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JOTE Journal of Occupational Therapy Education

Volume 9 | Issue 4 Article 3

2025

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du Plooy, E., Casteleijn, D., Franzsen, D., & Ramkilawon, G. (2025). Demographic Factors as Predictors of Academic Performance in First- and Second-Year Occupational Therapy Students. *Journal of Occupational Therapy Education, 9* (4). https://doi.org/10.26681/jote.2025.090403

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Abstract

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Keywords

Occupational therapy education, academic performance, predictive factors, demographic variables, resource-constrained countries

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Acknowledgements

The authors acknowledge the support of the Business Intelligence Service at the University of the Witwatersrand for their assistance with data acquisition for this study. The first author acknowledges the Papers with Purpose program, funded by the British Academy and jointly run by the University of Oxford and the University of Cape Town, for writing support in developing this manuscript.

This original research is available in Journal of Occupational Therapy Education: https://encompass.eku.edu/jote/vol9/iss4/3

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ABSTRACT

Significant disparities in academic performance that may be associated with specific demographics can be utilized for supporting diverse student cohorts. Strategies can be developed for students to enhance equity and inclusivity in undergraduate occupational therapy education to ensure student success. This study aimed to determine the predictive demographic factors influencing academic performance among first- and second-year undergraduate occupational therapy students at a university in South Africa. A quantitative, cross-sectional design was utilized, and the sample included 129 first- and second-year students. Data were collected retrospectively from university records and student dashboards. Key demographic and academic variables were analyzed, including personal and geographical information, parental education, funding, university enrollments, and academic performance. Data analyses included descriptive statistics for the overall cohort and students who failed courses in the first and second year. Logistic regression was utilized to identify patterns and relationships between the variables and academic performance for students who failed ranging from 2 to 48 students per course in first year, and 7 to 50 students who failed per course in second year. The study indicates that demographic factors influenced academic performance among occupational therapy students in South Africa, but their impact varied by course. Gender, age, and geographical context were noteworthy predictors of academic performance, particularly highlighting the challenges faced by male students and students from rural contexts. These insights contribute to understanding the complex nature of demographic factors affecting student outcomes, particularly in the context of

resource-constrained countries in the global South. The study advocates for individual support and targeted interventions to address diverse student needs, moving away from a one-size-fits-all approach.

Introduction

Challenges in Predicting Academic Success in Higher Education

Higher education continues to evolve, with increasing recognition of the diverse factors that contribute to student success. The limitations in predicting academic performance, particularly in the first year of university, highlight the need for a better understanding of the factors that influence academic performance (Espinoza et al., 2025). Higher education institutions in resource-constrained countries face challenges that can act as barriers to equitable outcomes for diverse student populations. These challenges can be related to socio-economic, geographic and cultural factors such as students from lower quintile schools (ranging from 1 to 5 based on the poverty level of the surrounding community; Department of Education, 2004) not having foundational science knowledge required for university (Tomaszewski et al., 2024). Students might face financial challenges in covering university fees, learning materials, and living expenses (Naim, 2024). Most universities are located in urban centers and students from rural contexts can experience challenges with cultural adjustment and experience isolation (Zahl-Thanem & Rye, 2024). Students who cannot afford to live near campus need to commute, incurring transportation costs (Brownie et al., 2023). Many students also must work while studying and, in a resource-constrained context, face pressure from their family to generate an immediate income or have additional responsibilities such as managing households or caring for family members (Hurley, 2020). Students whose primary language is not English might face additional systemic barriers to higher education (Ciuffetelli Parker & Conversano, 2021). Other potential barriers include academic culture, hidden curricula, and course materials which can reflect Western perspectives and disadvantage first-generation students or those from diverse cultural backgrounds (Popa, 2024).

Academic and Demographic Predictors of Student Performance

Existing literature has identified various factors that predict students' academic performance across disciplines. These include demographic factors such as gender, age, parental education, socioeconomic status, family size, and geographical residence (Tabassum & Akhter, 2020). Academic performance has been consistently linked to previous academic records, demographic characteristics, and current course involvement (Batool et al., 2023). Among these, the cumulative grade point average (GPA) stands out as a particularly strong predictor (Hu et al., 2017). While high school grades are often good predictors of success, relying solely on standardized test scores can be inefficient (Svirina et al., 2021).

Psychosocial and Contextual Influences on Academic Success

Research has also highlighted the impact of psychosocial factors such as resilience, and social support on academic success in higher education (Van Zyl & Rothmann, 2012). Factors such as motivation, self-efficacy, and study skills can be equally or more

DOI: 10.26681/jote.2025.090403

important in predicting academic success and have also shown promise in explaining variance in student GPA (Scheidt et al., 2018). Students' interest in the subject, regular attendance, time management, and exam preparation have been identified as key determinants of academic performance (Jony, 2021). Ability, prior education, learning environment, and behavioral engagement along with lecturers' pedagogical skills and course structure have been found to be more effective predictors of success in higher education (Van Rooij et al., 2018). Furthermore, socioeconomic factors such as parental income and education levels as well as family involvement can significantly impact academic performance (Sesay et al., 2021).

The Need for Context-Specific Research in Occupational Therapy Education

While research on academic performance in health professions education is extensive, there are limited studies specifically addressing the predictive factors of academic success in occupational therapy education, particularly within the context of resource-constrained countries (Pucillo & Perez, 2023). Research in occupational therapy education has identified several key predictors of academic success. Older students and strategic study approaches were associated with better academic outcomes, while surface learning approaches negatively impacted performance (Bonsaksen et al., 2021). Wang et al. found that admission GPA, graduate record examination scores, and emotional intelligence were predictive of both academic and fieldwork success in occupational therapy programs (Wang et al., 2023). Academic performance was also influenced by gender, with female students achieving better results, while the type of previous degree also influences academic outcomes (Thew & Harkness, 2018).

Understanding the factors that contribute to academic success enables the development of proactive support systems that enhance student experiences and outcomes which is particularly important in low resourced contexts (Ned et al., 2020). South Africa presents challenges to this success, influenced by historical inequalities and ongoing socioeconomic disparities. These challenges are compounded by systemic barriers such as educational access and language diversity, with the country having 12 official languages (Statistics South Africa, 2019). Studies in health sciences education among South African students have identified prior academic achievement, socioeconomic status, and language proficiency as significant predictors of academic performance (Mabizela & Bruce, 2022). This indicates that the exploration of academic performance in health professions education, particularly in resource-constrained countries such as South Africa, requires a context-specific approach.

South Africa's rich diversity and multicultural heritage provide a context for examining student success that offers valuable insights into creating innovative educational approaches responsive to and inclusive of students' needs, thereby supporting student success in resource-constrained countries. Instead of considering demographic factors as deterministic or exclusionary, they should be seen as an essential foundation for creating targeted interventions and support systems that cater to the unique needs of students (Okai-Ugbaje et al., 2022). Understanding the factors that contribute to the academic success of occupational therapy students in resource-constrained contexts is essential for developing targeted interventions and support systems for academic

success and students' preparedness for professional practice (Hooper et al., 2020). Therefore, this study sought to determine the predictive demographic factors influencing academic performance among first- and second-year occupational therapy students at a university in South Africa, with the goal of informing tailored support strategies that better serve diverse student populations.

Occupational therapy education in South Africa is offered at eight universities, including institutions such as the University of Cape Town, University of the Witwatersrand, Stellenbosch University, and the University of KwaZulu-Natal. The eight higher education institutions offer World Federation of Occupational Therapists (WFOT)-accredited entry-level programs leading to a Bachelor's or Bachelor of Science degree in Occupational Therapy (WFOT, 2025). Foundational coursework includes but is not limited to anatomy, physiology, clinical courses such as medicine and surgery, pathology, psychology, as well as health promotion, and research methods, alongside clinical and community-based practice. Entry-level programs are four years in duration and equivalent to an Honour's degree. All graduates are required to complete a year of community service before registering as independent practitioners with the Health Professions Council of South Africa (HPCSA). South Africa does not offer clinical doctorates in occupational therapy, but postgraduate options include Postgraduate Diploma's, Master's by coursework or dissertation, and PhD degrees (World Federation of Occupational Therapists, 2025). As of 2025, there were approximately 6,597 registered occupational therapists in South Africa, with a significant proportion working in urban settings and the private sector (Ned et al., 2020)

The hypothesis for the study was as follows:

Null Hypothesis (H0): Demographic factors will not significantly predict academic performance among first- and second-year occupational therapy students at a South African university.

Hypothesis (H1): Demographic factors (including gender, age, geographical context, provincial origin, school quintile, first-generation status, financial support, university enrollment status) will significantly predict academic performance among first- and second-year occupational therapy students at a South African university.

Methodology

This study utilized a quantitative, cross-sectional study design. This philosophical stance assumes that reality can be measured objectively, and that knowledge is acquired through empirical observation and logical analysis.

Study Population and Sample

Purposive sampling was used to select undergraduate occupational therapy student records on the university's Business Intelligence Service (BIS) database. The study included the total sample of Bachelor of Science (BSc) Occupational therapy degree students from the first and second years who were enrolled in the 2022 academic year. Students from the first two academic years of the occupational therapy program were

DOI: 10.26681/jote.2025.090403

selected based on historical academic records which indicated that the highest number of students who failed courses were in the first and second year of the program. The 2022 cohort was chosen due to feasibility constraints, allowing for a cross-sectional analysis of a single academic year. Importantly, this cohort had recently transitioned from extended periods of online learning and pandemic-related disruptions, including lockdowns and limited or no access to campus resources, which were prevalent in South Africa during 2020 and 2021. Following the Covid 19 pandemic, 2022 marked the first full in-person academic year on campus. These contextual factors may have influenced academic performance and engagement, making the 2022 cohort particularly relevant for understanding challenges in student success and identifying areas for targeted support.

Data Collection

The data was collected from the university's BIS database, which collates all student data from the various university systems. The collected data consisted of non-academic student demographics and included 1) personal information: gender and age; 2) geographical information: home context, home province, school quintile; 3) parent education: first generation; 4) funding: National Student Financial Aid Scheme (NSFAS), self-funded and financial aid; and 5) university enrollments: special group at first enrollment and club or society participation. The academic metrics collected included 6) academic performance at university: year marks, exam marks and final marks per course.

The researchers obtained access to the data through a formal request process, which included university and BIS permissions, that was subject to ethical approval of the study. Ethical approval to conduct the study was obtained from the University of the Witwatersrand Human Research Ethics Committee (HREC) – non-medical, reference number: H22/10/07. This study used secondary, de-identified data to ensure anonymity and confidentiality in the reporting of results. The researchers followed the procedures recommended by the University of the Witwatersrand HREC (non-medical) regarding the collection, storage and protection of personal data to be consistent with the guidelines under the Protection of Personal Information Act (POPIA). The extracted data were captured in a self-developed data collection sheet in Excel. Data cleaning was performed to remove duplicates, identify and correct incomplete student records, ensuring accuracy. Wrangling was performed to merge multiple datasets and aggregate the data in preparation for the data analysis.

Data Analysis

Logistic regression modelling was applied to explore the relationship between student variables and final marks across different courses in the first and second years of study. The regression analysis included both categorical/nominal and continuous/interval variables. To appropriately manage this mix, categorical variables (e.g., gender, geographical context, provincial origin, school quintile, first-generation status, financial support, university enrollment status) were coded using dummy variables prior to inclusion in the regression model and analyzed using the R statistical computing software (version 4.2.1, 2022; R Core Team, 2021). Continuous variables (e.g., age)

were included in their original form. This approach allowed us to assess the contribution of each variable type within a unified analytical framework while maintaining statistical validity. We ensured that all assumptions for regression analysis were met and that the model specification was appropriate for the data structure. A single outcome was used for the analysis with Pass=0 and Fail=1 to determine the relationship between each variable and the final mark (<50) for students who failed a course. All statistical tests were evaluated at a 5% significance level and 95% confidence interval (CI). Categorical and numerical data were analyzed through descriptive statistics to determine measures of central tendency and measures of dispersion, and they were presented as frequency, proportion and percent distributions in tables and graphs.

The analysis calculated odds ratios, which provide measures of the strength and direction of relationships between predictor variables and the outcome. When the odds ratio exceeds 1, it signifies a higher probability of the outcome occurring, while a ratio below 1 indicates a reduced likelihood. If a specific predictor has an odds ratio of 1.5, it suggests that for every one-unit rise in that variable, there is a corresponding 50% increase in the odds of the outcome taking place, assuming all other variables remain unchanged. This method allows for the identification of key factors that may influence academic performance while controlling multiple variables simultaneously. Protective effects in odds ratios refer to factors that decrease the likelihood or probability of a negative outcome occurring, in this study, failing a course. The further below 1.0 the odds ratio is, the stronger the protective effect. Narrower confidence intervals suggest more reliable estimates of the protective effect, while wider intervals indicate more uncertainty in the estimate.

Traditional power analysis to determine sample size was not applicable in the design phase as the study included a total population sample. A post hoc power analysis was completed to determine the observed power of the analysis and assess whether the sample size was sufficient to detect statistically significant effects with reasonable confidence and assist with interpreting the results of the logistic regression and odds ratios.

The observed post hoc analyses indicated that for PSYC1A, the observed power was 81,5% for age and 50.95% for gender. For ANAT2, age had an observed power of 66.08%. For OCCT2, Gender had an observed power of 68.12% and Home Context (Urban) has an observed power of 55.56%.

Results

The results section provides demographic details of first-and second year occupational therapy students and identifies the demographic variables that predict academic performance.

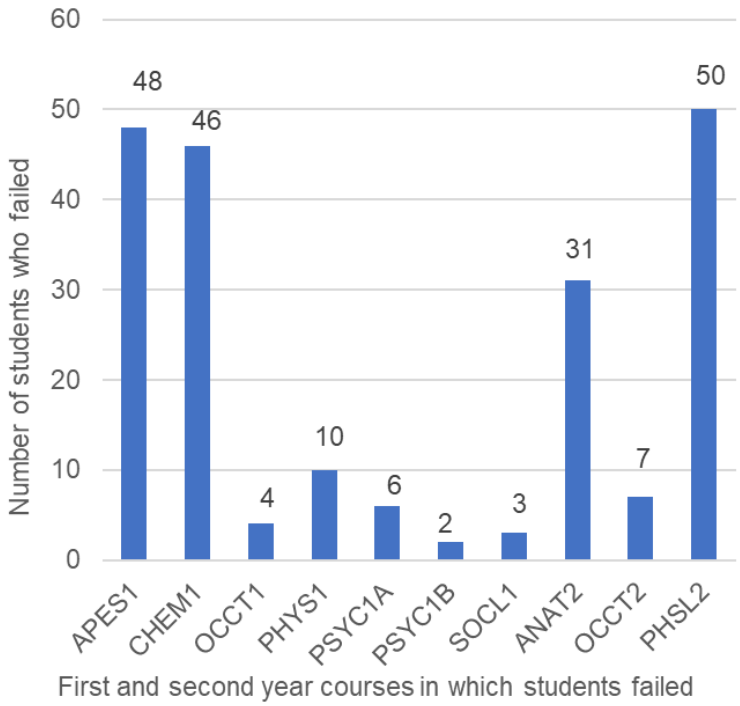
The study sample comprised 129 student records, after excluding 14 records from the dataset that were duplicate or had missing data for our variables of interest. The final sample for analysis included 75 first year and 54 second year student records.

DOI: 10.26681/jote.2025.090403

The courses with the highest failure rates in 2022 were APES1 (Introduction to Medical Sciences) and CHEM1(Chemistry) in the first year, and ANAT2 (Anatomy) and PHSL2 (Physiology and Medical Biochemistry) in the second year, as seen in Figure 1.

Figure 1

Course Failure Rates In 2022



First year courses:

APES1 Introduction to medical sciences*
CHEM1 Chemistry*
OCCT1 Fundamentals of Occupational Science and Occupational Therapy
PHYS1 Physics*
PSYC1A Basic Principles of Group and Individual Psychology I*
PSYC1B Introduction to Psychology I*
SOCL1 Human Behavioural Sciences*

Second year courses:

ANAT2 Anatomy*
OCCT2 Fundamentals of Occupational Science and Occupational Therapy II
PHSL2 Physiology and Medical Biochemistry I*

Note. All the closed service courses marked with * are presented as joint classes to students from various disciplines. The numbers and percentages presented in the results refer to students who failed within the occupational therapy 2022 student cohort.

Demographic Profile of Student Cohorts

The average age was 19.3 years for first-year students and 20.6 years for second-year students, with a similar age range observed among students who did not pass their courses. The demographic profile of the overall first- and second-year student cohorts is available in Appendix A.

Figure 2 portrays a pronounced gender imbalance; 68 female students represented 89.5 % of the first-year intake and 49 female students 89.1 % of the second-year intake, while there were only 8 male students in first year (10.5 %) and 6 male students in second year (10.9 %). The fractional (< 0.4 percentage-point) shift between years highlight a consistently female-dominant profile across the early curriculum.

Figure 2

Gender Distribution of Overall Cohort in First and Second Year

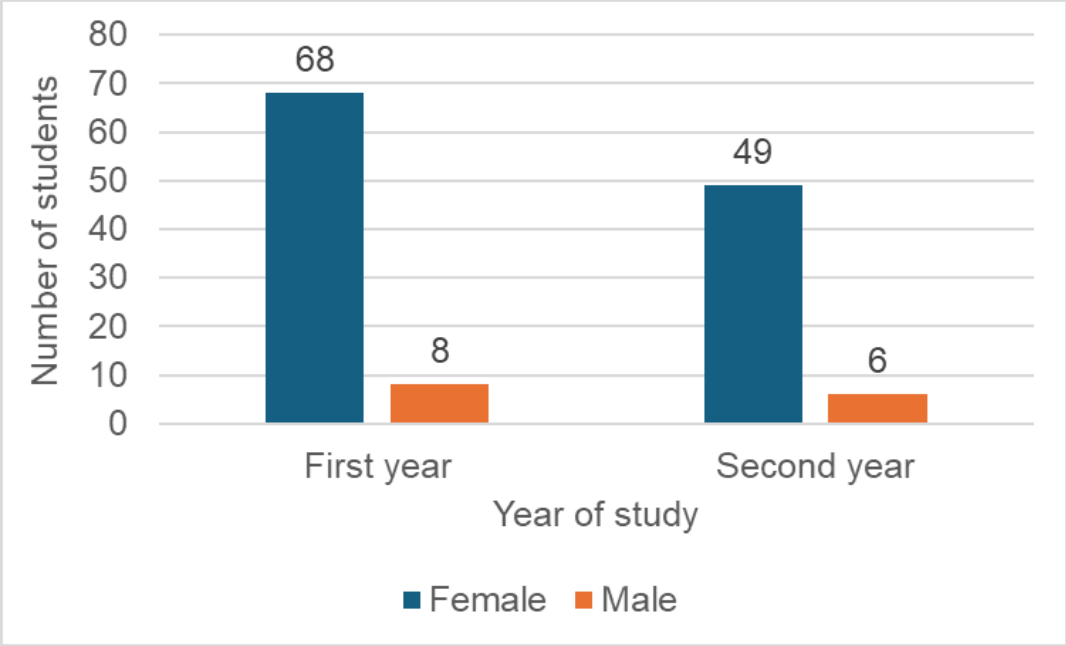


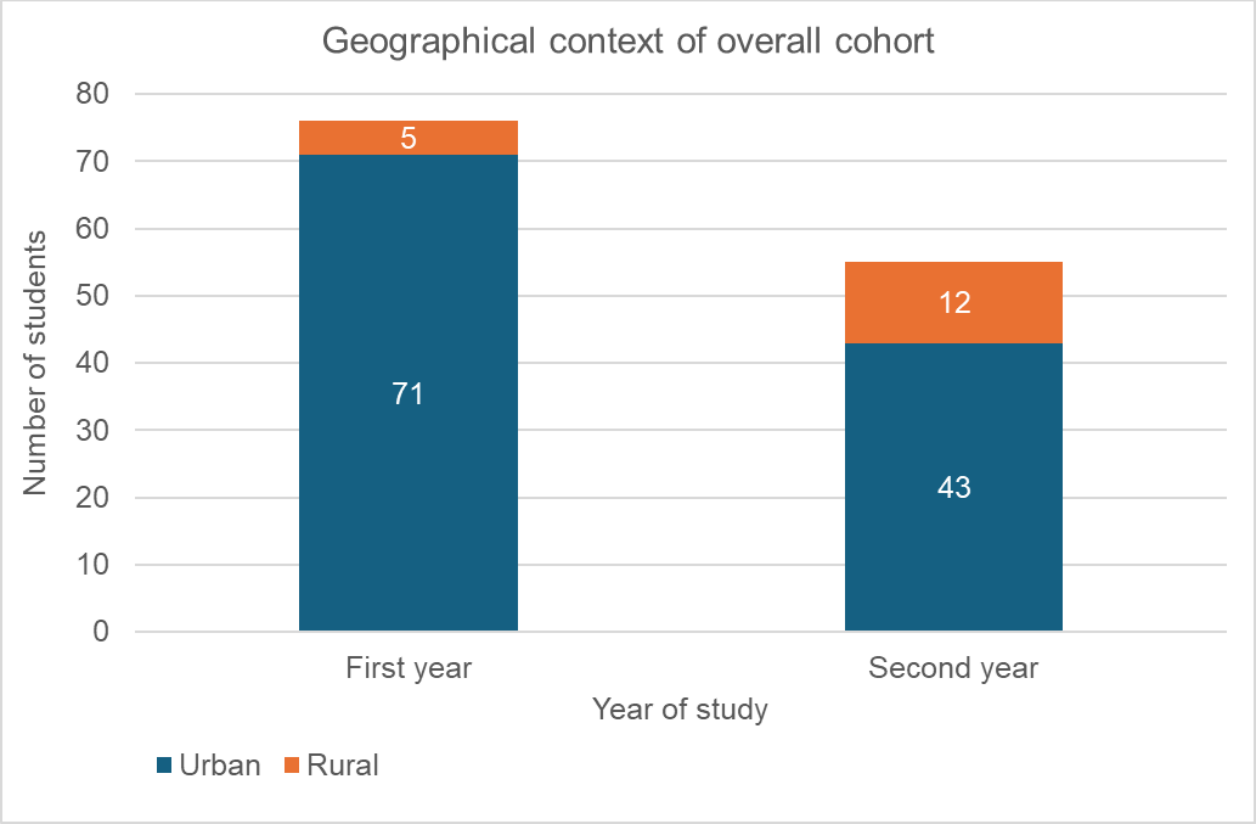
Figure 2 confirms that the BSc occupational therapy cohort was overwhelmingly female; therefore, it is essential to interpret the failure data in relation to the overall cohort's gender distribution. In first-year courses such as APES1, CHEM1, PSYC1A, SOCL1 and PHYS1, females formed the majority of student failures which ranged from 2 to 48 students who failed per course. Yet, this proportion was slightly lower than their overall cohort share, indicating a modest over-representation of males among those at risk. The imbalance became more pronounced in OCCT1 and PSYC1B, where failures were split evenly between female and male students. Given that the eight male students comprised only 10.5% of the first-year cohort, their 50% representation in the failure group signals a disproportionately higher vulnerability. PSYC1A showed a similar trend, with two of the six students that failed being male. The male representation was again elevated relative to the cohort size. In contrast to the high proportion of male student failures, it was observed that the three students who failed SOCL1 were all female, indicating it as a potential bottleneck for female students within the first-year curriculum. A comparable pattern emerged in the second year. Although the 23 female students that failed in ANAT2 accounted for 85.2% of the failures and the 41 female students that failed PHSL2 represented 91.1% of the failures, the figures closely mirror their representation in the cohort. The OCCT2 course departed from the norm, with failures evenly split between three male and three female students, highlighting it as another course in which male students were disproportionately affected and had a relatively higher risk of failure.

DOI: 10.26681/jote.2025.090403

Figure 3 elucidates the urban-weighted profile of the occupational therapy program. In the first year, 71 students were from urban contexts, with only five students from rural backgrounds. While the cohort in the second year was predominantly from urban settings, there was a notable shift in balance with urban representation reduced to 43 students whereas the representation of students from rural contexts escalated to 12 students. Collectively, the student data indicated a modest expansion of geographical diversity throughout the early curriculum, albeit with the majority of student intake from urban settings.

Figure 3

Geographical Context of Overall Cohort



The BSc occupational therapy cohort in first and second year consisted predominantly of students from urban backgrounds, as shown in Figure 3. When interpreting the student failure data, it is important to consider the contextual distribution of the overall student population. A significant representation of students from rural backgrounds was noted among the students who failed in several first-year courses, such as PSYC1B (50%), in which an eight-fold increase was seen from the overall cohort representation of 6.6%. One student from a rural background was seen in the four students who failed OCCT1, while students from rural backgrounds who failed APES1, PSYC1A, CHEM1, and PHYS1 ranged from one to seven students per course, representing 10% to 16.7%

of the failures in each of the respective courses. The sole exception was SOCL1, where all three students who failed were from an urban background. In the second year two students from rural contexts accounted for 33.3% of the failures in OCCT2, exceeding their 21.8% enrollment proportion. The five students from rural areas who failed ANAT2 (18.5%) and the eight students from rural backgrounds who failed PHSL2 (17.8%) was marginally lower than the overall cohort proportion of 21.8% that were from a rural context. The findings indicate that although most students were from urban contexts, there was a heightened risk of failure for students from rural backgrounds during the first two years of study, particularly in OCCT2.

All public schools in South Africa are divided into five quintile rankings. Factors such as income, literacy and unemployment levels in a community are used as indicators by the Department of Basic Education to determine a school's quintile ranking. Quintile one to three schools do not require fees and represent the most economically disadvantaged communities, whereas quintile four and five schools are located in more affluent areas and require school fees (Department of Education, 2004). Quintile ranking does not apply to self-funded private schools.

Several universities, particularly within health sciences faculties, incorporated school quintile rankings into their admissions processes to promote equity and transformation. For example, the University of KwaZulu-Natal reserved a minimum of 15% of new entrants to each program from students who completed their schooling at Quantile 1 or 2 schools and met all the minimum entry requirements for the program, while specific programs may provide for increased quotas (University of KwaZulu Natal, n.d.). Other institutions such as Sefako Makgatho Health Sciences University applied quota systems and targeted selection criteria to support health science applicants from under-resourced schools (Sefako Makgatho Health Sciences University, n.d.). While not all occupational therapy programs explicitly use quintile rankings in admissions, these practices reflect broader efforts to address socio-economic disparities and widen access to higher education. This context is relevant when interpreting the academic outcomes of students from different school backgrounds, as seen in the higher failure rates among students from lower quintile schools in our study.

Figure 4 and Figure 5 highlights that most students in the first- and second-year cohorts were enrolled in schools belonging to the highest quintile (Quintiles 5) and private schools. Conversely, a larger proportion of students who failed in OCCT2 were from schools categorized in the lower quintiles (Quintiles 1 and 3- no fee and highly subsidized schools).

DOI: 10.26681/jote.2025.090403

Figure 4

School Quintile Distribution of Overall First Year Cohort

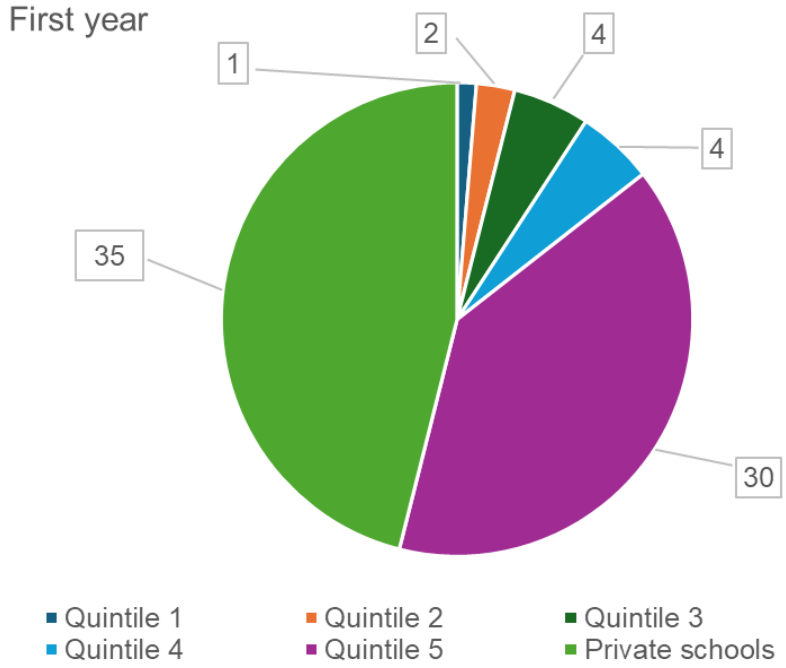
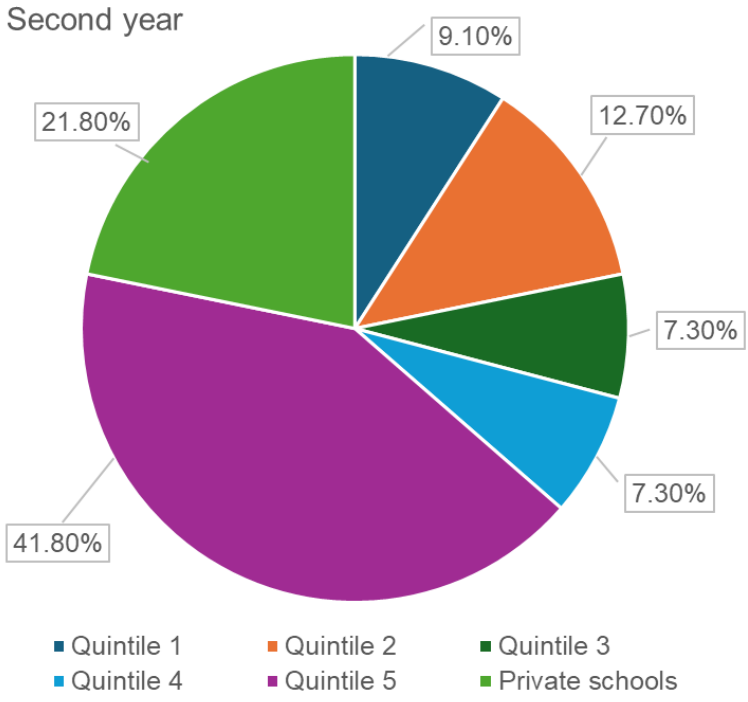


Figure 5

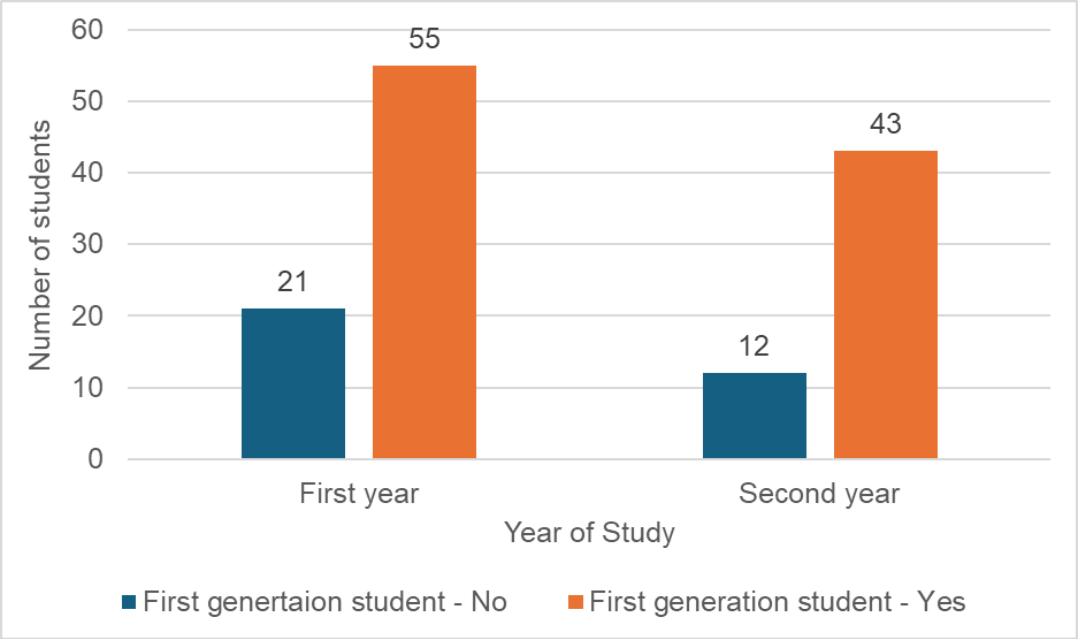
School Quintile Distribution of Overall Second Year Cohort



As illustrated in Figure 6, 55 students in the first year (72.4%) and 43 students in the second year (78.2%) were the first in their families to pursue higher education. This pattern was also evident among those who did not successfully complete their courses.

Figure 6

First Generation Students In Overall Cohorts



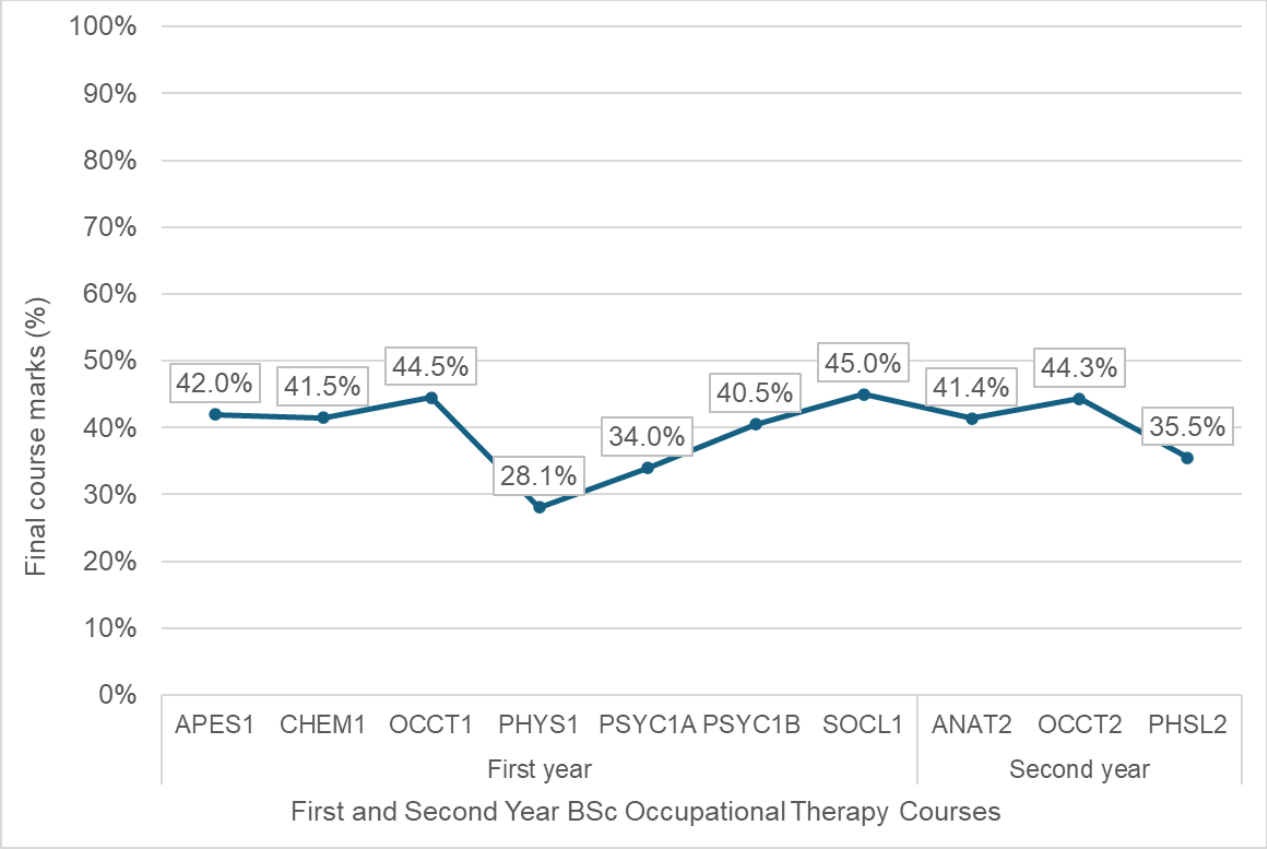
There was a significant change in funding of the university fees between the two groups with financial aid or NSFAS funding rising from three students in the first year (3.9%) to 23 students in the second year (41.8%). A large portion of students who did not pass their courses were not receiving NSFAS support, especially in the first year, where 39 of the students (90.7%) who failed CHEM1 were self-funded. Sixty-one first year students and 39 second year students (70.9%) began university immediately after completing high school. First year students who failed courses generally had low involvement in extracurricular activities, with two to 35 first year students who failed per course (50 to 100%) indicating they did not participate in university clubs or societies, and five to 35 students who failed per second year course (77.8% to 83.3%) indicating the same.

The graph in Figure 7 demonstrates that the average final marks for students who failed in the ten first- and second-year occupational therapy courses were clustered in the low- to mid-40 percent range, significantly below the 50 percent pass threshold. Within the first-year cohort, performance remained relatively consistent (approximately 42–45%) with a pronounced decline in PHYS1 (28.1%). A similar trend was observed in the second year in OCCT2 (44.3%) and ANAT2 (41.4%) in the mid-40s, and a lower final mark average in PHSL2 (35.5%). Collectively, these patterns emphasize academic vulnerability in first- and second-year occupational therapy courses, specifically Physics in the first year and Physiology in the second year are seen as courses requiring targeted intervention.

DOI: 10.26681/jote.2025.090403

Figure 7

Average Final Marks of Students Who Failed Courses in First- And Second Year



Variables Influencing Failure Rates in Early University Courses

Logistic regression analyses were completed for courses in the first and second year and only included students who failed each of the respective courses. The variables included academic performance metrics, demographic characteristics, and other contextual factors. The number of students who failed courses in the first year ranged from two in PSYC1 to 48 students in APES1, and the students who failed per course in second year ranged from seven in OCCT2 to 50 students in PHSL2. The demographic data of students who failed in each of the first-year courses can be seen in Appendix B, and the demographic data of students who failed courses in second year can be seen in Appendix C.

The Logistic regression and odds ratio results with failing as an academic outcome seen in Table 1, highlights the relationship between independent demographic variables and the likelihood of failing each of the first and second-year university courses. The significance of each variable is indicated by its p-value, with a threshold of 0.05 used to determine statistical significance. Several significant predictors of course failure were identified through the Logistic regression analysis in Table 1.

Table 1

Logistic Regression Results for Predictors of Course Failure in Occupational Therapy Students

Course	Predictor	B	SE	z	p	OR	95% CI for OR
First Year	PSYC1A: Age	1.20	0.50	2.37	.018	3.31	[1.35, 10.36]
	PSYC1A: Gender (M)	2.05	1.01	2.03	.042	7.75	[0.89, 55.72]
Second Year	ANAT2: Age	0.52	0.24	2.21	.027	1.68	[1.10, 2.79]
	OCCT2: Gender (M)	2.71	1.01	2.68	.007	15.00	[2.07, 123.79]
	OCCT2: Home Context (Urban)	-2.30	0.95	-2.43	.015	0.10	[0.01, 0.60]

Note. *B* = Estimate/ Logistic regression coefficient; *SE* = standard error; *z* = Wald test statistic; *p* = probability value; OR = odds ratio; CI = confidence interval. Gender coded as 1 = male, 0 = female.

In the context of first-year courses, age was identified as a significant factor in PSYC1A (p = 0.0177, OR = 3.3072), indicating that older students had a higher probability of failing this course. Furthermore, gender was a significant determinant in PSYC1A (p = 0.0422, OR = 7.7500), with male students having a higher likelihood of failure compared to female students.

In second-year courses, age was found to be a significant factor in predicting outcomes in ANAT2 (p=0.0273, OR=1.6816), with each additional year of age correlating with a 68% higher chance of failing the course. Gender had an even more substantial impact in OCCT2 (p = 0.0074, OR = 15.0000), where the odds of male students failing were 15 times higher than those of female students. Additionally, the home environment significantly influenced OCCT2 results (p=0.0152, OR=0.1000), with students from urban areas having a 90% reduced likelihood of failing compared to their rural counterparts, highlighting a strong protective benefit for those from urban settings.

DOI: 10.26681/jote.2025.090403

Discussion

The study aimed to determine if demographic factors (including gender, age, geographical context, provincial origin, school quintile, first-generation status, financial support, university enrollment status) would significantly predict academic performance among first- and second-year occupational therapy students at a South African university.

The results partially support the hypothesis as only gender, age and geographical context were significant predictors of academic performance in three specific courses of the undergraduate occupational therapy curriculum, as opposed to the overall first and second year of study. Other demographic factors such as provincial origin, school quintile, first-generation status, financial support, university enrollment status did not show significant predictive value.

Variables Supporting the Hypothesis

This study found that gender was one of the most significant predictors of academic outcome for male students in two specific occupational therapy courses, one service course in first year and a core occupational therapy course in second year. Male students had much higher odds ratios for failing these two courses. It was especially evident in the second-year course, where nearly half the students who failed were male students, although they only represented 10.9% of the student cohort. Our study findings of higher failure rates among male students align with a study from Bonsaksen et al. (2018), who also highlighted gender differences in occupational therapy students' academic outcomes. The high odds ratios for failure among male students warrant further investigation into possible gender-related barriers to learning within specific occupational therapy courses. A possible explanation for the results is that the curriculum, instructional strategies, or evaluation methods might unintentionally disadvantage male students in a predominantly female profession. Although males in the profession may report feeling marginalized, this perception is not a result of systemic inequity as occupational therapy programs often proactively recruit male applicants, and they therefore do not face obstacles to entry (Beagan & Fredericks, 2018).

Establishing support systems and mentorship can assist male students to navigate challenges and achieve their academic goals (Thornton et al., 2018). The study by Thornton et al. (2018) also found that male students with supportive families achieved better academic outcomes, while support from role models, faculty, and peers showed no correlation with their performance. This contrasts with Colaianni et al. (2022), who identified the absence of male role models and societal stereotypes as major obstacles for men entering the profession. Supporting these findings, Macabagdal et al. (2023) revealed that Filipino male occupational therapy students faced significant barriers due to entrenched gender stereotypes and societal expectations. VanPuymbrouck and Friedman (2023) further demonstrated this bias, finding that most occupational therapy undergraduates unconsciously associated careers with men and family roles with women, highlighting how deeply ingrained these biases are. Brown (1998) noted that male occupational therapists frequently experience role strain from implicit biases and

stereotypes, affecting their job satisfaction and professional performance. Gender stereotypes can significantly impact male students in female-dominated fields like occupational therapy. It is essential to challenge societal perceptions of gender roles and norms and work towards a more inclusive environment for all professionals rather than simply focusing on increasing the number of males in occupational therapy (Beagan & Fredericks, 2018).

Research suggests that increasing exposure to gender-atypical roles and providing targeted support systems can help male students overcome these biases (Hamjediers, 2023). Additionally, challenging stereotypes and promoting gender equality in academic and professional environments create more inclusive learning spaces (Rakib, 2024). Additionally, aspects such as first choice of university degree among male students who have failed courses should be considered, as occupational therapy might not align with their personal interests. Students will show higher levels of motivation and engagement when they pursue university programs that align with their career goals than students who select a degree due to external factors such as pressure from parents (Merhi et al., 2025). It is, however, possible that the study results are specific to the student cohort. Therefore, the results need to be interpreted with caution.

The results highlighted age as a significant predictor of failure in both PSYC1A (OR=3.3072) and ANAT2 (OR=1.6816). This suggests that older students may face challenges in these courses, as they are generally more theoretical and content-heavy than courses centered on practical skills. Richardson et al. (2012) noted that older students in higher education encountered comparable difficulties, particularly in theoretical courses with extensive content. Contrary to earlier findings, research by Bonsaksen et al. (2021) indicated that older students often outperformed their younger counterparts in professional practice courses due to their life experiences and superior interpersonal skills. This indicates that age might influence performance across various occupational therapy course categories and that future research is warranted around age and academic performance in different contexts. These results emphasize the importance of incorporating diverse teaching strategies and support systems in educational settings to address the learning requirements of different age groups. For older students, there may be a need for greater emphasis on theoretical instruction while engaging in practice-oriented courses might prove advantageous.

Students from an urban setting were one of the strongest predictors in our results, lowering failure probabilities by 90% and showing up as a significant protective factor in OCCT2 (OR=0.1000). The proportion of rural first-year students (6.6%) and second-year students (21.8%) not only increased the likelihood of systemic hurdles that got worse as students progressed through the program, but they were also strongly represented among failed students. This finding aligns with the study by Chiramba and Ndofirepi, (2023) which suggested that students from rural contexts in South Africa would not be able to overcome systemic educational disadvantages in a university setting. Students from rural settings may have less support systems being away from family and possibly face additional challenges such as language barriers as occupational therapy programs are taught in English which might be a second or third

DOI: 10.26681/jote.2025.090403

language for some students. Nonetheless, research indicates that students from these rural regions tend to be more adaptable and resilient, traits that could be beneficial for training in health professions (Motsabi et al., 2020). Higher education institutions may be able to better prepare prospective health science students developing transition support programs specifically for students from rural areas addressing digital divide issues that may affect their access to learning resources. A review of the curriculum design is necessary to determine if specific courses may inadvertently favor urban experiences.

Variables Not Supporting the Hypothesis

Contrary to expectations, this study did not find first-generation status a significant predictor of academic performance, although most students from both the first year (72.4%) and second year (78.2%) cohorts were first-generation students. Our findings align with the study by Cataldi et al. (2018) who reported that adequate support can assist first-generation students to succeed or outperform fellow students. The results challenge traditional beliefs about disadvantages faced by first-generation students and suggest that other factors such as resilience should be considered which can impact academic performance of occupational therapy students in South Africa (Motsabi et al., 2020). In contrast with our findings, a recent study by Meyer and Schreiber (2024) found that first-generation status was a significant risk factor for poor academic performance. Overall, approximately 30% of the sampled student population of 1208 students across different demographic segments and academic faculties at a university in South Africa were first-generation students. A majority of the student group (80%) were between 18 and 25 years old and 75% of this subgroup were first-generation students. The high percentage of first-generation students align with the findings of our study of occupational therapy students. The combined effects of limited academic preparedness, financial constraints, reduced cultural and social capital, and systemic support gaps create a challenging environment for first-generation students that undermine their academic performance (Meyer & Schreiber, 2024).

The difference in the percentage of students receiving NSFAS financial aid between the first year (3.9%) and second year (41.8%) cohorts indicates a significant trend in the data. Of the students who failed courses the percentage of students who were self-funded ranged between 75% to 100% in the first year and between 50% to 77.8% of those who failed second year courses. The high prevalence of self-funded students among those who fail necessitates further investigation. Students who must work after hours to support themselves during their studies may face additional pressure to succeed academically as occupational therapy students have no free time on the timetable, requiring them to complete academic tasks and assignments after hours and weekends. However, a study by Darolia (2014) found that students who participated in part-time work to finance their studies often developed time management and organizational skills, which enhanced their academic performance.

Although not statistically significant predictors in our regression model, provincial origin and school quintile exhibited noteworthy patterns that warrant further discussion. Students from Limpopo and students from lower quintile schools (1 and 3) had a high

failure rate in the second-year occupational therapy course. The results align with a previous study on higher education inequalities in South Africa, which indicated that regional educational backgrounds may affect performance (Chiramba & Ndofirepi, 2023). Motsabi et al. (2020) suggested a framework for higher education institutions to implement, asserting that individual agency and institutional support can mitigate potential disadvantages based on students' backgrounds. The findings indicate a necessity for focused academic assistance for students from provinces characterized by historically under-resourced educational systems, especially in subjects with elevated failure rates. Curriculum design must be scrutinized to prevent the unintentional assumption of background knowledge or skills that may disadvantage students from lower quintile schools.

Course Specific Vulnerabilities

The results highlighted a high concentration of students who failed basic science courses in the first and second year which warrants further investigation into the curriculum. One explanation might be that students are more interested and motivated to engage in core occupational therapy courses which are often more practical or applied versus basic science subjects that can be content heavy. One way to enhance student engagement and academic outcomes in basic sciences is to apply and contextualize the theoretical science knowledge to practice within the profession (Hooper et al., 2020). Another explanation may be that the entry requirements for the BSc Occupational therapy degree require students to have completed Life Sciences and/or Physical Sciences subjects in matric (University of the Witwatersrand, 2024). This may result in students entering the occupational therapy program without fundamental knowledge in Life Sciences or Physical Sciences.

Statistically significant predictors of student success as well as odd ratios for predicting course failure can be valuable indicators for curriculum review, highlighting the need to evaluate specific courses in terms of content, instructional design, assessment and inclusivity to support diverse student populations. It is, however, important to strive for a holistic approach to student support and not focus too narrowly on specific predictors for each individual course as it might lead to fragmented interventions, instead of focusing on overall competencies required by students.

Theoretical Integration

The study hypothesis was only partially supported by the results which indicated that gender, age, and geographical context were significant predictors of success within the first year and 2nd year students. Contrary to our expectations demographic variables such as first-generation status, financial support, provincial origin, and school quintile did not show significant results in predicting student success. Our study findings thus highlight the complex nature of determining predictors of academic performance within the South African occupational therapy education context. This aligns with the educational interface model by Kahu and Nelson (2018), which described student success as the result of complex interactions between individual characteristics and learning environments. Given the complex nature of aspects influencing academic

DOI: 10.26681/jote.2025.090403

success, it is recommended that prediction models are developed (Batool et al., 2023) that consider a variety of student variables such as academic, emotional and contextual factors. This will avoid the risk of overreliance on specific factors such as demographic data, which may perpetuate bias and be less reliable as a predictor of student success. To address the needs of diverse student cohorts and improve academic outcomes, a targeted approach is required for establishing student support interventions and inclusive curriculum design.

Limitations and Future Research Recommendations

The limitations include a relatively small sample size limited to data from one academic year as well as geographical bias as the data was collected from one specific university in one country. These limitations can introduce bias, limit the generalizability of findings, and fail to capture longitudinal trends. Future studies should conduct longitudinal analyses across multiple institutions, as a larger dataset will enhance the generalizability of the findings and mitigate the limitations.

The sole reliance on quantitative data may overlook contextual or personal student factors impacting academic performance. Incorporating qualitative methods will increase contextual relevance and applicability of the findings by including the students' voices. Another recommendation for future research is to assess the predictive value of student variables such as emotional intelligence, professional identity, learning approach or communication style.

A further recommendation for future research would be to evaluate the relationship between academic variables and demographic variables of students who successfully completed courses as well as practice fieldwork education placements.

Implications for Occupational Therapy Education

Based on the results of our study we advocate for the development of strategies to address gender, age, and geographical disparities. We recommend peer mentorship programs that connect male students with accomplished male mentors in occupational therapy (Gehreke et al., 2024). This may be difficult in occupational therapy programs with no male role models on the teaching staff. To promote inclusive learning environments, occupational therapy programs can incorporate gender-responsive and diverse case studies and organize workshops to identify and address potential biases in the curriculum. This is especially crucial for male students, who were found to have a notably higher likelihood of failing certain courses. Supplementary theoretical instruction, adaptable learning modalities and asynchronous materials, acknowledgment of earlier learning derived from life experiences, and targeted study skills training for high-risk courses would assist older students in surmounting age-related challenges. To reduce the urban advantage observed in our findings, targeted interventions such as pre-university bridging programs, digital literacy training, blended learning with offline resources, a curriculum tailored to rural practice, and low-bandwidth learning solutions could better support students from rural backgrounds (Zahl-Thanem & Rye, 2024).

A comprehensive strategy for student achievement should include ongoing support for initiatives aimed at first-generation students and financial aid, although these variables were not significant predictors of success in our study. We recommend implementing tactics that emphasize strengths, leveraging the resilience and life experiences of first-generation students (Meyer & Schreiber, 2024). This encompasses conducting workshops to cultivate professional identities, coordinating alumni networking events, facilitating support for bilingual education, and participating in community-based learning that connects theoretical knowledge to local contexts. In occupational therapy education, we promote the creation of equipment-sharing programs, the establishment of work-study opportunities pertinent to occupational therapy training, the introduction of emergency funding mechanisms for students in precarious circumstances, and the facilitation of inter-institutional collaboration for the collective utilization of educational resources to minimize expenses as well as mobile-compatible learning resources and complimentary instructional materials would mitigate cost obstacles (Russell et al., 2025).

We propose institutional improvements that focus on high-risk courses and educational backgrounds to tackle broader issues affecting academic preparation. We propose the following solutions for science-intensive courses with elevated failure rates: integrating foundational sciences into occupational therapy practice; implementing early identification systems to detect at-risk students (Sosibo & Katiya, 2015); establishing supplemental instruction facilitated by advanced students; developing a modular curriculum that deconstructs intricate content into manageable segments; employing multi-modal pedagogical approaches (Rudovic et al., 2019); and creating interactive online resources featuring visualizations for complex concepts. Although some of these recommendations may be made within institutions, the impact thereof requires further investigation. Focused academic assistance through discipline-specific literacy enhancement, context specific case studies addressing local health issues, incorporation of indigenous knowledge, and strength-based evaluation techniques may mitigate educational disparities for students from lower quintile schools and underrepresented provinces (Hutchison & McAlister-Shields, 2020). Furthermore, an enhanced institutional environment can be established through the implementation of data-driven early alert systems, adaptable progression policies, faculty professional development focused on teaching in resource-limited settings, optimized course scheduling for students managing various responsibilities, and comprehensive curriculum evaluations emphasizing essential competencies.

Educators and policymakers can design more effective support systems by acknowledging the primary factors that predict academic achievement, alongside the socio-economic and contextual hurdles faced by students in resource-limited countries. Recognizing these predictive factors is essential for developing targeted interventions for students through flexible and inclusive teaching methods which align with the broader aims of transformative education in health professions. Such understanding enriches the global dialogue on achieving educational success in occupational therapy

DOI: 10.26681/jote.2025.090403

education within low- to middle-income countries. Ultimately, we support a personalized strategy for the early implementation of support systems that cater to the varied needs of students, grounded in comprehensive academic performance predictors.

Conclusion

The findings partially supported the study hypothesis into the significance of demographic factors as predictors of academic performance among first- and second-year occupational therapy students at a South African university. The study highlights the complex role of demographic variables across the first two years of study and that demographic factors can increase or decrease a student's risk of failing, but that it was different in each course. This highlights the complexity of diverse student populations and the current one-size-fits-all approach to higher education, including occupational therapy undergraduate programs. The study results emphasize the need for individualized student support and targeted interventions for the high number of students who are failing first- and second-year occupational therapy courses. Although demographic variables provide valuable insight into student cohorts it should not be viewed deterministically, but rather as a starting point for developing evidence-based, targeted interventions to support students from diverse backgrounds. Student success should not be viewed from a deficit perspective, and therefore identifying student differences should only be the foundation for seeking strategies to build strength-based support systems that benefit all students.

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Appendix A

Demographic Data of First- And Second-Year Occupational Therapy Students In 2022

Variable	Metrics	Year I (n=83)	Year II (n=60)
Student records with missing values		7	5
Personal demographics			
Gender	F	68 (89.5%)	49 (89.1%)
	M	8 (10.5%)	6 (10.9%)
Age	Mean (SD)	19.26 (± 0.74)	20.62 (± 1.33)
Geographical demographics			
Home context	Urban	71 (93.4%)	43 (78.2%)
	Rural	5 (6.6%)	12 (21.8%)
Home province	Unspecified	32 (42.1%)	12 (21.8%)
	Gauteng	26 (34.2%)	25 (45.5%)
	Mpumalanga	6 (7.9%)	4 (7.3%)
	Western Cape	3 (3.9%)	0
	KwaZulu Natal	4 (5.3%)	4 (7.3%)
	Limpopo	2 (2.6%)	7 (12.7%)
	Free State	1 (1.3%)	0
	Northwest	1 (1.3%)	0
	Eastern Cape	1 (1.3%)	3 (5.5%)
School quintile	1	1 (1.3%)	5 (9.1%)
	2	2 (2.6%)	7 (12.7%)
	3	4 (5.3%)	4 (7.3%)
	4	4 (5.3%)	4 (7.3%)
	5	30 (39.5%)	23 (41.8%)
	6	35 (46.1%)	12 (21.8%)
Parental education			
First generation student	No	21 (27.6%)	12 (21.8%)
	Yes	55 (72.4%)	43 (78.2%)
Financial demographics			
NSFAS	No	73 (96.1%)	32 (58.2%)
	Yes	3 (3.9%)	23 (41.8%)
Self-funded	No	11 (14.5%)	14 (25.5%)
	Yes	65 (85.5%)	41 (74.5%)
University enrollment demographics			
Special group at first enrollment	Past Matric	15 (19.7%)	11 (20.0%)
	Current Matric	61 (80.3%)	39 (70.9%)
	University Experience	0	5 (9.1%)
Club or society	No	58 (76.3%)	49 (89.1%)
	Yes	18 (23.7%)	6 (10.9%)

DOI: 10.26681/jote.2025.090403

Appendix B

Demographic Data of First-Year Occupational Therapy Students Who Failed One Or More Courses In 2022

Variable	Metrics	First year occupational therapy modules						
		APES1 (n=48)	CHEM1 (n=46)	OCCT1 (n=4)	PHYS1 (n=10)	PSYC1A (n=6)	PSYC1B (n=2)	SOCL1 (n=3)
Missing values		5	3	0	0	0	0	0
Personal demographics								
Gender	F	35 (81.4%)	38 (88.4%)	2 (50%)	8 (80.0%)	4 (66.7%)	1 (50.0%)	3 (100.0%)
	M	8 (18.6%)	5 (11.6%)	2 (50%)	2 (20.0%)	2 (33.3%)	1 (50.0%)	-
Age	Mean (SD)	19.40 (± 0.88)	19.37 (± 0.85)	19.50 (± 1.29)	19.60 (± 1.51)	20.17 (± 1.60)	20.00 (± 1.41)	19.00 (± 0.00)
Geographical demographics								
Home context	Urban	36 (83.7%)	38 (88.4%)	3 (75%)	9 (90.0%)	5 (83.3%)	1 (50.0%)	3 (100.0%)
	Rural	7 (16.3%)	5 (11.6%)	1 (25%)	1 (10.0%)	1 (16.7%)	1 (50.0%)	-
Home province	Unspecified	11 (25.6%)	14 (32.6%)	1 (25%)	3 (30.0%)	3 (50.0%)	1 (50.0%)	2 (66.7%)
	Gauteng	14 (32.6%)	14 (32.6%)	1 (25%)	4 (40.0%)	2 (33.3%)	-	1 (33.3%)
	Mpumalanga	4 (9.3%)	3 (7.0%)	-	-	-	-	-
	Western Cape	4 (9.3%)	3 (7.0%)	-	1 (10.0%)	-	-	-
	KwaZulu Natal	4 (9.3%)	2 (4.7%)	1 (25%)	1 (10.0%)	-	1 (50.0%)	-
	Limpopo	3 (7.0%)	5 (11.6%)	-	-	1 (16.7%)	-	-
	Free State	1 (2.3%)	1 (2.3%)	1 (25%)	1 (10.0%)	-	-	-
	Northwest	1 (2.3%)	1 (2.3%)	-	-	-	-	-
	Eastern Cape	1 (2.3%)	-	-	-	-	-	-
School quintile	1	2 (4.7%)	-	-	-	-	-	-
	2	4 (9.3%)	6 (14.0%)	-	1 (10.0%)	1 (16.7%)	-	-
	3	5 (11.6%)	3 (7.0%)	1 (25%)	2 (20.0%)	-	1 (50.0%)	-
	4	4 (9.3%)	2 (4.7%)	1 (25%)	1 (10.0%)	-	-	-
	5	16 (37.2%)	17 (39.5%)	1 (25%)	3 (30.0%)	3 (50.0%)	-	1 (33.3%)

	6	12 (27.9%)	15 (34.9%)	1 (25%)	3 (30.0%)	2 (33.3%)	1 (50.0%)	2 (66.7%)
Parental education								
First generation student	No	15 (34.9%)	11 (25.6%)	1 (25%)	3 (30.0%)	2 (33.3%)	-	1 (33.3%)
	Yes	28 (65.1%)	32 (74.4%)	3 (75%)	7 (70.0%)	4 (66.7%)	2 (100.0%)	2 (66.7%)
Financial demographics								
NSFAS	No	36 (83.7%)	39 (90.7%)	3 (75%)	8 (80.0%)	6 (100%)	-	3 (100.0%)
	Yes	7 (16.3%)	4 (9.3%)	1 (25%)	2 (20.0%)	-	2 (100.0%)	-
Self-funded	No	7 (16.3%)	8 (18.6%)	1 (25%)	1 (10.0%)	-	-	-
	Yes	36 (83.7%)	35 (81.4%)	3 (75%)	9 (90.0%)	6 (100.0%)	2 (100.0%)	3 (100.0%)
University enrollment demographics								
Special group at first enrollment	Past Matric	11 (25.6%)	11 (25.6%)	-	2 (20.0%)	2 (33.3%)	-	-
	Current Matric	32 (74.4%)	32 (74.4%)	4 (100%)	8 (80.0%)	4 (66.7%)	2 (100.0%)	3 (100.0%)
	University experience	-	-	-	-	-	-	-
Club or society	No	32 (74.4%)	35 (81.4%)	3 (75%)	7 (70.0%)	3 (50.0%)	2 (100.0%)	3 (100.0%)
	Yes	11 (25.6%)	8 (18.6%)	1 (25%)	3 (30.0%)	3 (50.0%)	-	-
Academic performance – University								
Final mark (%)	Mean (SD)	42.01 (± 6.58)	41.50 (± 6.20)	44.50 (± 5.00)	28.10 (± 11.34)	34.00 (± 17.25)	40.50 (± 12.02)	45.00 (± 0.00)

DOI: 10.26681/jote.2025.090403

Appendix C

Demographic Data on Second-Year Occupational Therapy Students Who Failed One Or More Courses In 2022

Variable	Metrics	Second year occupational therapy modules		
		ANAT2 (n=31)	OCCT2 (n=7)	PHSL2 (n=50)
Missing values		4	1	5
Personal demographics				
Gender	F	23 (85.2%)	3 (50.0%)	41 (91.1%)
	M	4 (14.8%)	3 (50.0%)	4 (8.9%)
Age	Mean (SD)	21.30 (± 1.68)	20.67 (± 1.37)	20.93 (± 1.47)
Geographical demographics				
Home context	Urban	22 (81.5%)	4 (66.7%)	37 (82.2%)
	Rural	5 (18.5%)	2 (33.3%)	8 (17.8%)
Home province	Unspecified	6 (22.2%)	-	9 (20.0%)
	Gauteng	12 (44.4%)	-	22 (48.9%)
	Mpumalanga	2 (7.4%)	2 (33.3%)	2 (4.4%)
	Western Cape	-	-	-
	KwaZulu Natal	2 (7.4%)	-	5 (11.1%)
	Limpopo	3 (11.1%)	3 (50.0%)	5 (11.1%)
	Free State	-	-	-
	Northwest	-	-	-
	Eastern Cape	2 (7.4%)	1 (16.7%)	2 (4.4%)
School quintile	1	1 (3.7%)	2 (33.3%)	3 (6.7%)
	2	4 (14.8%)	1 (16.7%)	5 (11.1%)
	3	3 (11.1%)	3 (50.0%)	4 (8.9%)
	4	2 (7.4%)	-	4 (8.9%)
	5	11 (40.7%)	-	20 (44.4%)
	6	6 (22.2%)	-	9 (20.0%)
Parental education				
First generation student	No	5 (18.5%)	3 (50.0%)	9 (20.0%)
	Yes	22 (81.5%)	3 (50.0%)	36 (80.0%)
Financial demographics				
NSFAS	No	18 (66.7%)	1 (16.7%)	24 (53.3%)
	Yes	9 (33.3%)	5 (83.3%)	21 (46.7%)
Self-funded	No	6 (22.2%)	3 (50.0%)	13 (28.9%)
	Yes	21 (77.8%)	3 (50.0%)	32 (71.1%)

University enrollment demographics				
Special group at first enrollment	Past Matric	3 (11.1%)	3 (50.0%)	9 (20.0%)
	Current Matric	5 (18.5%)	3 (50.0%)	32 (71.1%)
	University experience	-	-	4 (8.9%)
Club or society	No	21 (77.8%)	5 (83.3%)	35 (77.8%)
	Yes	6 (22.2%)	1 (16.7%)	10 (22.2%)
Academic performance – University				
Final mark (%)	Mean (SD)	41.44 (± 5.13)	44.29 (± 3.99)	35.52 (± 9.32)

DOI: 10.26681/jote.2025.090403