (between 28 and 30 years) where in 2020 the median graduation age was 29 and the mean slightly higher at 32,2 years. The range, as illustrated by the whiskers in the plot below, shows that in 2020, Masters students in Psychology complete their studies when they are between the ages of 23 and 44 years.

Figure 9-29: Distribution of Masters students' graduation age

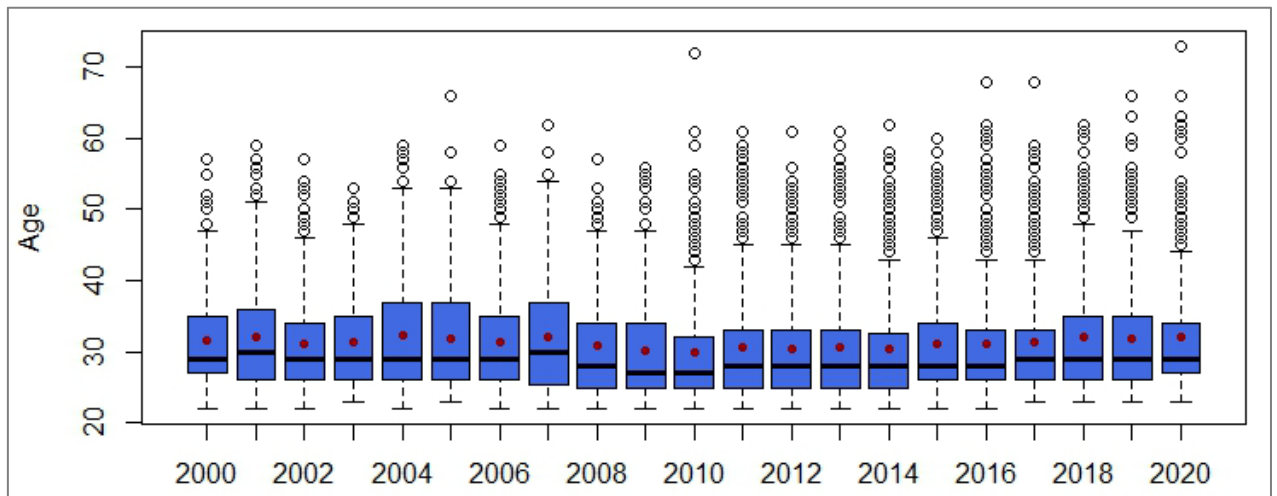
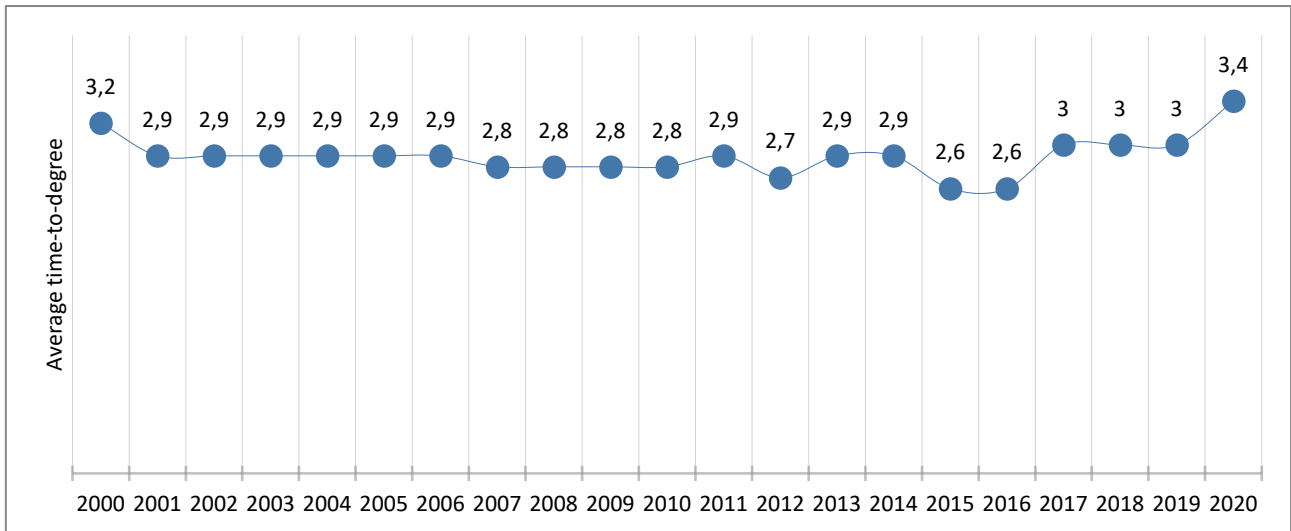


Table 21: Number of Masters graduates per university in Psychology

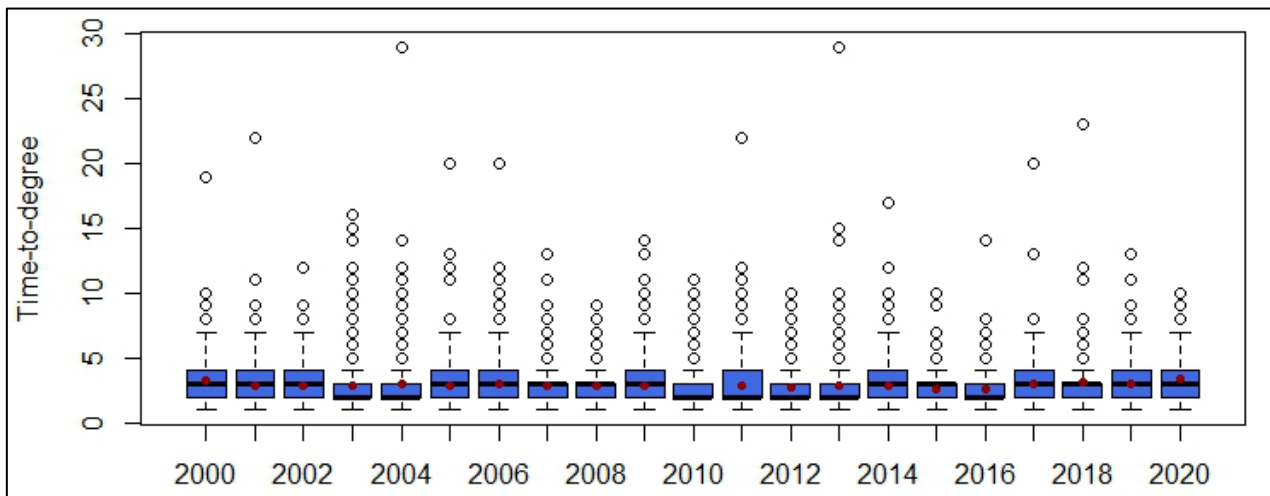
University	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
NMU	2	8	23		13	18	11	1	2	8	19	16	8	20	15	17	13	11	23	24	27
NWU	34	25	40	56	34	49	61	45	40	41	39	35	42	72	55	44	34	44	31	47	54
SU	37	45	37	33	59	65	19	28	14	26	35	29	30	48	46	34	42	47	39	50	34
UCT	14	20	27	6	5	17	25	30	22	35	37	32	25	36	41	27	34	15	30	42	31
UFH	1	2	1	3	2	7	15	10	21	13	35	25	33	16	46	29	36	20	12	15	18
UFS	28	41	24	25	31	22	19	24	21	23	20	16	10	13	28	7	12	10	15	25	14
UJ	82	79	47	30	35	37	20	10	34	22	66	30	30	38	38	19	28	33	33	46	48
UKZN	45	46	53	53	47	37	36	39	50	63	56	44	50	51	55	56	67	52	67	69	69
UL	17	12	20	18	13	16	14	14	22	18	11	14	22	22	28	20	15	10	7	12	6
UNISA	64	32	32	22	35	55	45	53	26	17	33	34	37	47	73	52	63	43	47	51	67
UNIVEN	3				2	6	3		1	1				1	1	1	5	7	2	5	1
UNIZULU	3	3	8	9	8	11	10	6	3	9	8	13	6	1	7	5	7	7	3		
UP	32	25	40	21	26	30	28	22	26	21	49	32	17	23	20	28	38	40	52	37	43
UWC	12	9	18	17	25	24	30	17	22	27	45	23	21	27	22	27	23	22	26	17	25
Vista	1	1	2	8																	
WITS	34	39	30	27	38	21	55	33	43	63	60	48	43	48	48	47	71	61	53	56	50
RU		13	22	10	17	17	18	7	14	12	25	9	5	21	12	12	18	14	23	16	8
WSU								1		1		1	1	1	1						
SMU																8	8	12	11	5	8

Figure 9-30: Average time-to-degree of Masters graduates in Psychology by year: 2000 – 2020



The boxplot below illustrates the distribution of the time-to-degree of Masters students. The black horizontal line represents the median, whilst the red dot indicates the mean time-to-degree for the respective years. The median time-to-degree has remained consistent between 2/3 years over the period analysed where in 2020 the median time-to-degree was 3 years and the mean slightly higher at 3,4 years. The range, as illustrated between the whiskers in the plot below, shows that in 2020, Masters students in Psychology took between 1 and 7 years to complete their studies.

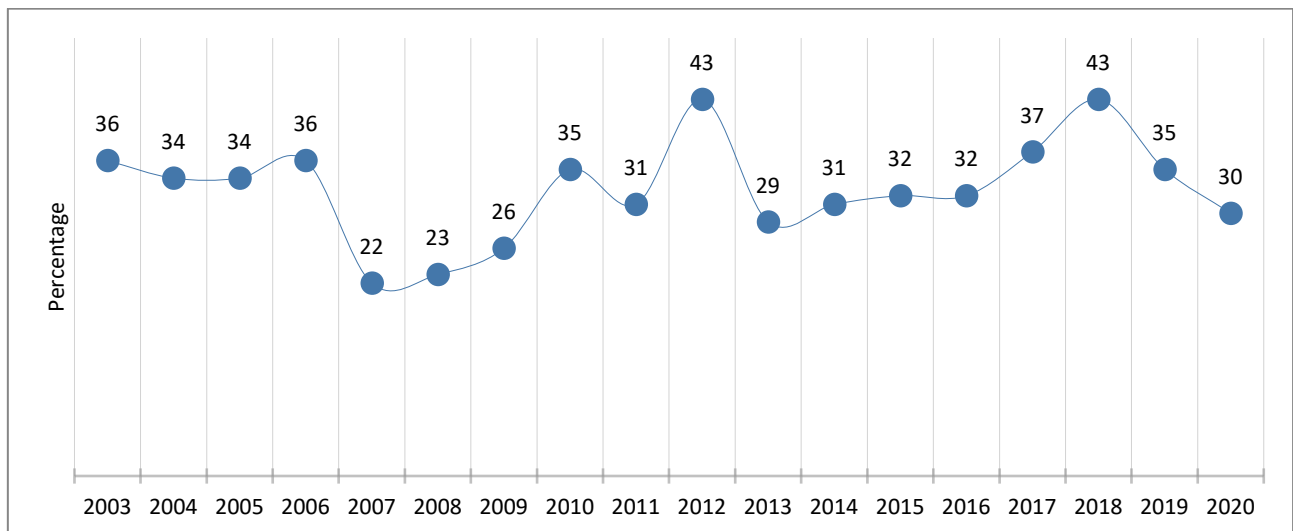
Figure 9-31: Distribution of Masters students' time-to-degree



A conversion rate is an indicator which measures the ‘flow’ of postgraduate students from one degree programme to another qualification. It is important to note that this indicator is not cohort-based. This is a simple measurement of the percentage new enrolments in a given year divided by the average number of graduates in the previous three years. In the figure below we report on the conversion rates of Masters’ studies to Doctoral studies in Psychology: in other words, at what rate do Masters’ students convert to Doctoral studies in general and without tracking students specifically? Given the fluctuating (and often small) numbers of graduates and enrolments across years we report on at three year average conversion rate (for details on the calculation of this indicator refer to Appendix 2).

In the figure below we see that in Psychology, the conversion rate for 2003 was 36% and in 2020 this percentage was 30%. However, we see some fluctuations between years, but generally the conversion rate to Doctoral studies in Psychology is low with a small number of Doctoral students enrolling than who are graduating at a Masters level. This could largely be due to the more professional nature of some Psychology fields.

Figure 9-32: Conversion rates from Masters to Doctoral studies in Psychology by year: 2000 - 2020⁵



⁵ Due to errors in the data reported for UNISA in 2017 and 2018 we have excluded UNISA from our calculation of the conversion rate.

9.3. Doctoral students

9.3.1. Enrolments

Figure 9-33: Number of total Doctoral enrolments in Psychology by year: 2000 - 2020

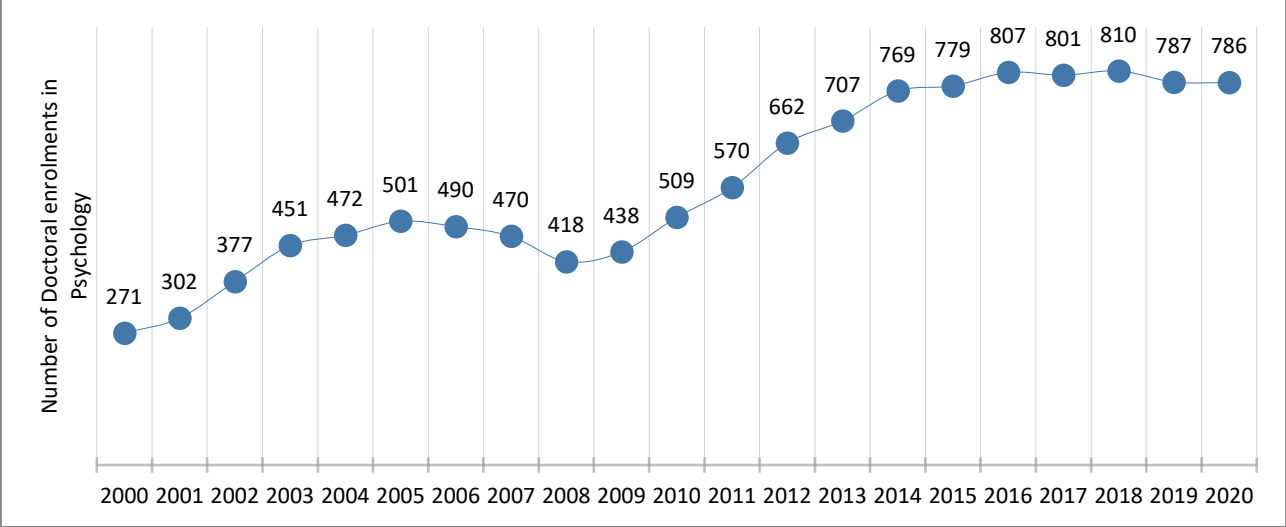
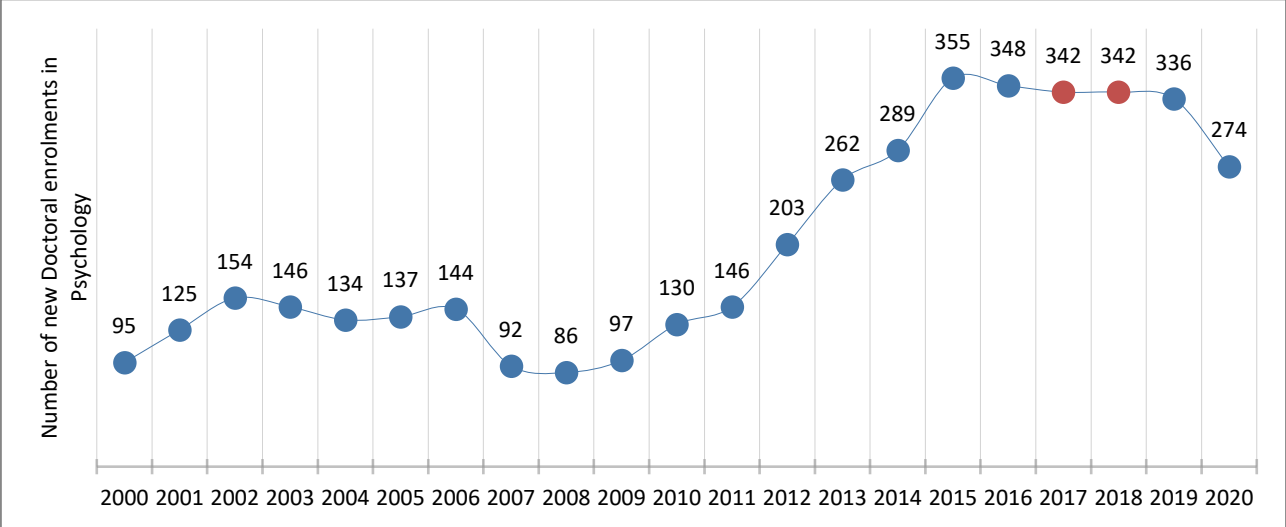


Figure 9-34: Number of new Doctoral enrolments in Psychology by year: 2000 - 2020⁶



⁶ Due to missing data reported for UNISA in 2017 and 2018 we have imputed data for these years for the entire system.

Figure 9-35: Percentage of total Doctoral enrolments in Psychology by gender and year: 2000 - 2020

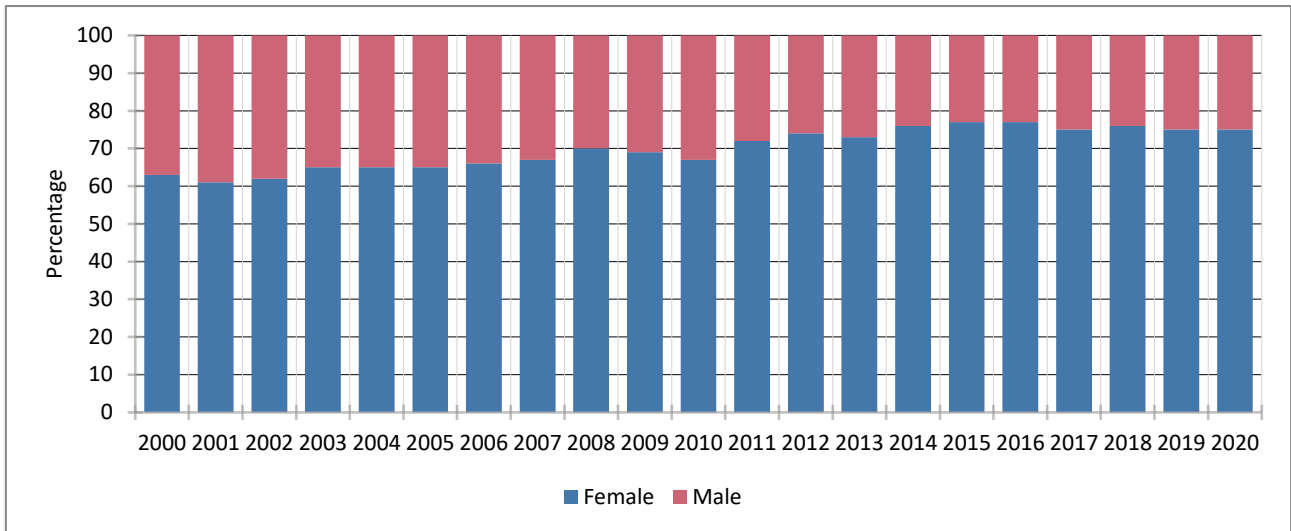


Figure 9-36: Percentage of total Doctoral enrolments in Psychology by race and year: 2000 - 2020

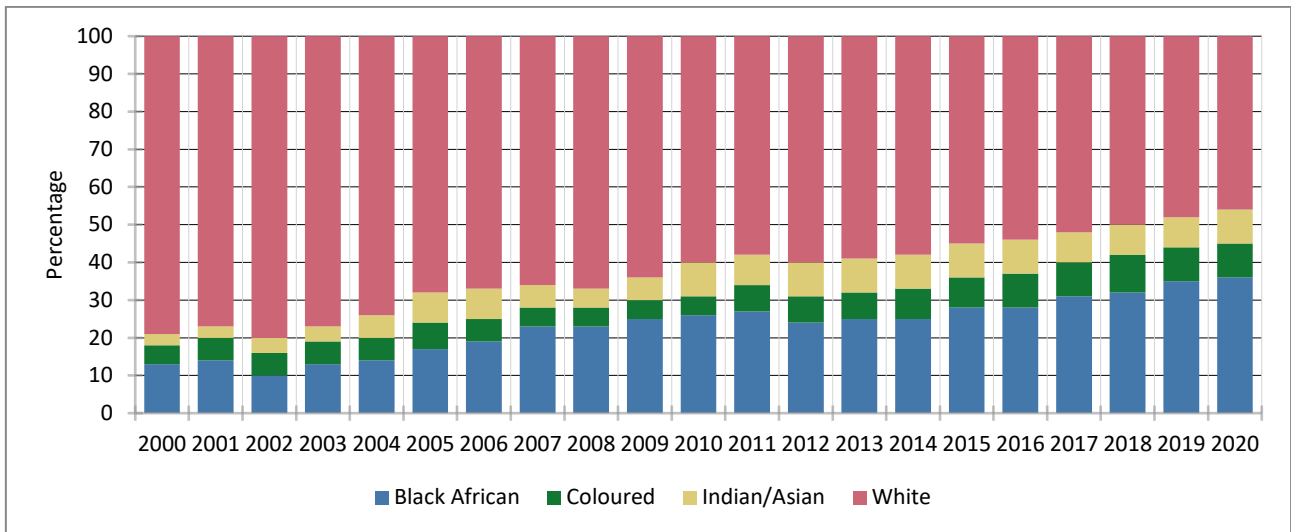


Figure 9-37: Percentage of total Doctoral enrolments in Psychology by nationality and year: 2000 - 2020

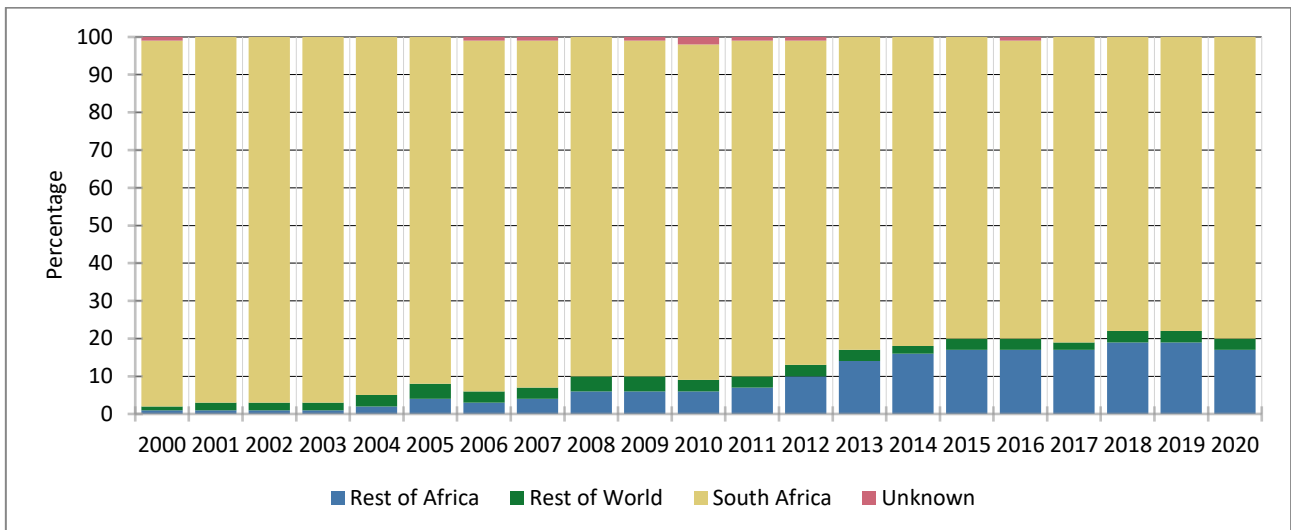
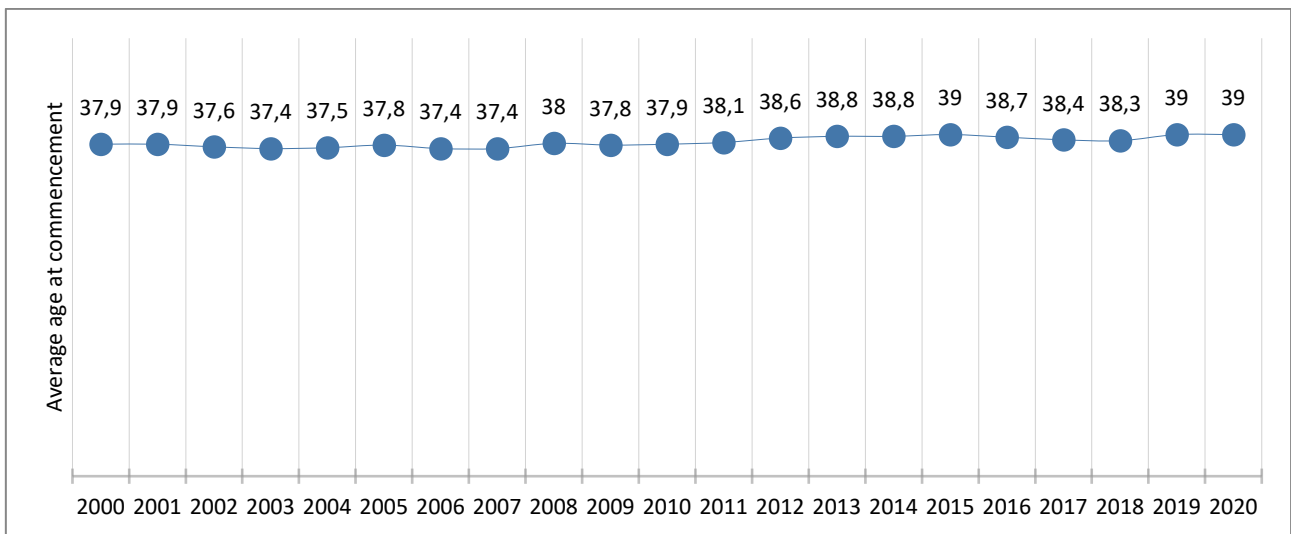


Figure 9-38: Average age of Doctoral students at commencement of studies in Psychology by year: 2000 – 2020



The boxplot below illustrates the distribution of the age at commencement of Doctoral enrolments. The black horizontal line represents the median age, whilst the red dot indicates the mean age for the respective years. The median enrolment age was consistent at 36/37 years over the reported period. In 2020 the median age was 37 years while the mean was slightly higher at 39 years. The large range, as illustrated by the whiskers in the plot below, shows that in 2020, students were between the ages of 22 and 68 when enrolling for their Doctoral studies in Psychology.

Figure 9-39: Distribution of Doctoral enrolments' commencement age

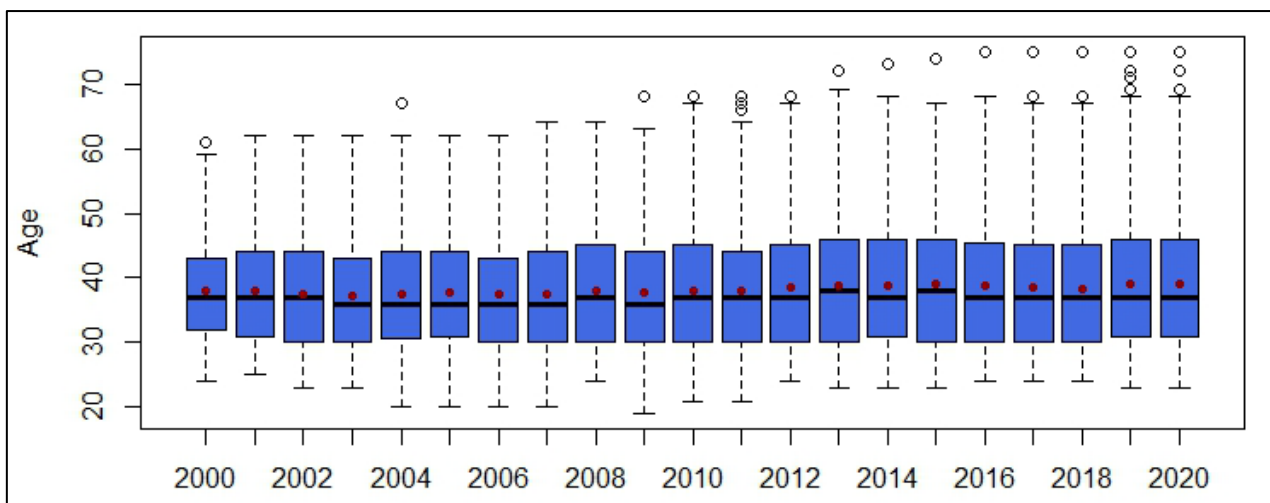


Table 22: Number of Doctoral enrolments per university in Psychology

University	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
NMU	8	10	16	21	18	19	11	9	8	13	14	14	18	20	28	33	27	26	28	27	25
NWU	9	10	22	37	55	62	65	53	47	39	57	77	76	66	62	54	54	55	57	55	53
RU	11	15	13	16	15	13	18	22	17	16	17	19	18	19	20	26	27	26	30	36	33
SU	14	12	20	23	27	28	28	24	17	19	22	31	39	41	40	35	49	53	54	55	52
UCT	10	9	11	15	17	22	25	25	29	30	39	46	43	45	45	39	47	42	47	46	43
UFH	2	1		1		1		1	3	1	2	7	10	17	18	24	32	32	38	26	15
UFS	56	52	66	60	53	48	42	50	48	54	44	37	31	16	15	5	28	26	22	23	29
UJ	32	46	76	91	81	65	58	48	39	39	34	38	39	43	35	28	42	39	40	32	41
UKZN	14	14	17	19	24	29	31	36	30	29	33	42	74	88	99	109	100	89	77	79	75
UL	7	6	6	13	11	24	20	18	13	14	17	14	13	19	25	19	18	21	29	30	30
UNISA	25	28	33	53	75	87	82	74	66	73	85	98	134	189	215	221	210	217	203	190	205
UNIZULU	1	9	7	12	16	34	30	37	36	39	44	44	38	26	30	22	21	20	12	11	7
UP	56	60	65	68	60	57	53	44	40	38	62	63	69	65	66	72	58	54	55	59	66
UWC	12	13	10	9	10	11	7	7	5	4	4	5	10	8	18	24	26	27	29	29	31
Vista	3	2	2	2																	
WITS	11	14	13	10	9		19	22	20	30	35	35	50	45	53	59	61	64	79	81	74
UNIVEN		1		1														5	6	7	7
CUT					1	1	1														
SMU																9	7	5	4	1	

9.3.2. Graduates

Figure 9-40: Number of Doctoral graduates in Psychology by year: 2000 - 2020

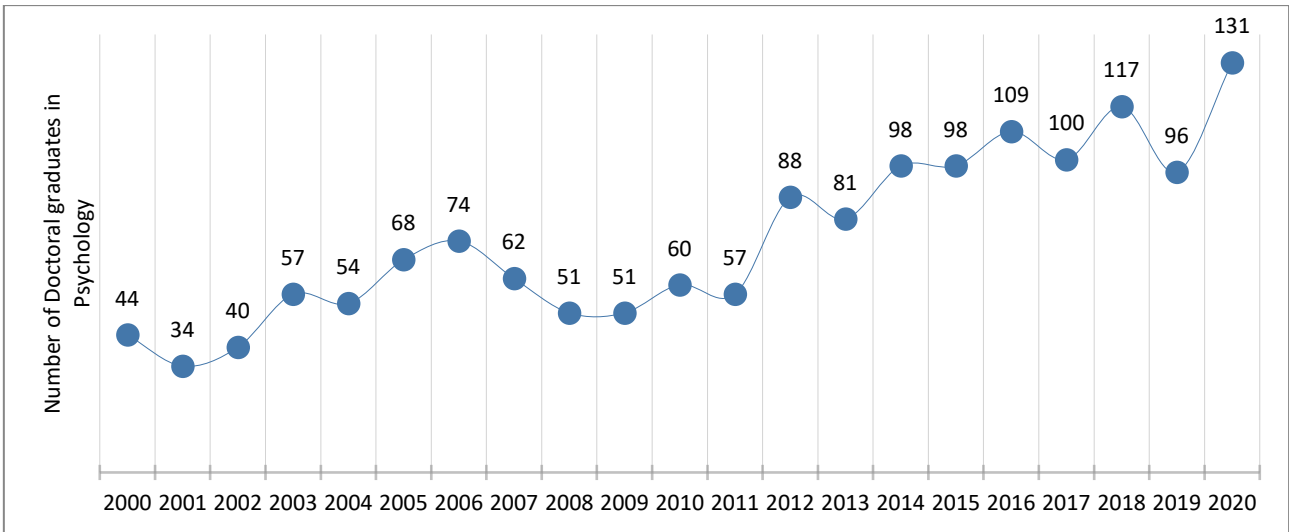


Figure 9-41: Percentage of Doctoral graduates in Psychology by gender and year: 2000 - 2020



Figure 9-42: Percentage of Doctoral graduates in Psychology by race and year: 2000 - 2020

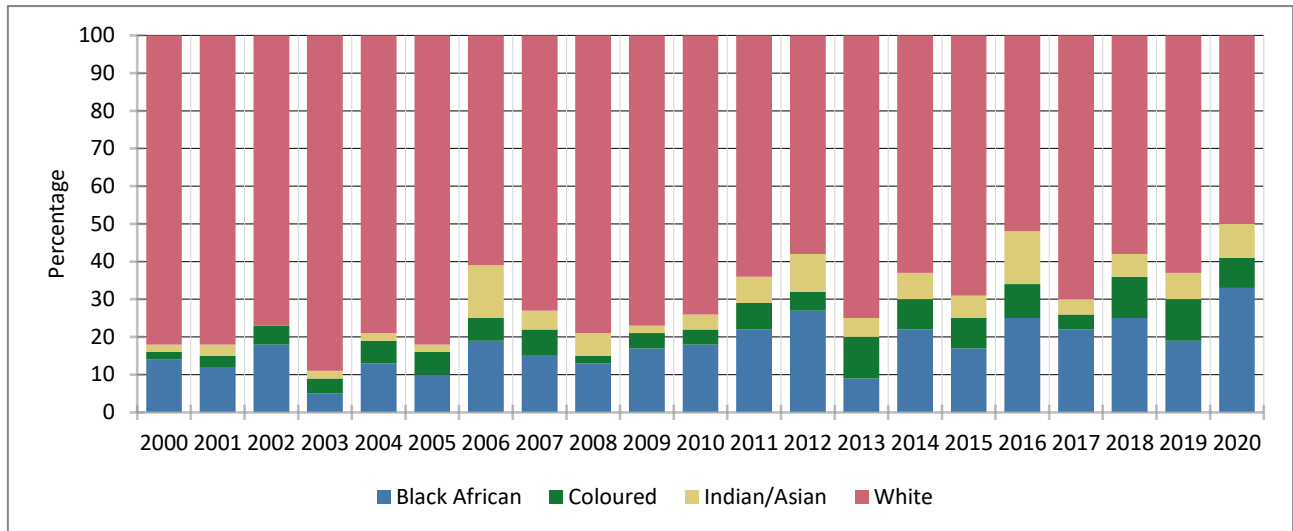


Figure 9-43: Percentage of Doctoral graduates in Psychology by nationality and year: 2000 - 2020

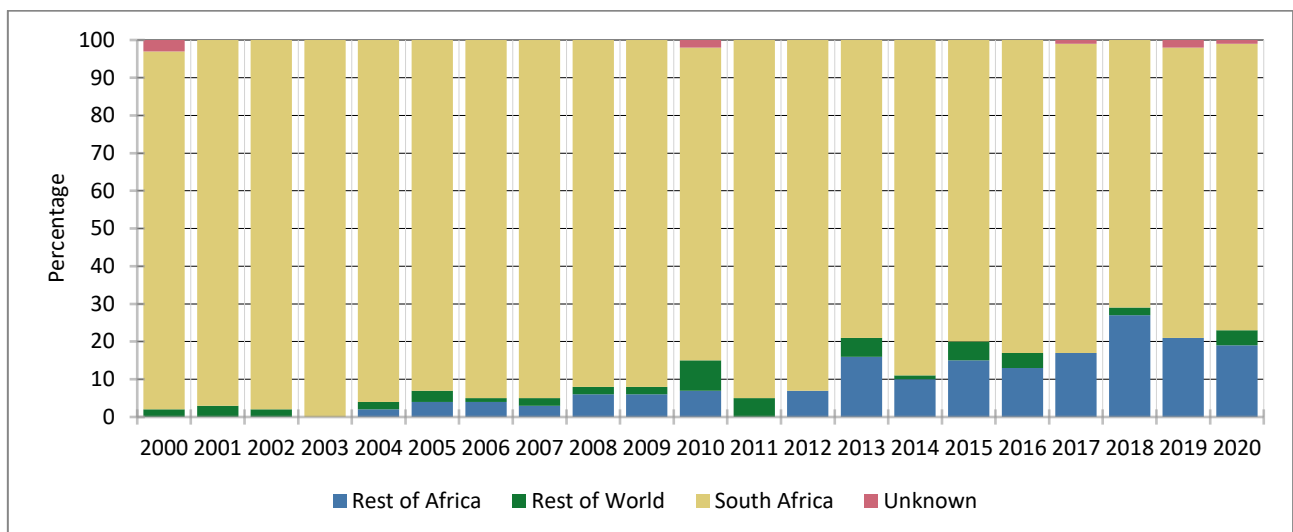
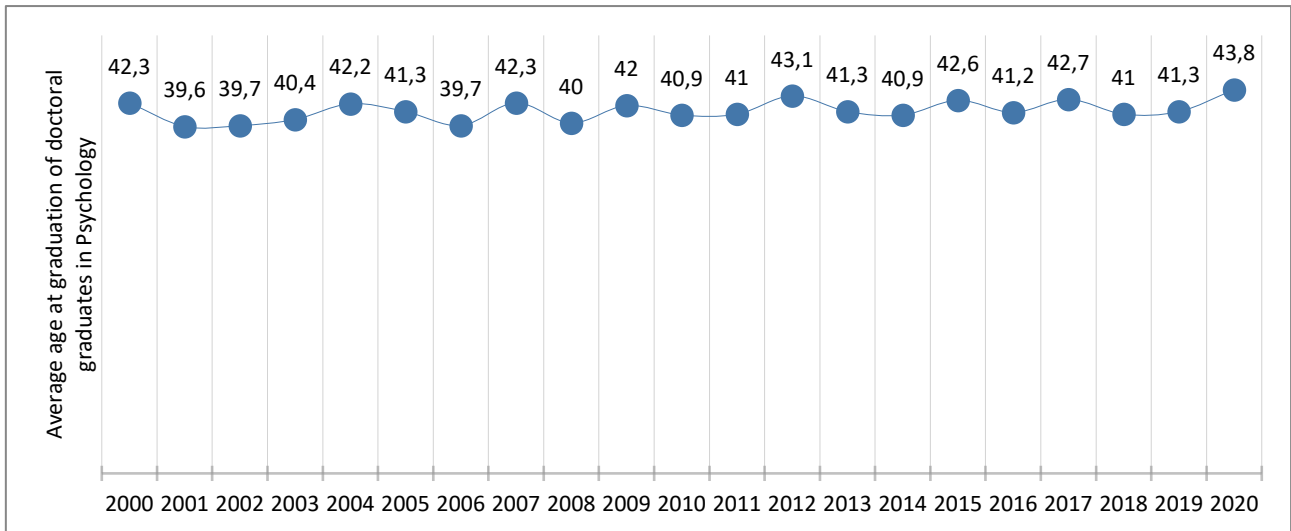


Figure 9-44: Average age at graduation of Doctoral students in Psychology by year: 2000 – 2020



The boxplot below illustrates the distribution of the age at graduation of Doctoral students. The black horizontal line represents the median age, whilst the red dot indicates the mean age for the respective years. There has been some variation in the median graduation age of Doctoral students (between 38 and 44 years) the median and mean age increased to 44 years in 2020. The large range, as illustrated by the whiskers in the plot below, show that in 2020, Doctoral students in Psychology complete their studies when they are between the ages of 23 and 67 years.

Figure 9-45: Distribution of Doctoral students' graduation age

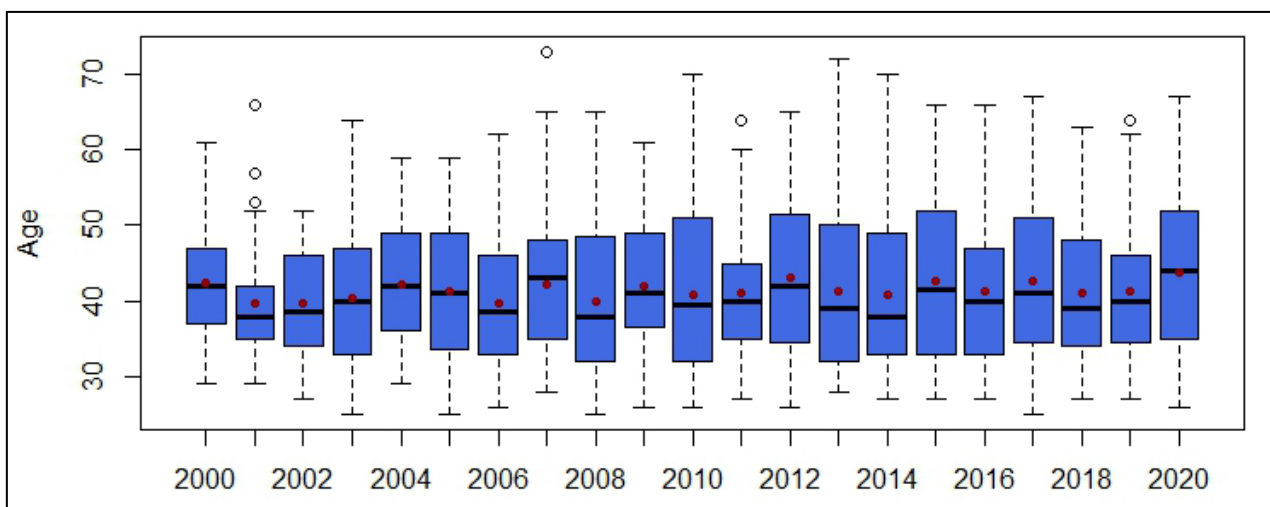
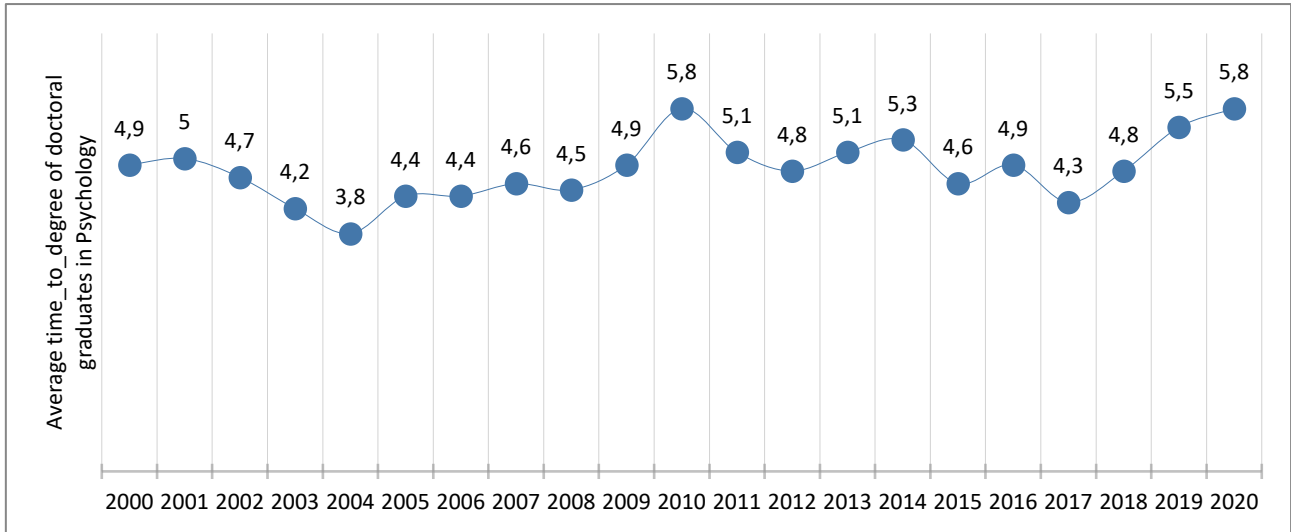


Table 23: Number of Doctoral graduates per university in Psychology

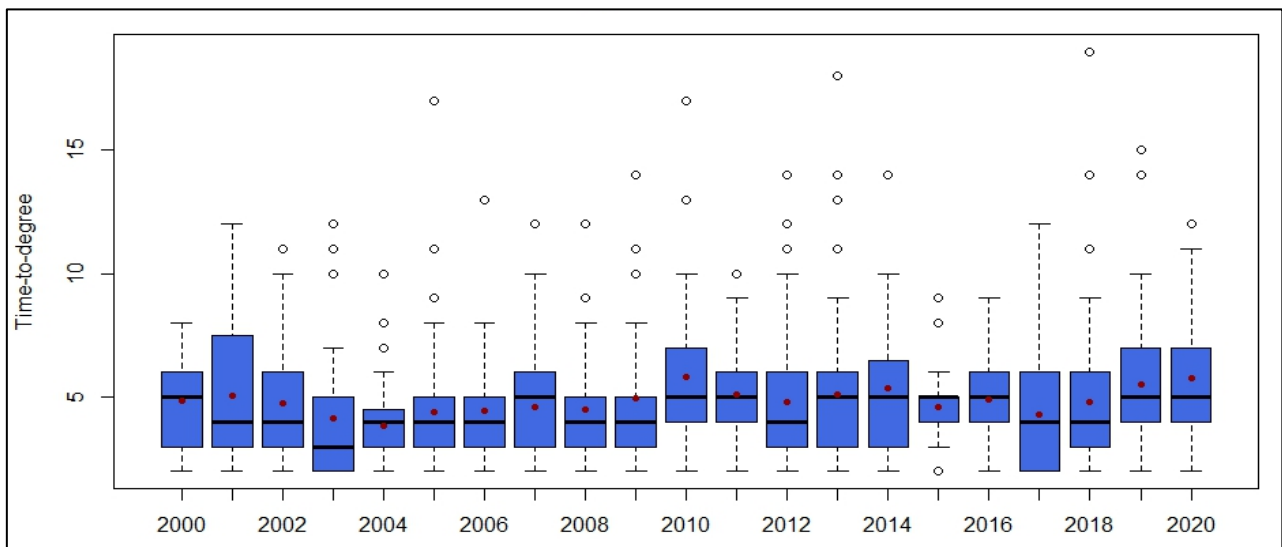
University	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
NMU	1		1	3	2	2	1	1	1	2	1		1	2	2	5	4	3	3	6	5
NWU	1	2	1	8	8	10	12	6	9	8	8	5	16	12	7	13	13	12	9	14	7
RU	2		2		2	2	1		1	2	4	1	1	2	2	3	1	2	1	4	6
SU	3	1	1	2	1	5	5	8	1	6	4	2	5	9	6	9	12	8	6	12	11
UCT	3	2		1	1	4	5	3	4	2	3	7	3	8	10	2	3	7	5	5	7
UFS	6	5	14	11	5	8	6	11	4	5	11	8	6	4	4		5	3	2		2
UJ	6	4	9	11	11	13	7	9	5	5	5	6	4	3	5	4	9	8	13	3	8
UKZN	1	2	1	3	1		2	1	3	3	4	3	5	2	12	11	14	7	13	10	14
UL	1			1		3	1	2	1		2	4	2	2	3	2	4	1	2	1	7
UNISA	12	4	2	5	11	12	11	7	10	8	4	4	20	24	27	28	20	26	26	21	43
UNIZULU	1	2	3		3	5	13	6	4	3	3	7	8		3	1	4	3	1		2
UP	4	8	4	8	7	3	9	6	2	6	8	7	10	7	8	11	7	9	12	8	6
UWC	1	2		1	1	1			2	1	1		2		3	2	3	2	3	1	2
Vista	1			1																	
WITS	1	2	2	2	1		1	2	4		1	2	5	6	6	5	5	5	8	7	10
UFH											1	1					3	4	12	4	1
SMU																2	2		1		

Figure 9-46: Average time-to-degree of Doctoral graduates in Psychology: 2000 – 2020



The boxplot below illustrates the distribution of the time-to-degree of Doctoral students. The black horizontal line represents the median, whilst the red dot indicates the mean time-to-degree for the respective years. The median time-to-degree has remained consistent at 4/5 years over the period analysed where in 2020 the median completion time was 5 years while the mean was slightly higher at 5.8. The range, as illustrated between the whiskers in the plot below, shows that in 2020, Doctoral students in Psychology took between 2 and 12 years to complete their studies.

Figure 9-47: Distribution of Doctoral students' time-to-degree



10. Research output in the field of Psychology

In the graphs below we present the trends of publications in the field of Psychology as well as the trends of the demographics of the contributing authors.

Figure 10-1: Number of Psychology articles with contributing authors: 2005 – 2020

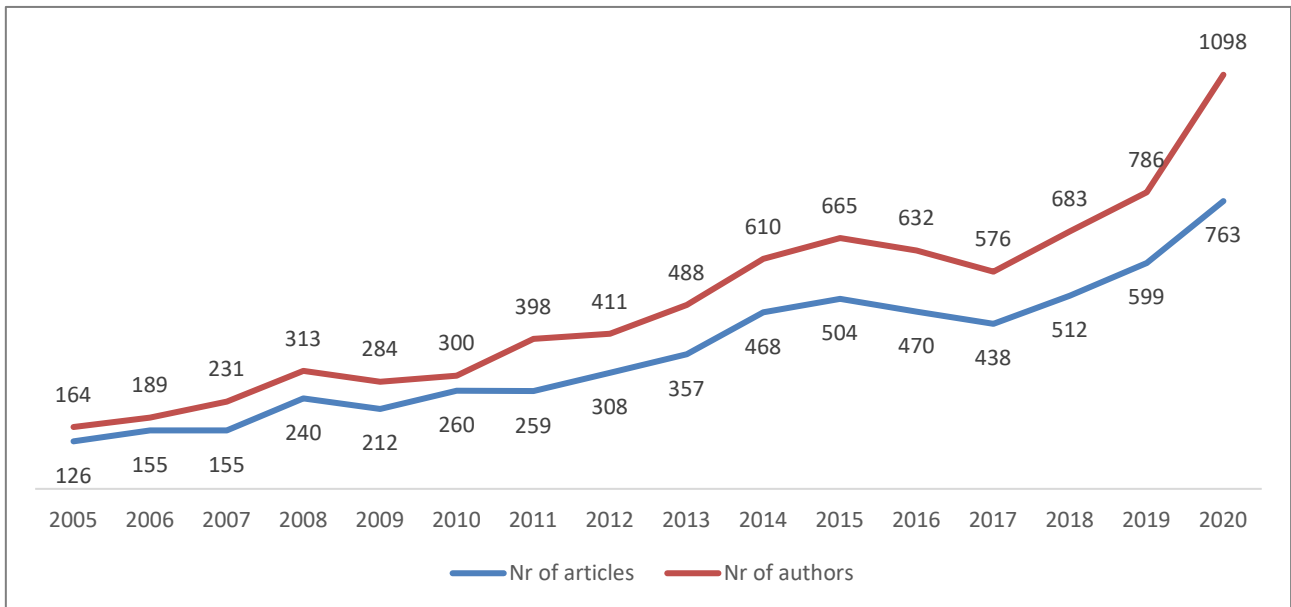


Figure 10-2: Percentage of authors in Psychology by gender and year: 2005 - 2020 (SAK)

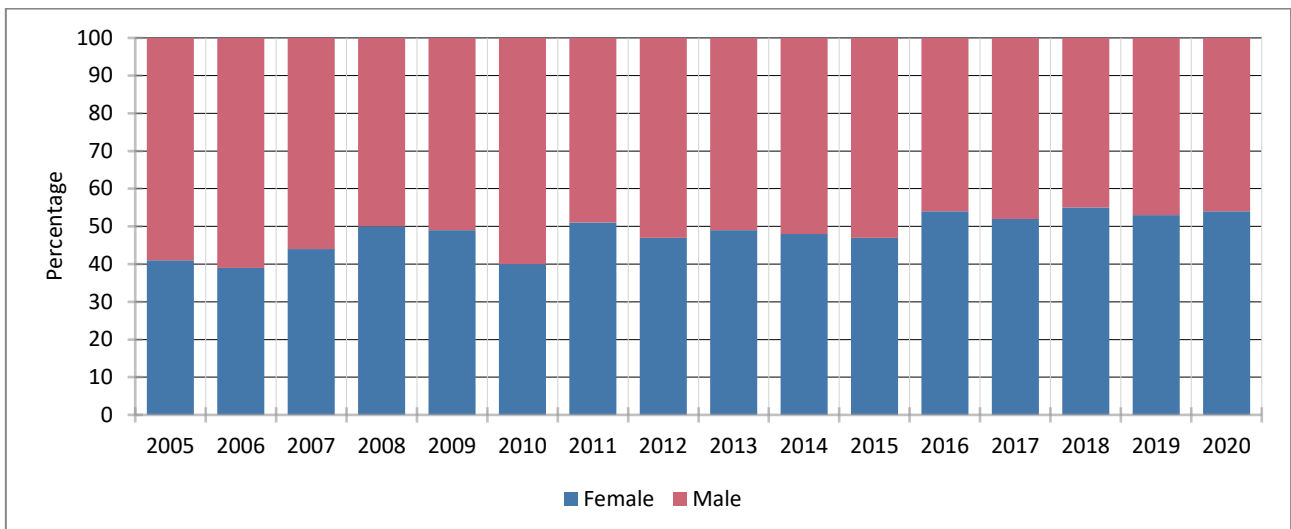


Figure 10-3: Percentage of authors in Psychology by race and year: 2005 - 2020 (SAK)

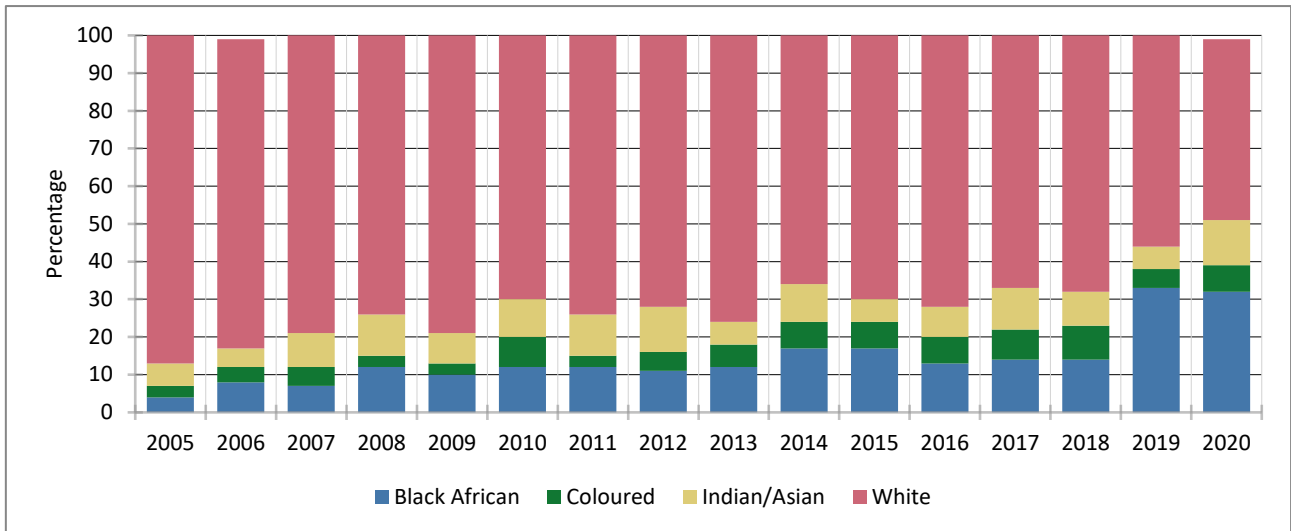


Figure 10-4: Percentage of authors in Psychology by region and year: 2005 - 2020 (SAK)

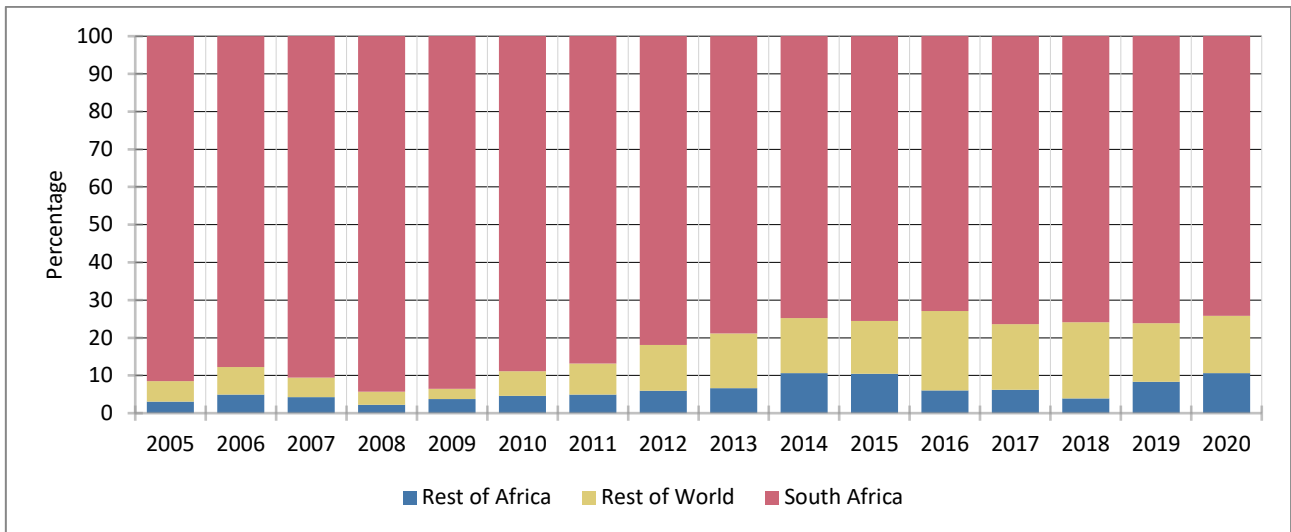
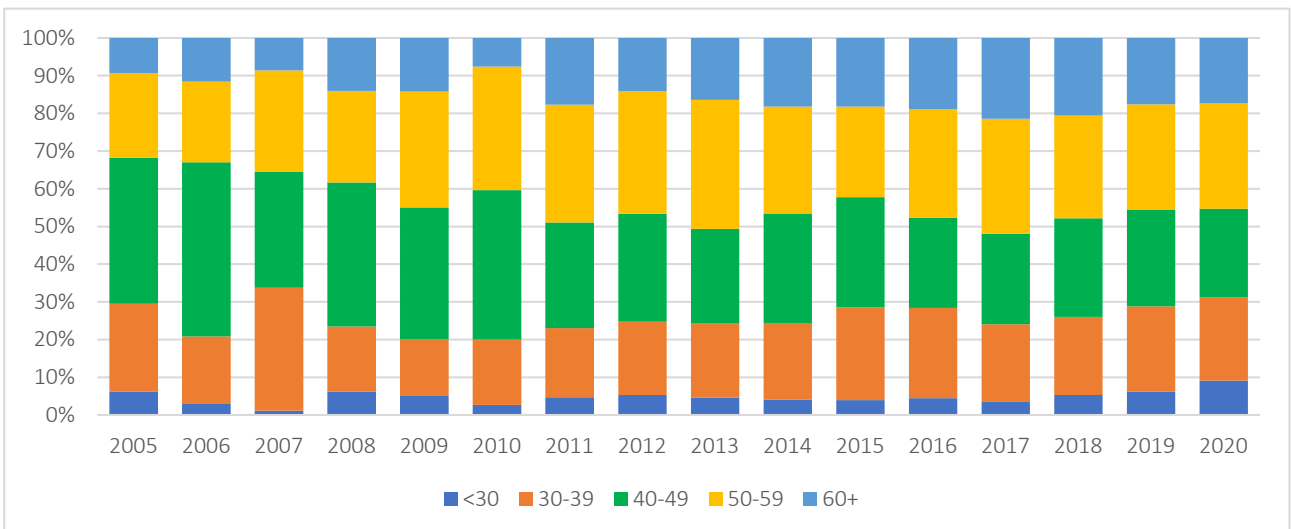


Figure 10-5: Percentage of authors in Psychology by age and year: 2005 - 2020 (SAK)



The graphs below are based on data from the ^{CA}Web of Science as classified in their subject category for Psychology. The difference between these results and the data presented in the tables above (sourced from SA Knowledgebase) are due to the fact that the graphs below only count articles published in journals indexed in the WoS. The advantage of these analyses is that they allow us to report on world share, collaboration trends as well as trends in citation impact.

Figure 10-6: Number of publications in Psychology by year: 2000 - 2020 (WoS)

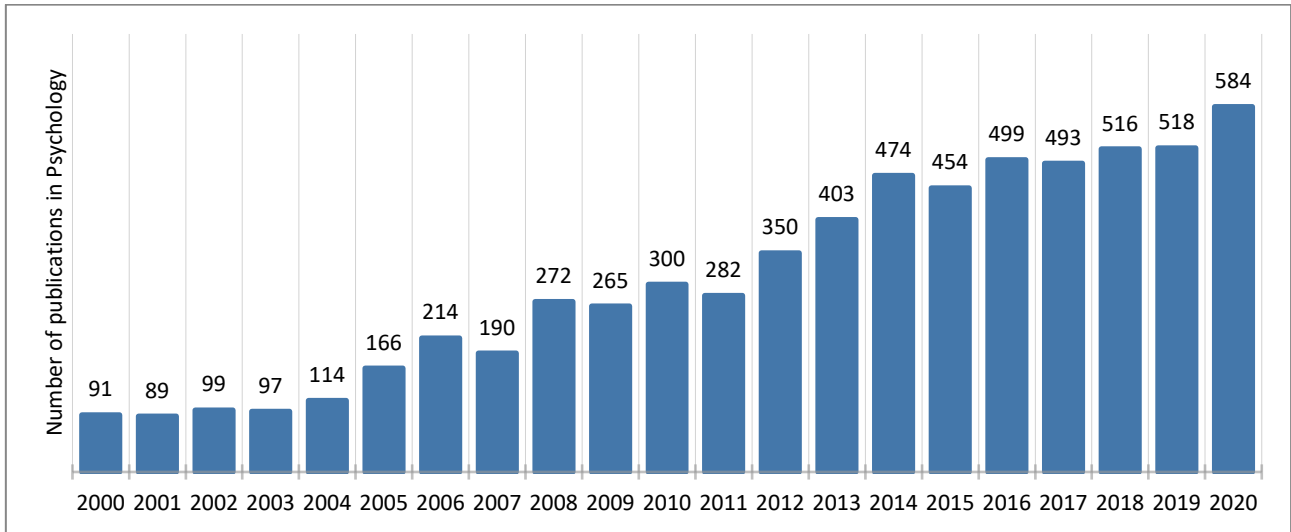


Figure 10-7: Number of publications per million of the population in Psychology by year: 2000 - 2020 (WoS)

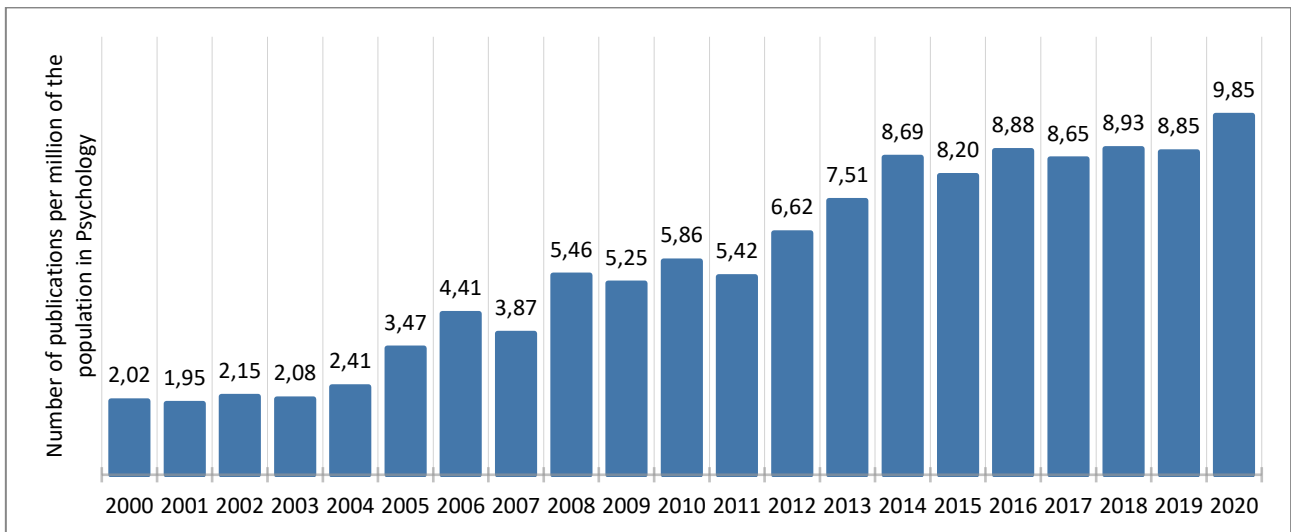


Figure 10-8: South Africa's world share of publication output in Psychology by year: 2000 - 2020 (WoS)

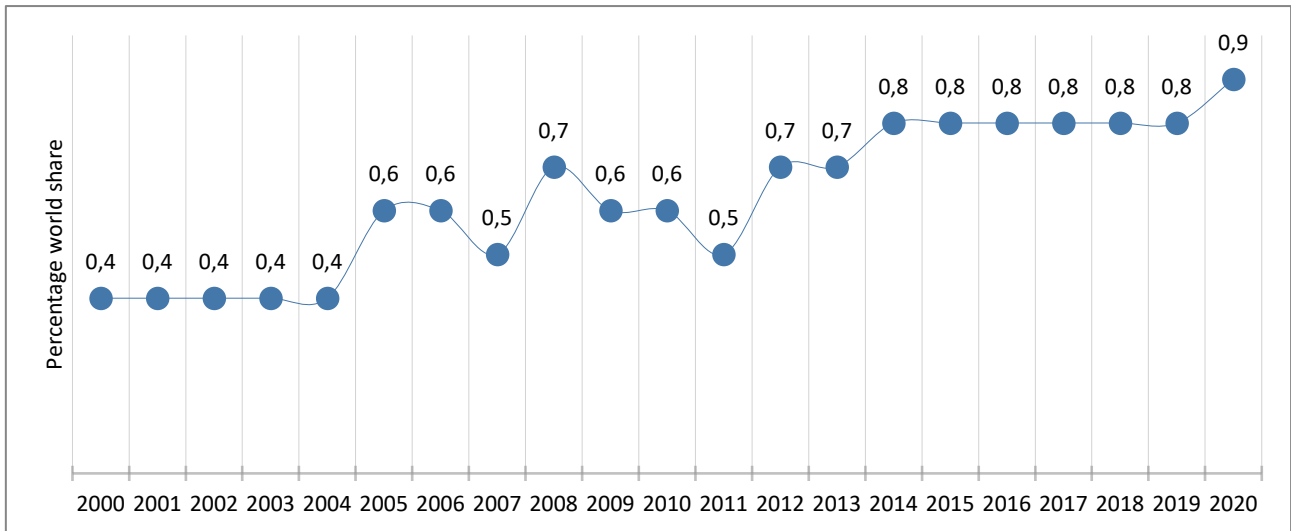


Figure 10-9: South Africa's rank among countries in terms of total output in Psychology by year: 2000 - 2020 (WoS)

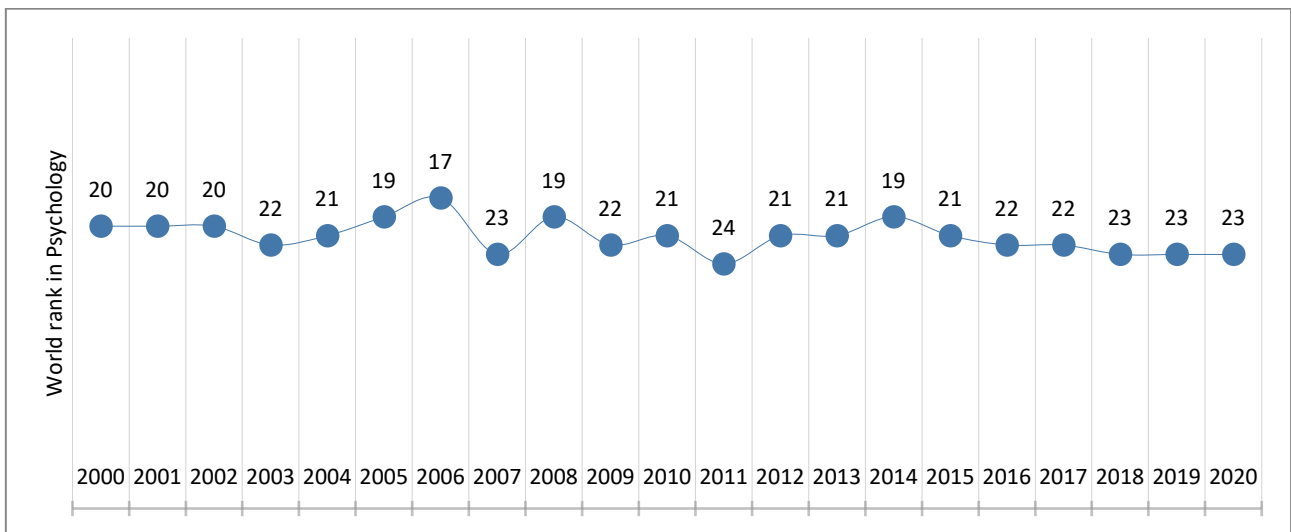


Figure 10-10: South Africa's relative field strength in Psychology by year: 2000 - 2020 (WoS)

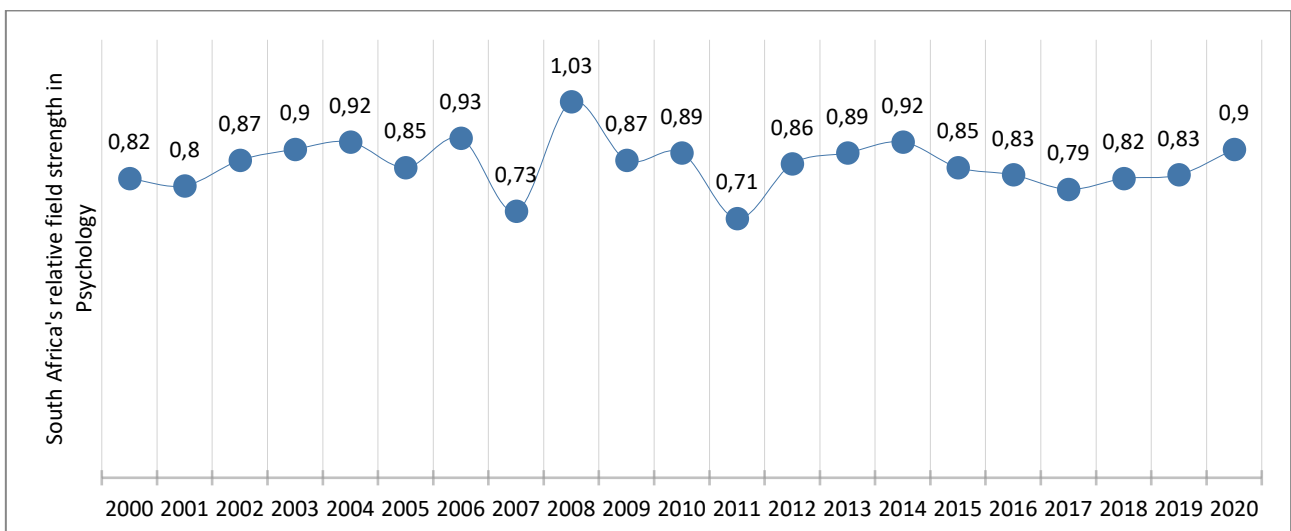


Figure 10-11: Percentage of South Africa's publications in the top citation percentile intervals in Psychology by year: 2000 - 2020 (WoS)

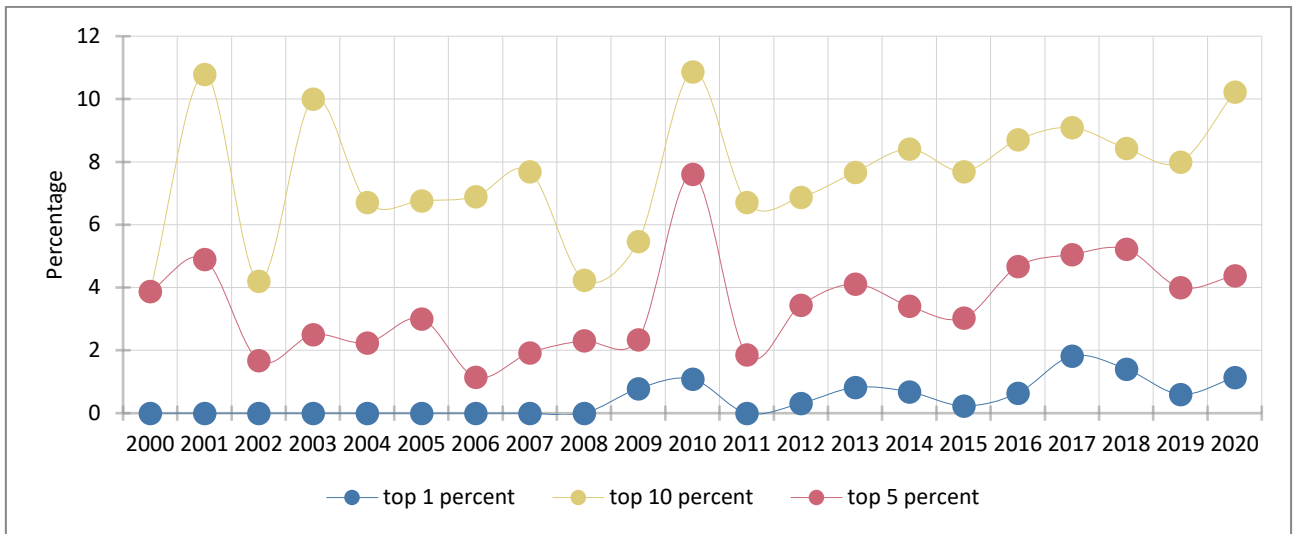


Figure 10-12: Percentage of Psychology articles by quartile (according to JIF) by year: 2000 - 2020 (WoS)

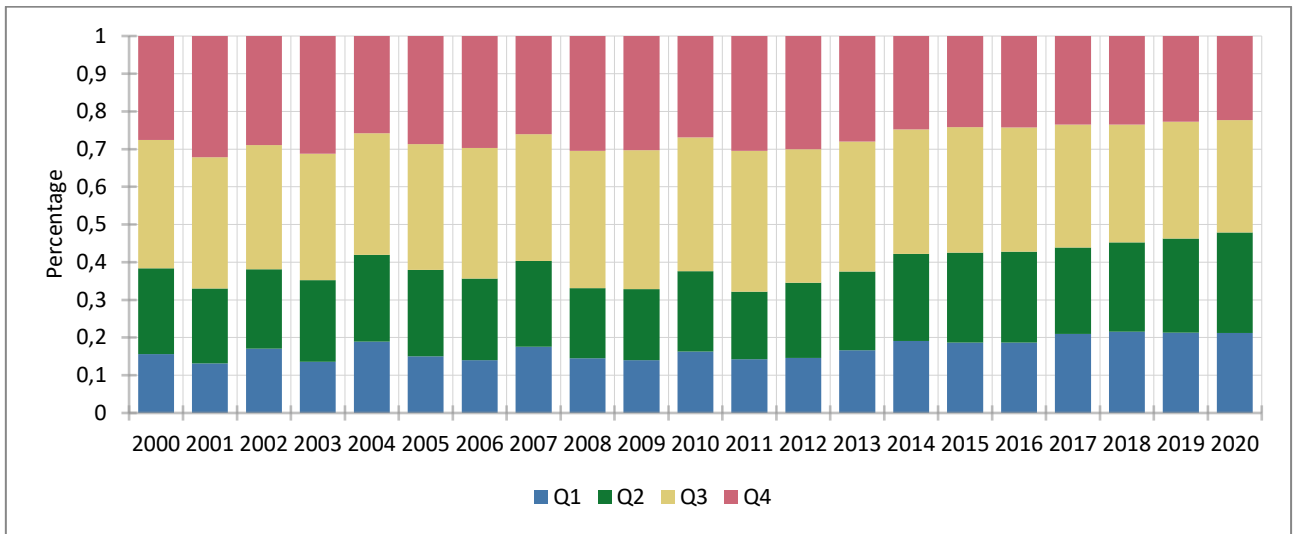


Figure 10-13: Trends in research collaboration in Psychology by year: 2000 - 2020 (WoS)

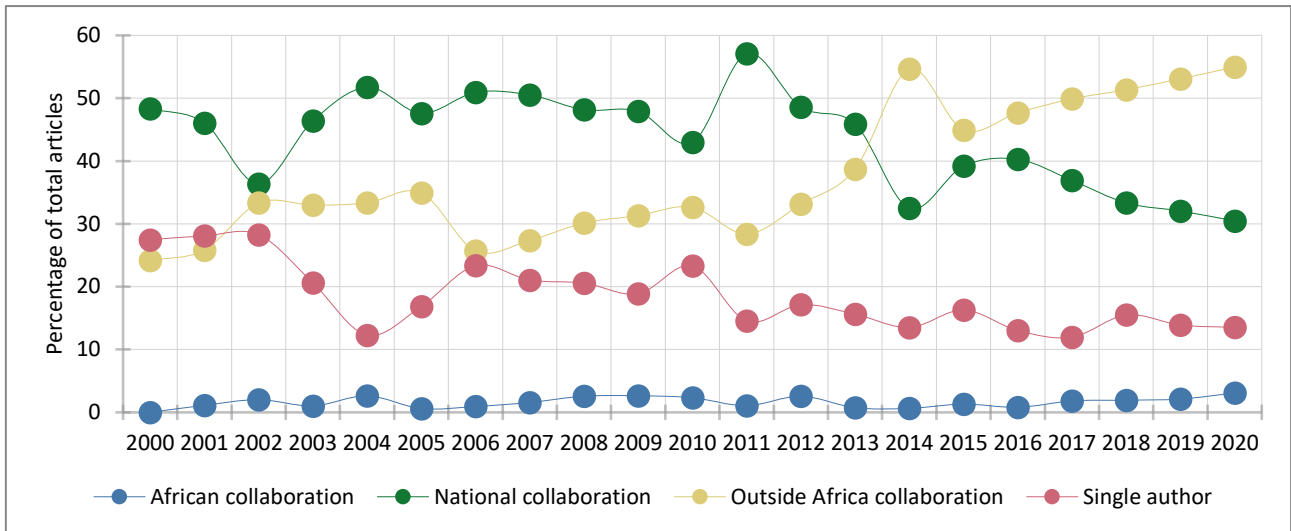


Figure 10-14: Trends in citation impact (5-year MNCS) for papers in Psychology by year: 2000 - 2020 (WoS)

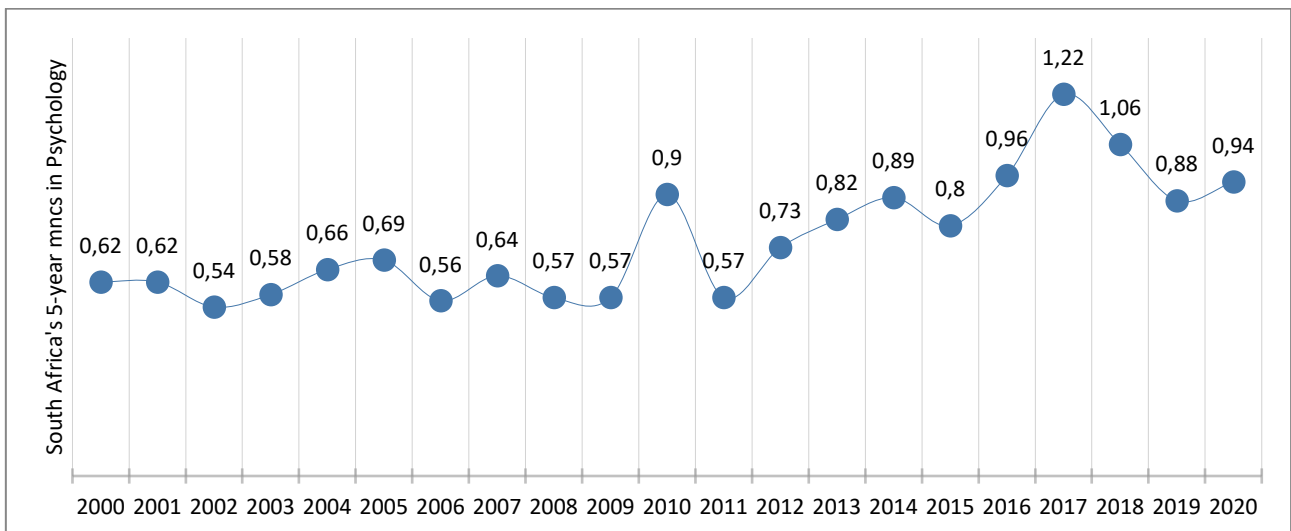


Figure 10-15: South Africa's research collaboration intensity in Psychology between 2005 and 2012

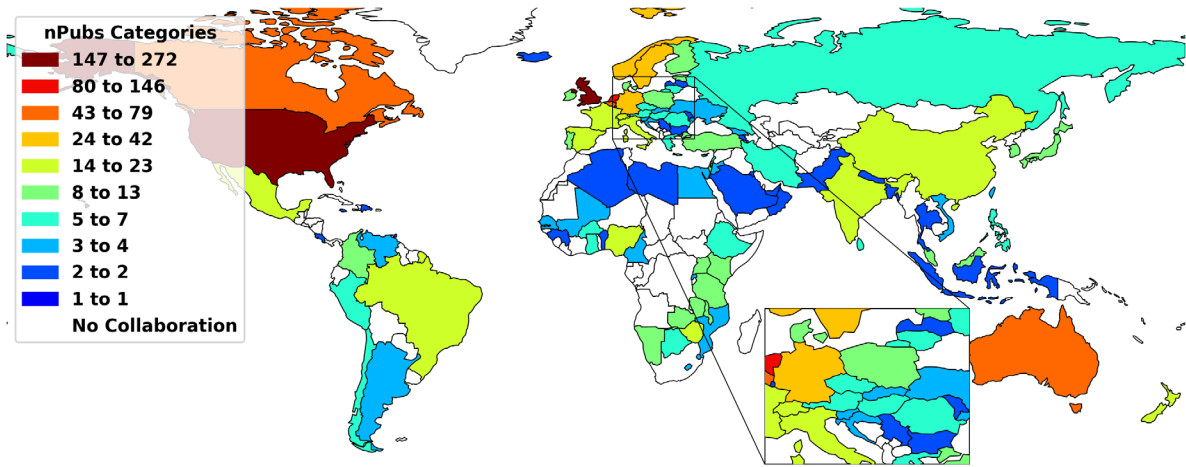
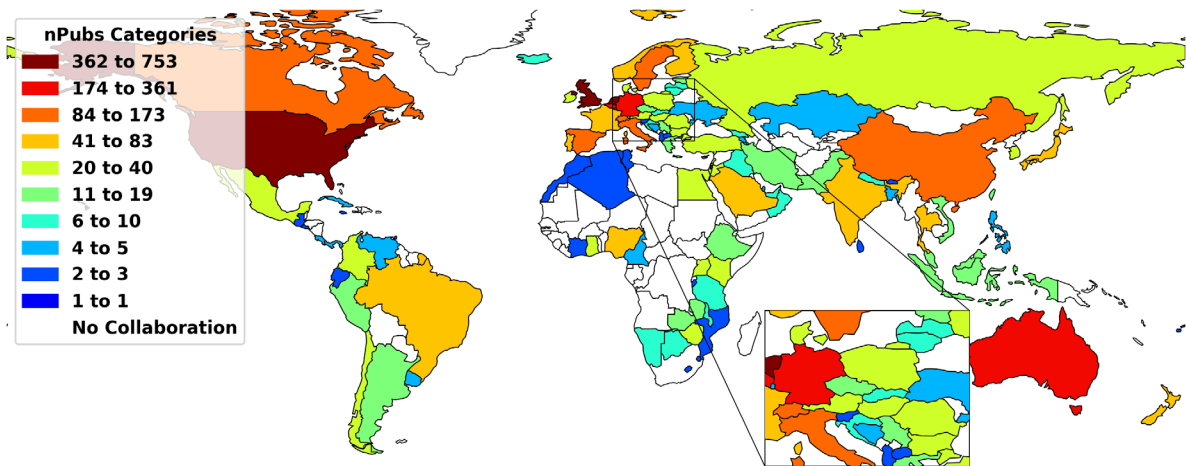


Figure 10-16: South Africa's research collaboration intensity in Psychology between 2013 and 2020



Appendix 1: Data and methodology

1.1 The construction of disciplines

For the purposes of this study, we used four different data sources to ‘construct’ the disciplines as required by the Terms of Reference of the study. We deliberately use the word ‘construct’ as the meaning attached to ‘discipline’ varies across different contexts and paradigms. One typical challenge is the boundaries between a ‘discipline’ (which most scholars would define in terms of its cognitive or theoretical core) and a department at a university. From an administrative point of view academic departments (e.g. the department of Sociology or Psychology) are generally equated with the ‘disciplines’ of ‘sociology’ and ‘psychology’. But academic departments – even when we use the same words, reflect very different cognitive and theoretical approaches and historical trajectories. What is meant by the ‘discipline’ of ‘Psychology’ in one department may be very different from how the discipline of ‘Psychology’ is understood at another department of Psychology at another university. But the real challenge lies even deeper. As scholarship has become more specialised over the past 50 to 60 years, we have seen the development of increasing numbers of interdisciplinary ‘spaces’ such as gender studies, development studies, applied ethics, business ethics, monitoring and evaluation studies, science and technology studies, land reform studies, and so on. And these new ‘inter-disciplines’ are often not found in traditional academic departments. Some may be institutionalised as such (new names given to academic departments), but it is more often the case that they are found in research chairs, research centres and institutes.

In the context of this study, this problem manifested at different levels. Scholars from the same ‘discipline’ do not necessarily publish in the same set of scientific journals. There has also been a huge increase in interdisciplinary and trans-disciplinary journals which cater for scholars from different disciplines. In fact, one could even argue that it is not particularly important where a scholar is housed academically (or in which discipline he or she was trained) when manuscripts are submitted to the journals. So, the distinction between the ‘academic departmental affiliation’ and ‘disciplinary identity’ of the author does not seem to matter.

The same point can be made when we look at the funding of research. In our studies we only had access to the NRF database on funding of SA academics. Besides the obvious constraint of this database – that it does not cover all academics in the country – there is no singular classification of the ‘discipline’ of the grant recipient (see elaboration below).

In the final analysis, we were faced with a number of different considerations and methodological choices, in constructing the set of academics or scholars that were included in our 11 disciplines in this study. We elaborate below on what these considerations and methodological choices were for the main categories of research assessment in the six reports.

1.1.1 Publications

A decision had to be made to follow an output-based (the journal article) perspective on a discipline as opposed to an (author) affiliation-based view on the discipline. In databases with collections of journal articles (e.g., Scopus or WoS), a journal is typically classified as belonging to one or more subject categories. The subject categories of a journal then also become the subject categories of the articles appearing in that journal. An output-based view of a discipline, therefore, means that a discipline is typically defined as the sum total of all articles in journals that are assigned to a selection of subject categories considered to be representative of that discipline. As far as the **Web of Science** database by Clarivate Analytics is concerned, an affiliation-based construction of a discipline was not possible. It would have required that we identify, clean, and standardise not only all the South African addresses in the six disciplines but all addresses in all countries in those disciplines. Hence, an output-based approach to the definition of a discipline was the only

feasible option for the WoS data, as each article (irrespective of where in the world it is published) appears in a journal with one or more subject categories. The relevant journal subject categories corresponding to a specific discipline were therefore identified and all articles in the world in those categories extracted to be used as a benchmark (in terms of both output volume and citations) for the South African set of articles in the WoS. In the case of the *SAKnowledgebase* (SAK) of CREST, an affiliation-based construction of a discipline was also followed, as the subject categories assigned to journals in the database are the same as those used by Clarivate Analytics in their Web of Science citation database. ‘Interdisciplinarity is covered by both the SAK and the WoS data, in the sense that the authors who publish in a journal that belongs to a specific discipline could come from any centre, unit or department outside that discipline.

1.1.1 Funding

In terms of the **NRF grant-holder** data, the datasets received from the NRF included a number of fields which contain subject related information that could have been used to define the 13 disciplines. However, these fields were not well-populated at all. Moreover, in some cases the field entries seem to reflect the research specialisation of an individual while in other cases the subject classification of a project, where the same project is often classified using different subject categories. As a result, apart from the many missing entries, there is very little consistency in the subject categories used for any specific grant-holder. We therefore decided to implement an affiliation-based definition of disciplines for the NRF data. Two existing variables in the database aided in the development of an affiliation-based field classification of NRF grant-holders. The first of these contains the centre and departmental affiliations of grant-holders at the time of their application (“NRF Department_Phoenix”). The second variable contains similar information for each grant-holder, but as provided by them when they report on their grants (“NRF Department_Submission_ProgressReport”). By taking into account information from both variables, the discipline reported on here was ‘constructed’. In cases where the two variables contained missing information or provided conflicting information for a single grant-holder, alternative sources were consulted. These were the available address information for publication authors in SA Knowledgebase, and the websites of South African universities that list the names of academic staff in departments in the relevant discipline.

The process followed to construct the disciplines in the NRF funding database invariably led to omissions, as the focus was on identifying grant-holders with clear affiliations in the discipline in question. To use Economics as an example: some economists would not necessarily be housed at Economics departments but in departments or centres such as Development Studies or Labour Studies and the like. This again may have produced an under-estimate of the funding received by ‘economic scholars’ from the NRF.

It further needs to be mentioned that other NRF data sources, such as NRF rating data or postgraduate (masters and doctoral) scholarship data, had not been made available for this analysis. We recognise that analyses of other public, private and international grants are equally important for reflecting on the state of a discipline.

1.1.2 Academic staff and postgraduate student data

In the case of the fourth data source, HEMIS data, the 13 disciplines were constructed in terms of the available CESM categories, as explained in Appendix 2. It must be emphasised that there is a huge difference between the CESM categories for a discipline and the university addresses corresponding to a discipline. These are not 100% correlated and it is very difficult, if not impossible, to map the CESM disciplinary information to the organisational departmental structures of universities.

1.2 Race as a construct

According to the South African Broad-Based Black Economic Empowerment (B-BBEE) Amendment Act, 2013 (Act No. 46 of 2013), “‘black people’ is a generic term which means Africans, Coloureds and Indians (a) who are citizens of the Republic of South Africa by birth or descent; or (b) who became citizens of the Republic of South Africa by naturalisation — (i) before 27 April 1994; or (ii) on or after 27 April 1994 and who would have been entitled to acquire citizenship by naturalisation prior to that date.”⁷ This definition stipulates that the category 'black', for B-BBEE purposes, only applies to South African citizens.

The Statistics Act of 1999 also makes it clear that the classification in terms of ‘population group’ or ‘race’ into four categories (Black African, Indian/Asian, Coloured and White) only applies to South African nationals. This means that assigning any of the four ‘categories’ to a specific individual, we have to know whether this person is in fact a South African national. Unfortunately, this information is not readily available across all national databases.

- In the case of the **HEMIS** database (which contains data about **academic staff and students**) it is possible to identify the **‘race’ of South African nationals (by filtering on certain fields)**.
- Although **SAKnowledgebase** (which contains data about **publications produced by universities**) does include a field called ‘nationality’, entries are missing. Where entries do occur, there is no clear distinction between ‘country of birth’, ‘citizenship’ and ‘residency’. Because citizenship is not constant, but can vary, it is also impossible (in the case of individuals with different 'nationalities') to determine what outputs were produced as part of what 'nationality'. Thus, in the analyses involving *SAKnowledgebase*, the **race categories apply to all authors publishing with a South African university address and not only university authors who are South African citizens**.
- As far the **NRF grant-holder** data are concerned, **race is also reported for all grant-holders (and not only those who are South African citizens)**. The reason is that the relationship between citizenship, country of birth and residency in the ‘country’ field in the NRF database is not clear.

In conclusion, then, the results of the analyses concerning race need to be interpreted with caution, as no credible data currently exist.

⁷ https://www.gov.za/sites/default/files/gcis_document/201409/37271act46of2013.pdf

Appendix 2: Technical notes on the analysis of HEMIS (staff and student) data

2.1 Disciplines selected for HEMIS analysis

The analysis of human resources for the selected disciplines used the classification of disciplines as outlined by the HEMIS classifications. The HEMIS Classification of Educational Subject Matter (CESM) changed three times over the 20-year period of data analysed. In the table below, the disciplines and their corresponding CESM codes that were used in our analysis are shown. In some cases, the first and second order classifications were used.

2.1.1 CESM codes

	MATHEMATICAL SCIENCES			150100	MATHEMATICS
Fields included prior to 2010 – not disaggregated in CESM codes	1999-2007	2008-2009	Description	2010-	Description
	1601	160100	Mathematical Sciences, General Perspective	150101	Mathematics, General
	1602	160200	Logic, sets, and Foundations	150102	Algebra and Number Theory
	1603	160300	Arithmetic and Algebra	150103	Analysis and Functional Analysis
	1604	160400	Classical Analysis	150104	Geometry/Geometric Analysis
	1605	160500	Functional Analysis	150105	Topology and Foundations
	1606	160600	Geometry and Topology	150199	Mathematics, Other
	1607	160700	Probability	150200	Applied Mathematics
	1609	160900	Numerical Analysis and Approximation Theory	150201	Applied Mathematics, General
	1610	161000	Classical Applied Mathematics	150202	Computational Mathematics
	1611	161100	Applications of Mathematics	150299	Applied Mathematics, Other
	1612	161200	User-oriented Mathematics	159999	Mathematics and Statistics, Other
	1699	169900	Other Mathematical Sciences		

STATISTICS					
Fields included prior to 2010 – not disaggregated in CESM codes	1999-2007	2008-2009	Description	2010-	Description
	1608	160800	Statistics	150300	Statistics
Descriptive Statistics				150301	Statistics, General
Applied Statistics				150302	Mathematical Statistics and Probability
Mathematical Statistics				150399	Statistics, Other
Parametric Inference					
Non-parametric Inference					
Linear Models					
Multivariate Analysis					

STATISTICS					
Fields included prior to 2010 – not disaggregated in CESM codes	1999-2007	2008-2009	Description	2010-	Description
Sample Surveys					
Decision Theory					
Time Series Analysis					
Reliability and Quality Control					
Other Statistics (Specify)					

Fields included prior to 2010 – not disaggregated in CESM codes	GEOLOGICAL SCIENCES			GEOLOGY AND EARTH SCIENCES/GEOSCIENCES	
	1999-2007	2008-2009	Description	2010-	Description
Crystallography and Chrystal Chemistry	1505	150500	Geology	140600	Geology and Earth Sciences/Geosciences
Economic Geology				140601	Geology/Earth Science, General
Geomorphology				140602	Geochemistry
Geohydrology				140603	Geophysics and Seismology
Mineralogy				140606	Geochemistry and Petrology
Palaeontology				140699	Geology and Earth Sciences/Geosciences, Other
Petrology					
Sedimentology					
Seismology					
Stratigraphy					
Structural Geology					
Other Geology (Specify)					

Fields included prior to 2010 – not disaggregated in CESM codes	COMPUTER SCIENCE			COMPUTER AND INFORMATION SCIENCES	
	1999-2007	2008-2009	Description	2010-	Description
	0601	060100	Applications in Computer Science and Data Processing	060100	Computer and Information Sciences
	0602	060200	Computer Operations and Operations Control	060101	Computer and Information Sciences, General
	0603	060300	Computer Hardware Systems	060102	Artificial Intelligence and Robotics
	0604	060400	Computer Hardware	060103	Information Technology
	0605	060500	Information and Data Base Systems	060199	Computer and Information Sciences, Other
	0606	060600	Numerical Computations	060200	Computer Programming
	0607	060700	Programming Languages	060201	Computer Programming, General
	0608	060800	Programming Systems	060202	Computer Programming, Specific Applications
	0609	060900	Software Methodology	060299	Computer Programming, Other
	0610	061000	Theory of Computation	060300	Data Processing and Information Science
	0611	061100	Educational, Societal, and Cultural Considerations	060301	Data Processing and Data Processing Technology

Fields included prior to 2010 – not disaggregated in CESM codes	COMPUTER SCIENCE			COMPUTER AND INFORMATION SCIENCES	
	1999-2007	2008-2009	Description	2010-	Description
	0699	069900	Other Computer Science and Data Processing	060302	Information Science
				060399	Data Processing and Information Science, Other
				060400	Computer Business Systems Analysis
				060401	Computer Business Systems Analysis
				060500	Data Entry/Microcomputer Applications
				060501	Data Entry/Microcomputer Applications, General
				060502	Word Processing
				060599	Data Entry/Microcomputer Applications, Other
				060600	Computer Science
				060601	Computer Science
				060700	Computer Software and Media Applications
				060701	Web Page, Digital/Multimedia and Information Resources Design
				060702	Data Modelling/Warehousing and Database Administration
				060703	Computer Graphics
				060799	Computer Software and Media Applications, Other
				060800	Computer Systems Networking and Telecommunications
				060801	Computer Systems Networking and Telecommunications
				060900	Computer/Information Technology Administration and Management
				060901	Systems Administration
				060902	Systems, Networking and LAN/WAN Management
				060903	Computer and Information Systems Security
				060904	Web/Multimedia Management
				060999	Computer/ Information Technology Administration and Management, Other
				061000	Management Information Systems and Services
				061001	Management Information Systems, General
				061002	Information Resources Management
				061003	Knowledge Management
				061099	Management Information Systems and Services, Other
				069999	Computer and Information Sciences, Other

CHEMISTRY					
Fields included prior to 2010 – not disaggregated in CESM codes	1999-2007	2008-2009	Description	2010-	Description
	1504	150400	Chemistry	140400	Chemistry
Analytical Chemistry				140401	Chemistry, General

CHEMISTRY					
Fields included prior to 2010 – not disaggregated in CESH codes	1999-2007	2008-2009	Description	2010-	Description
Biochemistry				140402	Analytical Chemistry
Electrochemistry				140403	Inorganic Chemistry
Inorganic Chemistry				140404	Organic Chemistry
Macro-molecular Chemistry				140405	Physical and Theoretical Chemistry
Nuclear Chemistry and Radiochemistry				140406	Polymer Chemistry
Organic Chemistry				140407	Chemical Physics
Physical Chemistry				140499	Chemistry, Other
Surface Chemistry					
Specialised Areas of Chemistry					
Other Chemistry (Specify)					

Fields included prior to 2010 – not disaggregated in CESH codes	BIOLOGICAL SCIENCES			LIFE SCIENCES	
	1999-2007	2008-2009	Description	2010-	Description
	1503	150300	Biological Sciences	130100	Biology general
Biological Behaviour				130101	Biology/Biological Sciences, General
Cytology				130200	Biochemistry, Biophysics and Molecular Biochemistry
Developmental Biology				130201	Biochemistry
Ecology				130202	Biophysics
Embryology (See 09.01 05 - Embryology)				130203	Molecular Biology
Evolution				130204	Molecular Biochemistry
Genetics				130205	Molecular Biophysics
Histology (See 09.01 09 - Histology)				130206	Structural Biology
Limnology				130207	Photobiology
Marine Biology				130208	Radiation Biology/Radiobiology
Microbiology				130299	Biochemistry, Biophysics and Molecular Biochemistry, Other
Molecular Biology				130300	Botany/Plant Biology
Parasitology (See 09.01 14 03 - Parasitology)				130301	Botany/Plant Biology, General
Radio biology				130302	Plant Pathology/Phytopathology
Taxonomy and Systematics				130303	Plant Physiology
Mycology (See 09.01 14 02 - Mycology)				130304	Plant Molecular Biology
Phycology				130399	Biology/Plant Biology, Other
Plant Anatomy				130400	Cell/Cellular Biology and Anatomical Sciences
Plant Pathology				130401	Cell/Cellular Biology and Histology
Plant Physiology				130402	Anatomy
General Zoology				130403	Developmental Biology and Embryology
Animal Anatomy				130404	Neuroanatomy

	BIOLOGICAL SCIENCES			LIFE SCIENCES	
Fields included prior to 2010 – not disaggregated in CESM codes	1999-2007	2008-2009	Description	2010-	Description
Animal Pathology				130405	Cell/Cellular Biology and Anatomy
Animal Physiology				130499	Cell/Cellular Biology and Anatomical Sciences, Other
Entomology				130501	Microbiology, General
Herpetology				130600	Zoology/Animal Biology
Ichthyology				130601	Zoology/Animal Biology, General
Mammalogy				130602	Entomology
Ornithology				130603	Animal Physiology
Other Biology (Specify)				130604	Animal Behaviour and Ethology
				130605	Wildlife Biology
				130699	Zoology/Animal Biology, Other
				130700	Genetics
				130701	Genetics, General
				130702	Molecular Genetics
				130703	Microbial and Eukaryotic Genetics
				130704	Animal Genetics
				130705	Plant Genetics
				130706	Human/Medical Genetics
				130799	Genetics, Other
				130805	Reproductive Biology
				131202	Marine Biology
				131204	Aquatic Biology
				131203	Evolutionary Biology
				131207	Conservation Biology

PHYSICS					
Fields included prior to 2010 – not disaggregated in CESM codes	1999-2007	2008-2009	Description	2010-	Description
	1507	150700	Physics	140700	Physics
General Physics				140701	Physics, General
Physics of Elementary Particles and Fields				140702	Atomic/Molecular Physics
Nuclear Physics				140703	Elementary Particle Physics
Atomic and Molecular Physics				140704	Plasma and High Temperature Physics
Classical Areas of Phenomenological Physics				140705	Nuclear Physics
Fluids, Plasmas and Electric Discharges				140706	Optics/Optical Sciences

PHYSICS					
Fields included prior to 2010 – not disaggregated in CESM codes	1999-2007	2008-2009	Description	2010-	Description
Structure, and Thermal and Mechanical				140707	Solid State and Low Temperature Physics
Properties of Condensed Matter Electronic Structure and Electrical,				140708	Acoustics
Properties of Condensed Matter Magnetic and Optical				140709	Theoretical and Mathematical Physics
Cross-Disciplinary Physics				140799	Physics, Other
Materials Science					
Biophysics					
Astrophysics and Geophysics					
Other Physics (Specify)					

PHILOSOPHY					
Fields included prior to 2010 – not disaggregated in CESM codes	1999-2007	2008-2009	Description	2010-	Description
	1801	180100	Systematic Philosophy	170100	Philosophy
	1802	180200	History of Philosophy	170101	Philosophy, General
	1803	180300	Main Philosophical Currents and Trends	170102	Main Philosophical Currents and Trends
				170103	Logic
				170104	Ethics
				170199	Philosophy, Other

PSYCHOLOGY					
Fields included prior to 2010 – not disaggregated in CESM codes	1999-2007	2008-2009	Description	2010-	Description
	2001	200100	Foundations of Psychology	180100	Psychology, General
	2002	200200	Biopsychology	180101	Psychology, General
	2003	200300	Environmental Psychology	180200	Clinical Psychology
	2004	200400	Experimental Psychology	180201	Clinical Psychology, General
	2005	200500	Psychology Applied to Health	180202	Clinical Child Psychology
	2006	200600	Psychology Applied to Education	180203	Clinical Psychology, Professional Studies
	2007	200700	Psychology Applied to Industry, Government and other Organisations	180299	Clinical Psychology, Other
	2008	200800	Psychometrics	180300	Cognitive Psychology and Psycholinguistics
	2009	200900	Social Psychology	180301	Cognitive Psychology and Psycholinguistics
	2010	201000	Developmental Psychology	180400	Community Psychology

PSYCHOLOGY					
Fields included prior to 2010 – not disaggregated in CESH codes	1999-2007	2008-2009	Description	2010-	Description
	2011	201100	Cognitive Psychology	180401	Community Psychology
	2099	209900	Other Psychology	180500	Comparative Psychology
				180501	Comparative Psychology
				180600	Counselling Psychology
				180601	Counselling Psychology
				180602	Family Psychology
				180603	Marriage and Family Therapy/Counselling
				180699	Counselling Psychology, Other
				180700	Developmental and Child Psychology
				180701	Developmental and Child Psychology
				180800	Educational Psychology
				180801	Educational Psychology
				180802	School Psychology
				180899	Educational Psychology, Other
				180900	Environmental Psychology
				180901	Environmental Psychology
				181000	Research Methodology for Psychology
				181001	Research Methodology for Psychology
				181100	Forensic Psychology
				181101	Forensic Psychology
				181200	Geropsychology
				181201	Geropsychology
				181300	Health/Medical Psychology
				181301	Health/Medical Psychology
				181302	Psychopharmacology
				181399	Health/Medical Psychology, Other
				181400	Industrial and Organisational Psychology
				181401	Industrial and Organisational Psychology, General
				181402	Occupational and Career Psychology
				181403	Organisational Psychology
				181404	Occupational Health, Well-being and Performance Dysfunction in the Workplace
				181499	Industrial and Organisational Psychology, Other
				181500	Personality Psychology
				181501	Personality Psychology
				181600	Physiological Psychology/Psychobiology
				181601	Physiological Psychology/Psychobiology
				181602	Biopsychology
				181603	Neuropsychology
				181699	Physiological Psychology/Psychobiology, Other
				181700	Psychometrics and Applied Psychological Assessment
				181701	Psychometrics and Quantitative Psychology
				181702	Applied Psychological Assessment

PSYCHOLOGY					
Fields included prior to 2010 – not disaggregated in CESM codes	1999-2007	2008-2009	Description	2010-	Description
				181799	Psychometrics and Applied Psychological Assessment, Other
				181800	Social Psychology
				181801	Social Psychology, General
				181802	Positive Psychology
				181899	Social Psychology, Other
				189999	Psychology, Other

SOCIOLOGY					
Fields included prior to 2010 – not disaggregated in CESM codes	1999-2007	2008-2009	Description	2010-	Description
	2206	220600	Sociology	200700	Sociology
Community Sociology				200701	Sociology
Criminology				200702	Demography and Population Studies
Demography and Human Ecology				200703	The Sociology of Developing Societies
Population Change				200799	Sociology, Other
Population Problems					
Population Theory					
Juvenile Delinquency					
Marriage and Family Counselling					
Sociology of Marriage					
Sociology of the Family					
Psychology of Sociology					
Comparative Sociology					
History and Development of Sociology and Social Thought					
Theory of Social Conflict					
Theory of Social Structures					
Psychological Sociology					
Collective Behaviour Socialisation					
Rural Sociology					
Quantitative and Qualitative Methods					
Social Control and Deviance					
Social Institutions					
Social Organisation and Change					
Social Stratification					
Futuristics					
Social Structure					
Social Movements					
Social Problems					
Urban Sociology					

SOCIOLOGY					
Fields included prior to 2010 – not disaggregated in CESM codes	1999-2007	2008-2009	Description	2010-	Description
Sociology of Groups					
Intergroup Relations					
Small Groups					
Women Studies					
Other Sociology (Specify)					

ECONOMICS					
Fields included prior to 2010 – not disaggregated in CESM codes	1999-2007	2008-2009	Description	2010-	Description
	2202	220200	Economics	40400	Economics
Theory of Economics				40401	Economics, General
Micro-economic theory				40402	Applied Economics
History of Economic Thought				40403	Managerial Economics
Economic Policy				40404	Econometrics and Quantitative Economics
Monetary Economics				40405	Development Economics and International Development
National Income				40406	International Economics
Public Finance				40407	Natural Resource Economics
Economic Growth and Development				40499	Economics, Other
Consumer Economics					
Comparative Economic Systems					
Economics of Human Resources					
Labour and Manpower Economics					
Economics of Natural Resources					
Business and Industrial Economics					
Business Finance					
Industrial Organisation					
Industry Studies					
Economics of Industrial Change					
International Economics					
International Finance					
International Trade					
Social Economics					
Urban and Rural Economics					
Quantitative Economics					
Econometrics					
Economic Forecasting					
Other Economics (Specify)					

HISTORY					
Fields included prior to 2010 – not disaggregated in CESM codes	1999-2007	2008-2009	Description	2010-	Description
	2204	220400	History	200300	History
constitutional and Administrative History				200301	History, General
Diplomatic History				200302	African History
Economic History				200303	American (United States) History
Historiography				200304	Asian History
History of Science				200305	European History
Intellectual and Cultural History				200306	History and Psychology of Science and Technology
Labour History				200307	South African History
Political History				200308	History of Ancient Cultures
Religious History				200399	History, Other
Social History					
Urban History					
African History					
American -colonial History					
Antarctic History					
Asian History					
Australasian History					
British History					
Canadian History					
European History					
Latin American History					
Mediterranean History					
Oceanian History					
Russian History					
Southern African History					
United States History					
World History					
Ancient History					
Contemporary History					
Medieval History					
Modern History					
Minority Group History					
History of Women					
Other History (Specify)					

POLITICAL SCIENCE					
Fields included prior to 2010 – not disaggregated in CESM codes	1999-2007	2008-2009	Description	2010-	Description
	2205	220500	Political Science	200600	Political Science and Government
South African Political Systems				200601	Political Science and Government, General
Citizenship				200602	Comparative Political Systems
Comparative Political Systems				200603	Contemporary World Affairs

POLITICAL SCIENCE					
Fields included prior to 2010 – not disaggregated in CESM codes	1999-2007	2008-2009	Description	2010-	Description
African Political Systems				200604	International Relations and Affairs
Asian Political Systems				200699	Political Science and Government, Other
Communitistic Political Systems					
Latin American Political Systems					
Middle Eastern Political Systems					
Political Systems of the United States of America					
Western European Political Systems					
Contemporary World Affairs					
International Relations					
Political Behaviour					
Political Parties and Public Opinion					
Political Socialisation					
Political Structures					
Political Theory					
American Political Theory					
Provincial, Regional and Local Government					
Other Political Science (Specify)					

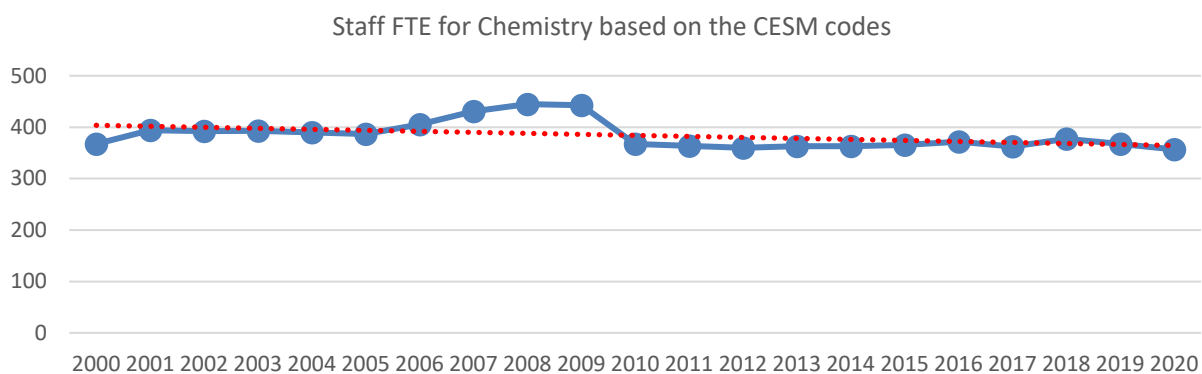
2.1.2. Implications of the CESM changes

We have shown in the tables above how the CESM disciplinary codes have changed over the last 21 years and how we have tried to align the three different classification frameworks. However, the changes in the CESM classification impacted on the HEMIS data in two ways.

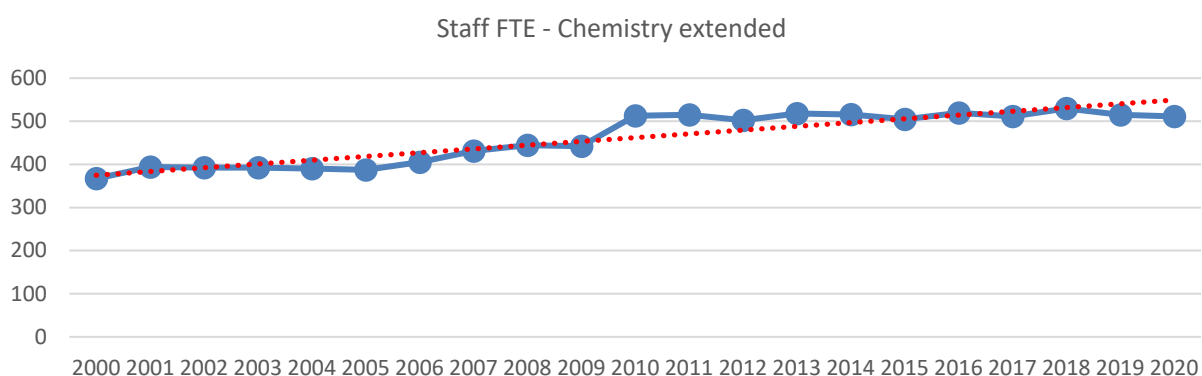
Firstly, many universities used the incorrect CESM codes (the new codes) in 2010 – where the old 2009 codes were used. This means that for some universities, in 2010, students and staff were assigned to incorrect disciplines. In these instances, we have tried where possible, to correct these errors and clean the HEMIS data.

Second, with the reclassification, some subfields were included and excluded. For some disciplines these changes had minor implications as the subfields were largely constant over the period. In other disciplines the subfields were not disaggregated at CESM level 2 which means that we could not align the inclusion and exclusion of the subfields to reconcile that data pre-2010 with that after the changes came into effect in 2010.

An illustrative example is provided below where we look at the field of Chemistry. Between 2000 and 2009 the only CESM code assigned to Chemistry was code 150400-Chemistry with no disaggregation at subfield level. From 2010 onwards, we see a breakdown of the subfields in Chemistry which each has an assigned CESM code in HEMIS. However, in the HEMIS documentation a list of subfields, which constitute the level 2 classification between 2000 and 2009, is given. We have provided these subfields, where available, in the tables above. When we look at the total staff FTE for Chemistry, using purely the CESM codes assigned to Chemistry for the three periods (1504, 150400 and 140400), as illustrated in the figure below, we find that there is a substantial decrease in the total FTE in Chemistry between 2009 and 2010 (from 442 to 367).



When we then align the subfields which were previously included in the classification of Chemistry (2000 to 2009), which mainly include fields related to biochemistry, and subsequently excluded in the 2010 onwards classification (as shown in the figure below) we see an expected linear growth for the period.



In the presentation of the trend data for staff and students, based on the HEMIS data, we report on the results of the given CESM classifications as given for the three periods. In many cases we will therefore see a decrease in the number of staff and students between 2009 and 2010 for the reasons explained above.

2.2. Data cleaning

In our analysis of staff and student data, which is based on the HEMIS data a number of challenges are reported. In the previous section we reported on two challenges which concerns the changes in the CESM classification framework. A third challenge pertains to the incorrect submission of data from the respective universities as well as cases where there are missing data – or no data submitted for certain years. In some cases, we have imputed missing data where there are obvious omissions, but in most cases we report on the data as captured in the HEMIS database. One such an example is UNISA in 2017 and 2018, where all students recorded the same commencement date. This affects the calculation of new enrolments and well as conversion rates. In our reporting of new enrolments, we have thus imputed data for 2017 and 2018 as the average number of new enrolments for 2016 and 2019. We have also excluded UNISA in our calculation of conversion rates.

2.2.1 Students

The HEMIS microdata received from the DHET were used in the analysis of Honours, Masters, and Doctoral students of selected disciplines. From here, all Honours, Masters and Doctoral students in each discipline were selected. The fields used from the microdata to select students are outlined below.

Code	Description	
529	Reporting year	Data from 2000 to 2020 were selected
005	Qualification type	The qualifications selected are as follows: Honours: 06: Honours Degree 47: HEQF Postgraduate Diploma 48: HEQF Bachelor Honours Degree 69: HEQSF Postgraduate Diploma 70: HEQSF Bachelor Honours Degree Masters: 07: Masters Degree 28: Magister Technologiae Degree 49: HEQF Masters Degree Doctoral 72: HEQSF Masters Degree 73: HEQSF Prof Masters Degree Doctoral: 08: Doctoral Degree; 30: Doctor Technologiae Degree 50: HEQF Doctoral Degree 74: HEQSF Doctoral Degree 75: HEQSF Prof Doctoral Degree
007	Commencement date	The date on which a student first commenced the qualification at the reporting institution. This was recoded to 'commencement year'
011	Date of birth	Each student's year of birth is recorded from which students' ages were determined.
012	Gender	Male; female and unknown
013	Race	Black African, Coloured, white, Indian/Asian and 'no information'
014	Nationality	Students' nationality were recoded into three regional categories: Rest of World (ROW) Rest of Africa (ROA) South African (RSA) Nationality refers to citizenship, not to country of permanent residence.
025	Qualification requirement status	N= Enrolments F= Graduates
026	CESM category (for first area of specialisation)	A second-order CESM code which depicts the field of study of a student's first or sole area of specialisation, established in the 'Collection Year'. This was the code used for the selection of students in the delineated disciplines.
063	Institution code	In 2005, a number of higher education institutions merged to form new institutions. All records for the years 2000 to 2004 were mapped to the post-2005 merged institutions

2.2.2 Staff

The micro staff FTE data from the DHET were used. The codes used to extract data and their descriptions are outlined below.

Code	Description	
529	Reporting year	Data from 2000 to 2020 were used
063	Institution code	In 2005, a number of higher education institutions merged to form new institutions. All records for the years 2000 to 2004 were mapped to the merged institutions after 2005

Code	Description	
National Staff Register ID	A code which uniquely identifies a staff member at an institution.	This was used to identify staff members uniquely
012	Gender	Male, female and unknown
013	Race	African, Coloured, white, Indian/Asian and 'no information'
014	Nationality	Students' nationalities were recoded into three regional categories: Rest of World (ROW) Rest of Africa (ROA) South African (RSA) Nationality refers to citizenship, not to country of permanent residence.
039	Personnel category	A code indicating the personnel category of a staff member. Category 01 (Instruction/Research professional) was selected.
041	Permanent/Temporary	A code which indicates whether or not a staff member's most recent appointment at the institution was on a permanent basis. Only permanent staff members were selected for our analysis.
042	Fulltime/Part time	A code which indicates whether a staff member has full-time or part-time employment status in respect of their most recent employment at the institution. In our analysis, both full-time and part-time staff members were selected.
044	Staff Programme	A code indicating the type of programme in which a staff member is undertaking duties. The codes included in our selection are: 010: Instruction 020: Research
045	CESM	The area of specialisation is to be established each year by the institution. Personnel can have FTE in more than one CESM field. Personnel can have up to four areas of specialisations. For each unique personnel member, the sum of FTEs (across all specialisations) were added to calculate the total FTE that a unique staff member has in a reporting year.
046	Staff qualification	A code indicating the highest most relevant qualification of a staff member (if the personnel category is Instructional/Research professional)
571	Age	This refers to a person's age (in years) in a recording year.
043	Staff time FTE	A value indicating the FTE time spent by a staff member on a particular programme (and staff programme CESM category if the programme is Instruction or Research). As indicated above, the FTE time were calculated across CESM categories to indicate a staff member's total FTE in a selected discipline.
040	Rank of staff member	A code indicating the rank of a staff member (if Instructional/Research professionals).

2.3 Indicators

2.3.1 Student analysis

The results presented in this report, are based on an analysis of individual records which were specific to students registered for an Honours, Masters or Doctoral degree between 2000 and 2020. The database included biographical information which allowed for an in-depth analysis of students by gender, race, nationality (categorised into three broad geographical locations) and age. Below the definition and calculation of each indicator is explained.

Indicator	Working Definition	Calculation
Enrolments	All students registered for a selected degree (H, M, PhD) in the recording year, regardless of entrance category	
New enrolments	These are first-time entering students	We did not use the 'entrance category' classification of HEMIS. Rather, we define these students as those where the 'reporting year

Indicator	Working Definition	Calculation
		– commencement year' = 0, therefore all students whose commencement year is the same as the reporting year.
Graduates	Students who have fulfilled the requirements of the qualification	

2.3.1.2. Conversion rates

This indicator is a measure of the 'flow' of postgraduate students from undergraduate to Doctoral graduation. We calculate the conversion rate by dividing the number of new enrolments (i.e. Doctoral) in a particular year (year x+3) by the average number of graduates at the previous degree level (i.e. Masters) over the preceding three years [(year x) + (year x+1) + (year x+2) / 3]. It is important to note that this indicator is not cohort-based. This is a simple measurement of the percentage new enrolments in a given year divided by the average number of graduates in the previous three years. In other words, at what rate do masters students convert to Doctoral studies in general and without tracking students specifically?

$$\text{Conversion rates (\%)} = \frac{\text{PhD new enrolments (year x + 3)}}{\text{Master's graduates (year x + year x + 1 + year x + 2)}/3}$$

2.3.1.3. Time-to-degree

This indicator refers to the total time (in years) a student takes to complete their degree. Time-to-degree is only calculated for graduates and is calculated as 'reporting year' - 'year commenced' = 1, under the condition that the qualification requirement status was coded as 'F' – the HEMIS code for successful completion (graduates). In the calculation of Doctoral time-to-degree, all cases less than two years were excluded given the prescribed minimum registration time for a Doctoral student in South Africa.

2.3.1.4. Age at commencement

This indicator refers to the average age of a student at the time of registration (enrolments only). It is calculated as 'reporting year' minus 'year of birth'. The mean and median of all enrolments in each reporting year is calculated. Outliers were not excluded in the calculations.

2.3.1.5. Age at graduation

This indicator refers to the average age of a student at the year of graduation (graduates only). It is calculated as 'reporting year' minus 'year of birth'. Outliers were not excluded in the calculations.

2.3.2 Staff analysis

The criteria discussed in the section above were used to select individual records for the analysis of staff FTE. Personnel can have FTE time in more than one CESM specialisation. We determined the staff capacity in each disciplinary field by summing the FTE values for research or instructional staff who have an FTE in the specified CESM classification within a given year. We therefore report on the total FTE value for the respective disciplinary field, per year and per demographic group.

In calculating **supervisory capacity**, we used a simple calculation in determining the number of PhD enrolments per permanent instructional and research staff member who holds a PhD. The number of Doctoral (total) enrolments is then divided by the number of staff to determine a student-to-supervisor ratio. This ratio then serves as an indicator of supervisory capacity at the Doctoral level. However, it should be noted that supervisory capacity is a less robust indicator and should be interpreted within context as the distribution of students varies significantly across institutions. This indicator does therefore not take into consideration the unequal distribution of students across universities.

2.3.3. Compound Annual Growth Rate (CAGR)

Throughout the report, we indicated rates of change through the use of the CAGR which is a measure of growth over multiple time periods. The calculation of the CAGR is as follows:

(End Value/Start Value)^(1/Periods) – 1 written as:

$$r_{CAGR} = \left(\frac{X_f}{X_0}\right)^{\frac{1}{n}} - 1$$

which is derived from the compound growth formula (that defines the geometric growth series):

$$X_f = X_0(1 + r)^n$$

where X_f is the end value, X_0 is the start value and n the number of periods.

Appendix 3: Technical notes on bibliometric analyses

3.1. Web of Science indicators

3.1.1. Percentage World Share

Percentage of the publications in the world that can be attributed to a single entity,

$$\% WS = \frac{n_f}{N_f} \times 100\%$$

Where n_f is the number of publications produced by the entity in field f and N_f is number of publications produced by the whole world in field f .

3.1.2. Mean Normalised Citation Score (MNCS)

The calculation of the *MNCS* starts with a calculation of the expected number of citations for any publication in a specific field. Since publications are often associated with more than one field, each publication and all citations it receives are attributed in equal fractions to all the fields associated with it.

$$e_i = \frac{\sum_{j=1}^{N_i} \frac{c_j}{f_j}}{\sum_{j=1}^{N_i} \frac{1}{f_j}}$$

where e_i is the expected number of citations for any publication in field i , N_i is the number of publications in field i , c_j is the number of citations received by publication j and f_j is the number of fields associated with publication j . Now the normalised citation score for publication j is given by

$$\begin{aligned} ncs_j &= \sum_{i=1}^{f_j} \frac{c_j}{e_i f_j} \\ &= \frac{c_j}{f_j} \sum_{i=1}^{f_j} \frac{1}{e_i} \end{aligned}$$

Finally, we can calculate *MNCS* for any set of n publications:

$$mncs = \frac{1}{n} \sum_{j=1}^n ncs_j$$

It should be noted that in our citation-based calculations, self-citations are not counted. A self-citation happens when one publication cites another, but one of the authors of the citing article is also an author of the cited article. Furthermore, for this study, we use a 2-year citation window so only citations received up until the second year after publication are counted.

3.1.3. Relative field strength (RFS)

The relative field strength (RFS), or activity index, of an entity in field f is the ratio of two ratios, calculated as:

$$rfs_f = \frac{\frac{n_f}{n_t}}{\frac{N_f}{N_t}}$$

where n_f is the number of publications produced by the entity in field f , n_t is the number of publications produced by the entity across all fields, N_f is the number of publications produced by the world in field f and N_t is the total number of publications produced by the world. The *rfs* can be interpreted as

$$rfs = \frac{\text{field share of publications by entity}}{\text{field share of publications by world}}$$

3.2. SAK indicators

SAKnowledgebase by CREST, Stellenbosch University, is a comprehensive database of research output produced by the South African universities from 2005 onwards, and specifically research outputs (articles, books, book chapters and conference proceedings) that were submitted to the DHET for subsidy. It includes the demographics of authors (gender, race, age and institution) as well as specialised journal information. Relevant authors in each field were identified based on the available departmental affiliations of authors in

SAKnowledgebase, as well as by sourcing the names of academic staff in the field from the university websites and incorporating that information into SAKnowledgebase.
