# PRE-ADMISSION TESTS OF LEARNING POTENTIAL AS PREDICTORS OF ACADEMIC SUCCESS OF FIRST-YEAR MEDICAL STUDENTS

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ABSTRACT

Whilst performance in the school-leaving examination may be a good predictor of academic achievement at medical schools, it is not necessarily a perfect one. The Health Sciences Placement Tests (HSPTs), comprising four components, were adopted by several South African universities as a tool to understand student preparedness. Of 127 first-year students at the University of the Witwatersrand in 2010, those from private schools performed significantly better academically than their public school counterparts on overall HSPT performance and in the Academic Language test, and marginally better in the Mathematics Achievement and Mathematics Comprehension tests. Students from private schools performed better at first-year level in the subjects of Psychology and Fundamentals of Medical and Clinical Sciences. The Academic Language and Mathematics Comprehension tests showed significant correlations with performance in first-year subjects, both at mid-year and year-end assessments. The study points to the importance of the HSPTs as an additional tool in predicting and understanding academic success at first-year university level.

**Keywords:** higher education readiness, educational background, learning potential tests, academic success

## INTRODUCTION

Universally, the medical fraternity has required admission of academically excellent students to a curriculum with strong theoretical and scientific content. Medical school admission is a continuing topic of interest in education. Intellectual challenge and the wish to achieve are among the primary motives for choosing a career in medicine (Johnson et al. 1998). Medical practitioners are expected to possess an extraordinary blend of academic and personal attributes, in order to interact with patients and other medical staff. Consequently, medical schools worldwide constantly review their admissions processes and the criteria that classify potential candidates as suitable for entry.

Medical school admission policies are multifaceted and incorporate selection on the basis of academic achievement at high school or university together with the a test/interview to assess the personal qualities of the candidate (De Clercq, Pearson and Rolfe 2001). It has been reported that pre-admission, structured interviews may provide useful additional information not necessarily provided by other selection processes (Cliff and Hanslo 2009). However, studies have indicated that interviews – though an important potential component of the admissions process – do not reliably predict the performance of a student academically, or in the clinical setting (Basco et al. 2008; Elam and Johnson 1992). Medical admission tests are increasingly used as an additional source of information to help selectors differentiate between high achievers and to compare students from different educational backgrounds (Emery and Bell 2009; McManus et al. 2011). Edwards, Elam and Wagoner (2001) proposed a model for selection which considered the following components:

1. The applicant pool
2. Criteria for selection
3. The admission committee
4. Selection processes and policies

As a consequence of the growing diversity of students applying to medical schools from a pool of well-qualified applicants (Al Alwan et al. 2013) and because of the inequalities of schools in South Africa, there is a need to make use of selection criteria other than results obtained in the school-leaving examination. Such criteria are designed to level the playing fields for students from various and diverse socio-economic and educational backgrounds. A meta-analysis of student achievement reported by McManus (2002) showed that school attainment in general successfully predicts performance at medical school. However, in order to adjust selection as a result of poor schooling encountered by many potentially excellent students from educationally disadvantaged backgrounds (especially Black students), there is an argument for lowering entry requirements. This is not an unproblematic solution: research shows that lowering entry requirements increases the short-term risk of students dropping out of medical school or the longer term risk of the poorer-qualified medical entrants becoming less competent doctors (McManus 2002).. Similarly, other meta-analytic research has clearly shown that General Cognitive Ability (GCA) is a moderate to strong predictor of occupational achievement and relevant performance (Bore, Munro and Powis 2009). Although there is an indisputable need to redress demographic and socio-economic imbalances, especially as a result of the apartheid legacy in South Africa, lowering the entry standards to medical school is not the answer to accommodate students from previously disadvantaged backgrounds.

South African medical schools have recognised the need for transformation and consider academic and non-academic factors in the selection process. Academic criteria were mostly compiled according to the school-leaving examination pass rate and subject choices. Owing to the changing of the school evaluation system, the Faculty of Health Sciences at the University of the Witwatersrand, as well as other medical schools at South African universities, have introduced additional criteria, apart from academic performance in the penultimate and final schooling years, in the selection of medical students.

The selection criteria need to be both reliable and valid in order to ensure successful academic performance at university level within a medical school programme. In the United Kingdom, the Biomedical Admissions Test (BMAT), interviews and personal statements are designed to serve as an adjunct to examination results. This process is intended to provide a global scoring of eligible students (Emery and Bell 2009). South African medical schools have adopted a similar strategy by using the Health Sciences Placement Tests (HSPTs) developed by the Alternate Admissions Research Project (AARP – now the Centre for Educational Testing for Access and Placement). The HSPTs have shown that performance in the first year is better predicted by a set of tests that, in part, are similar to the scientific knowledge section of the BMAT, particularly for students from educationally disadvantaged backgrounds (Cliff and Hanslo 2009; Cliff and Montero 2010). In the United States, undergraduate Science scores have also been shown to be strong predictors of standardised test performance in the medical school curriculum (Basco et al. 2002).

Criteria used to select students arguably need to be effective in predicting competent performance, both during the course and after graduation, (Kay-Lambkin, Pearson and Rolfe 2002) but to date no single comprehensive and definitive medical student selection model has been described (Bore, Munro and Powis 2009). Traditionally, admissions policies have focused on the selection of applicants with high academic scores (Kay-Lambkin, Pearson and Rolfe 2002) for the obvious reasons of the high academic demands of a medical degree. Policies for selection of students were traditionally based on the assumption of a strong relationship between academic ability and success in medical school examinations.

Academic and non-academic criteria have to be applied in the selection process, much of which has been established on intuitive grounds and without any evidence basis (James and Chilvers 2001). It therefore becomes critical for medical schools to validate their selection on an ongoing basis where the educational climate changes and the attributes of graduating doctors have constantly to be considered to meet the needs of the patient population they serve. Every medical school should identify those objective factors which predict success on their course and incorporate them into their selection process (James and Chilvers 2001). Doctors need specialist knowledge and a complementary array of skills and personality traits if they are to be professionally competent (Powis 2010), which also suggests that any competency list for a generic medical practitioner should comprise the following:

1. Excellent academic ability
2. Good cognitive skills
3. Ability to use academic knowledge appropriately in quantitative, verbal and spatial domains.

Although changes in the selection policies began to take place prior to 1994 and the intake of medical students in South Africa showed progress with regard to changing the demographic profile (which demonstrated an improved representation of the more disadvantaged groups in 1999 as compared to 1994), equitable representation still remained a challenge that needed to be addressed (Cliff and Yeld 2006). In this context, a complementary selection mechanism was introduced as part of the process of selecting medical school students in South Africa. The Health Sciences Placement Tests (HSPTs) – developed by the then Alternative Admission Research Project (AARP) – were introduced at seven of the eight medical schools in South Africa and adopted from 2003 as an additional method of gathering information for the selection of future medical students. The HSPTs consisted of four tests, which included generic testing of language applied to an academic context, mathematical achievement and mathematical comprehension, and scientific reasoning. The HSPTs were developed by interdisciplinary teams of experts over a time span of several years and constituted the following tests (Cliff and Hanslo 2009):

- The Placement Test in English for Educational Purposes (PTEEP), which is aimed at assessing students' ability to make meaning of texts that they are likely to encounter in their studies and understand visually presented textual information, by using processes such as separating superordinate from subordinate information; applying inferential reasoning; interpreting features of academic discourse; and understanding analogous thinking.

- The Mathematics Achievement (MACH) test, which measures the extent of a student's backlog in basic mathematical knowledge and skills normally expected to have been acquired by the time the student reaches a senior secondary school mathematics phase.
- The Mathematics Comprehension (MCOM) test, which is designed to provide information concerning the student's potential to learn new mathematical knowledge and skills.
- The Scientific Reasoning Test (SRT), which is aimed at assessing the student's capacity to engage in the type of logical, evidence-based thinking typically required of students in higher education.

Given the historical context mentioned, the tests were designed to obtain information about the potential of students to cope with the typical academic and cognitive demands of higher education. Additionally, the goal of the HSPTs was to enable talented students whose education had been particularly compromised by unequal schooling, to demonstrate the extent to which they would be able to cope in higher education contexts where there would be high levels of academic and non-academic support and mentoring. These tests were regarded as a diagnostic benchmark of students' entry-level performance (AARP 2004), a benchmark which could then be incorporated into the selection and curriculum placement of students.

Studies have shown correlations between selection test scores and performance where aptitude selection instruments that assess science, mathematics and linguistic capabilities of selected candidates were significantly predictive of in-course performance of students in colleges in Saudi Arabia (Al Alwan et al. 2013). Internationally, there exist mixed results regarding formal measures of undergraduate institution selection but they still remain useful and important components to predicting student performances. Biomedical tests have to be valid and reliable predictive indicators of student eligibility and success and aspects such as verbal and numerical reasoning have been strong predictors of student success (Emery and Bell 2009). Ultimately, communication and interpersonal skills have to be balanced against academic and scientific ability and this still remains a major challenge for medical schools worldwide.

## THE CONTEXT OF THE CURRENT STUDY

Generally in South African medical school selection processes, academic pre-admission criteria include the prospective student's final secondary school mark, for example, a composite grading of all final-year schooling scores, as well as the scores on a set of pre-admission tests. Although previous academic performance is a good predictor of success on the medical programme (Ferguson, James and Madeley 2002; Lumb and Vail 2004), it is not a perfect one. For example, one study has shown that it accounted for 23 per cent of the variance in performance in undergraduate medical training and only 6 per cent in post-graduate competency (Ferguson, James and Madeley 2002).

The aim of the current study was to investigate the degree of association between the scores on the specific test components of the HSPTs and the scores on the in-course mid-year and final examinations for students in their first year of study towards a medical degree. First-year academic performance has historically been shown to be a critical filter of students entering medical school (Ruscingo, Pinto Zipp and Olson 2010). In terms of the tests, a composite score provides an average of the four tests that make up the HSPTs. For the purposes of this study, the individual component scores were teased out of the test and these analysed against the first-year subjects included in this study in order to identify specific predictor domains of student success in the first year. Additionally, attempts were made to control for variation in pre-admission test and academic performance scores by demographic variables such as gender, and student school background, since these variables are known historically to be associated with differences in academic performance.

## METHODOLOGY

The medical curriculum at the University of the Witwatersrand spans a minimum period of six years, the first two of which could be considered pre-clinical years comprising basic sciences, anatomy and physiology subjects. A retrospective study was performed where in-course performance for the basic and human sciences was assessed in conjunction with the pre-admission test results of the students who had been admitted for the 2010 intake.

Four pre-admission predictors of performance were examined and considered for this study:

1. PTEEP*
2. MACH*
3. MCOM*
4. SRT*

(* Defined above)

These scores and a composite HSPT score were assessed in conjunction with the mid-year and final first-year results in the following subjects:

1. Physics
2. Chemistry
3. Biology
4. Fundamentals of Medical and Clinical Sciences (SCMD)
5. Sociology
6. Psychology

The component results for pre-admission and corresponding first-year results were provided by the university with the permission of the Dean of the Faculty of Health Sciences. Variables analysed included student numbers, the mean scores of each component test and a composite as well as the class mean values for the first-year subjects chosen for scrutiny.

## DATA ANALYSIS

Database management and statistical analyses were performed with SAS software, version 9.1 (SAS Institute Inc., Cary, NC, USA). Results from each component of the Composite Index are reported as mean ±SD. Unadjusted means were compared by t-test or Wilcoxon-Mann Whitney tests when appropriate. Spearman Correlation coefficients were calculated between the pre-admission test components and the first-year subjects unadjusted and after gender adjustments. Stepwise multiple linear regression analysis was performed to assess independent relations between pre-admission test components and the first-year subjects marks with appropriate adjustors. A p-value of $<0.05$ was considered statistically significant.

## RESULTS

One hundred and twenty seven students were accepted to medical school at the University of the Witwatersrand for 2010 (Table 1).

**Table 1:** Composite index and PTEEP, MACH, MCOM and SRT scores on HSPTs for the 2010 intake per school type (public and private)

| | **Total** | **Public** | **Private** | **p-value** |
|---|---|---|---|---|
| Number of students, (%) | 127 | 86 (68%) | 41 (32%) | |
| Composite Index | 67.8±7.8 | 66.2±7.7 | 71.1±7.0 | <0.0001 |
| PTEEP | 67.9±14.8 | 63.9±14.5 | 76.4±11.8 | <0.0001 |
| MACH | 58.9±12.6 | 57.3±13.1 | 62.2±10.9 | 0.03 |

| | Total | Public | Private | p-value |
|---|---|---|---|---|
| MCOM | 65.2±18.0 | 62.6±17.9 | 70.6±17.3 | 0.03 |
| SRT | 68.0±8.6 | 68.0±8.6 | 68.2±8.7 | NS |

The majority were females (62%) and of Black ethnicity (42.5%); 33 per cent were White; 15 per cent Indian; and 9.5 per cent Coloured. Females and males had similar scores for the medical pre-admission tests (Composite Index (CI), PTEEP, MACH, MCOM and SRT) with $p>0.05$. Students from private schools performed higher in all tests besides the SRT compared to those from public schools (Table1), suggesting that school background factors continue to impact on the academic performance of entry-level medical school students.

Table 2 shows the results of the June and November examinations.

**Table 2:** Subject results for mid-year and final year 2010 per school type

| | Total | Public | Private |
|---|---|---|---|
| **June** | | | |
| Physics | 64.4±19.4 | 63.6±18.6 | 66.1±21.0 |
| Chemistry | 58.3±13.9 | 57.8±13.9 | 59.3±14.1 |
| Biology | 63.5±12.8 | 62.3±13.0 | 66.0±12.2 |
| Fundamentals of Medical and Clinical Sciences | 61.0±8.7 | 59.3±15.3 | 64.5±12.2 |
| Sociology | 60.9±6.3 | 60.4±7.0 | 62.1±4.6 |
| **November** | | | |
| Physics | 63.5±12.6 | 62.3±12.9 | 64.8±13.5 |
| Chemistry | 62.4±12.8 | 61.9±13.5 | 63.5±11.3 |
| Biology | 62.5±10.9 | 61.6±10.9 | 64.5±10.6 |
| Fundamentals of Medical and Clinical Sciences | **66.6±9.3** | **65.1±9.7** | **69.6±7.7^** |
| Sociology | 62.3±5.9 | 61.6±6.3 | 63.7±4.8 |
| Psychology **(**year-end only available) | **74.2±8.4** | **73.1±8.9** | **76.7±6.7^** |

Data are presented as mean ± SD; ^p<0.05 between public and private schools

No differences between public and private schools were found in the June examinations. In contrast in the November examination, students from private schools achieved higher marks than students admitted from public schools in the subjects of SCMD and Psychology ($p<0.05$). After adjusting for gender and school background the marks for Chemistry, SCMD and Sociology increased in November examinations ($p<0.001$). However, in Biology a small decrease in the marks was observed ($p=0.03$).

Strong positive correlations were noted between the Composite Index and the marks obtained by the students in their June and November examinations (Spearman correlation coefficients ($r_s$) between 0.42 and 0.79, with $p<0.0001$). Furthermore similar correlations coefficients were achieved after adjusting for school background (Table 3).

**Table 3:** Correlations of the Composite Index with mid-year and final year subject results

| | Unadjusted Spearman *r* | Spearman *r* adjusted for school background |
|---|---|---|
| **June assessments** | | |
| Physics | 0.52* | 0.48* |
| Chemistry | 0.46* | 0.41* |
| Biology | 0.56* | 0.51* |
| Sociology | 0.42* | 0.39* |
| Psychology | 0.73* | 0.72* |
| **November assessments** | | |
| Physics | 0.52* | 0.48* |
| Chemistry | 0.50* | 0.47* |
| Biology | 0.65* | 0.62* |
| Sociology | 0.56* | 0.51* |
| Psychology | 0.64* | 0.60* |
| Fundamentals of Medical and Clinical Sciences | 0.79* | 0.77* |

*p<0.0001

Table 4 depicts student performance according to each subject undertaken using the pre-admissions test (PTEEP, MACH, MCOM and SRT) and adjusting for gender and schooling background.

**Table 4:** Stepwise regression analysis for mid-year and final year subject results

| Results of subjects | ß coefficient ±SEM | Partial $r^2$ | p-value |
|---|---|---|---|
| Biology - June | 1.MCOM:0.24±0.07<br>PTEEP:0.22±0.09<br>2.Composite index: 0.94±0.12 | 0.25<br>0.04<br>0.32 | <0.0001<br>0.01<br><0.0001 |
| Biology - November | 1.MCOM: 0.37±0.07<br>2.Composite index: 0.60±0.17<br>MCOM: 0.16±0.07 | 0.37<br>0.41<br>0.02 | <0.0001.<br><0.0001<br>0.03 |
| Physics - June | 1.MCOM: 0.48±0.09<br>2. MCOM: 0.48±0.09 | 0.20<br>0.20 | <0.0001<br><0.0001 |
| Physics - November | 1.MCOM: 0.37±0.05<br>2.Composite index: 0.45±0.21<br>MCOM: 0.21±0.09 | 0.28<br>0.28<br>0.03 | <0.0001.<br><0.0001<br>0.04 |
| Chemistry - June | 1.MCOM: 0.34±0.06<br>2.Composite index: 0.79±0.14 | 0.20<br>0.20 | <0.0001<br><0.0001 |
| Chemistry - November | 1.MCOM: 0.31±0.06<br>2.MCOM: 0.31±0.06 | 0.19<br>0.19 | <0.0001<br><0.0001 |
| Sociology - June | 1.PTEEP: 0.22±0.03<br>2.PTEEP: 0.22±0.03 | 0.22<br>0.22 | <0.0001<br><0.0001 |
| Sociology - November | 1.PTEEP:0.14±0.04<br>MCOM: 0.07±0.03<br>2.Composite index: 0.44±0.06 | 0.25<br>0.03<br>0.33 | <0.0001<br>0.03<br><0.0001 |
| Psychology - June | 1.MCOM: 0.24±0.07<br>PTEEP :0.22±0.09<br>2. Composite index: 0.94±0.12 | 0.25<br>0.04<br>0.32 | <0.0001.<br>0.00.01<br><0.0001 |
| Psychology - November | 1.PTEEP: 0.16±0.05<br>MCOM : 0.18±0.04<br>2. Composite index: 0.53±0.10<br>PTEEP: 0.11±0.05 | 0.05<br>0.33<br>0.40<br>0.02 | 0.002<br><0.0001<br><0.0001<br>0.03 |
| Fundamentals of Medical and Clinical Sciences (SCMD)–November (only) | 1.MCOM: 0.37±0.04<br>2.Composite index: 0.60±0.18<br>MCOM: 0.16±0.07 | 0.37<br>0.41<br>0.02 | <0.0001.<br><0.0001<br>0.03 |

1. Individual tests scores (PTEEP, MCOM, MACH and SRT), gender and schools were included in the model for each subject
2. Individual tests scores (PTEEP, MCOM, MACH and SRT), gender and schools with the addition of Composite Index scores were included in the model for each subject

Higher marks of mid-term and year-end examinations were explained by better results in the MCOM tests for the different subjects (partial $r^{2=}$ 0.20 to 0.25, p<0.0001) and for PTEEP (partial $r^{2=}$ 0.04 to 0.25, p< 0.05) in June. Similar findings were seen in November as well (Table 4).

The combined pre-admission test (CI) appeared to be the most important predictor of the mid-year and final year marks of the majority of the subjects. For the June examinations, the CI explained 32 per cent, 20 per cent and 32 per cent of the variance in the marks obtained by the medical students in Biology, Chemistry and Psychology respectively (p<0.0001). In addition, at the year-end examinations the Composite Index predicted the scores achieved in Biology, Physics, Sociology and SCMD and Psychology (p<0.0001), but not Chemistry. MCOM exhibited an independent association with Biology November marks (partial $r^2$ of 0.02, p=0.03) together with CI. Physics marks in mid-term instead accounted for 20 per cent (p<0.0001) of the variance in the MCOM scores only. In addition, MCOM scores predicted Biology, SCMD examinations results for November (p=0.03) as well. The Academic Language test (PTEEP) scores were the sole predictor of the Sociology marks (partial r2=0.22, p<0.0001) in June and explained only 2 per cent of the increase in the Psychology scores (p=0.03).

## DISCUSSION

The present study attempted an investigation of a single overarching question: to what extent are scores on the HSPTs as individual tests and as a combined, composite measure, associated with academic performance of first-year students in key medical school courses at mid-year and year-end? This overarching question was approached from four angles: (1) an investigation of the extent to which differences in key demographic variables (gender and school background) were associated with differences in mean levels of achievement on pre-admissions tests and in key first-year courses; (2) the extent to which these demographic differences (if any) were still visible in academic performance at the end of the first year of study; (3) an investigation of correlations – adjusted for differences in school background – between a composite score on the pre-admissions tests and academic performance at mid-year and year-end; and (4) regression analyses – adjusted for gender and school background variables – to determine the contributions of pre-admissions tests individually and as a composite towards variation in academic performance in key courses at mid-year and at year-end.

The results of the present study point to the importance of selection criteria using the HSPTs as an additional tool in predicting academic success in health sciences at the University of the Witwatersrand. Our study initially compared the performance of students admitted from public versus private schools in their achievements on the HSPTs. The results indicate no gender difference in their performance across the various assessments. However, when the analysis was performed on admitted students from public and private schools, students from private schools performed significantly better than their public school counterparts in the assessments on the academic language proficiency (PTEEP) test and their overall composite scores were also significantly higher ($p<0.0001$; Table 1). Whilst the trend of better performance was still with students from private schools in the MACH and MCOM assessments, these did not reach statistical significance.

These findings confirm and augment those reported by Cliff and Hanslo (2009) in suggesting that pre-admission tests and the PTEEP as a test of academic language proficiency and academic literacy in particular, have predictive value in underscoring an ‘advantage’ on entry to higher education that students from private schools have over students from public schools. The effects of language and academic literacy on student performance at university are well-documented. (Higgins-Opitz and Tufts 2014; Higgins-Opitz et al. 2014; Fleisch, Schöer and Cliff 2015). Furthermore, studies have also shown that school-leavers embarking on university studies are generally inadequately prepared to cope with the language-of-instruction demands of studies in higher education (Ramukumba and Gravett 2004; Cliff 2014 and 2015). The results of the present study support the notion of using scores, such as those achieved on the PTEEP, as indicators of likelihood of succeeding at university. Further evidence in support of using PTEEP as an additional tool for admission purposes is provided by the recent work of Mashige, Ramprasad and Venkatash (2014) who demonstrated a weak correlation between matric English scores and first-year performance in all subjects.

The present study, and others referred to in the previous paragraph, also add weight to the importance of focusing on literacy as part of the disciplinary curriculum. Performance on tests such as the PTEEP and the MCOM are strongly influenced by the language proficiency and literacy-laden nature of the tests themselves, and the academic contexts that they simulate. The present study indicates that ‘conventional’ curriculum may not necessarily be sufficient to address the language and literacy needs of medical school students, especially those from English Second Language backgrounds, if these students are to be enabled to ‘overturn’ anticipated relationships between poor entry-level test performance and academic underperformance during and at the end of first-year studies.

In addition, data from Table 2 suggest that residual effects of the ‘advantage’ private school background students have over public school background students in terms of their readiness to cope with the demands of higher education study remain visible right through the first year of study. Students from private schools also performed better than their public school counterparts in SCMD and Psychology. The points made in the previous paragraph about the need to address language and literacy demands alongside conventional curriculum demands remain apposite.

Finally, we return to the argument about the use of tests such as the HSPTs as an additional tool in the selection of medical school students (and, by implication, students for other academic programmes). We believe the findings of this study emphasise the complementary value of the HSPTs in identifying and understanding variation in academic readiness of medical school students that is not necessarily visible on the basis of school-leaving results alone. Many applicants to medical schools at the University of the Witwatersrand (and other South African medical schools and equally high-demand academic programmes) obtain equally outstanding school-leaving examination results, which makes it extremely difficult to make selections decisions amongst these applicants who exhibit so little evidence of academic variation in their school-level academic achievement. Furthermore – as crtiterion-referenced assessments with the assessment ‘target’ being readiness to cope with first-year academic literacy, mathematical thinking and scientific reasoning demands in the medium-of-instruction – the HSPTs have value in identifying the ability of applicants to cope with their study programmes that is not visible in the school-leaving examination results. Increasingly (as pointed out earlier in this article), school-leaving examination results have been difficult to interpret: the diverse educational backgrounds of applicants make it difficult to establish the meaning of school-leaving examination scores and the interpretation of what these scores tell us about what applicants know and can do. The constructs assessed by the HSPTs produce additional academic readiness information against which the school-leaving examination results can be interpreted – and on the basis of which selection decisions can be made.

We believe that the present study also carries implications for the selection of students from educationally advantaged (well-resourced) and educationally disadvantaged school backgrounds. For students from educationally advantaged backgrounds, we believe results from tests such as the HSPTs by and large confirm the beneficial effects of well-resourced schooling – but the results remain useful at the level of individual applicants about whom selection decisions need to be made. Nonethless, HSPT results still provide important information to selection committees about the academic readiness (and literacies) of applicants from advantaged backgrounds. For students from educationally disadvantaged backgrounds, HSPT scores provide alternate academic readiness information to school-leaving examination results in many cases (consonant with the findings in the Cliff and Hanslo 2009, study), particularly in relation to the ability of these students to cope with the medium-of-instruction demands of tertiary study. For students from disadvantaged backgrounds, the tests provide important information about the extent to which these students will cope with their studies in, for example, an English medium-of-instruction teaching environment and about the extent and kind of academic support and curriculum responsiveness that might be indicated if such students are to be successful. From a selection point of view, the HSPTs act as mechanisms in this instance for making judgments about the level of academic support such will require once selected. Findings from this study confirm that – in the presence of conventional curriculum provision (such as that provided by the courses that formed the focus of this study) – the effects of (disadvantaged) educational background remain visible through the first year of study. The use of HSPT information provides a framework for the development of explicit or additional support aimed at addressing the needs of students from disadvantaged backgrounds.

## LIMITATIONS

In a South African context, demographic factors such as school background or population group continue to play an important part in understanding talent and achievement. Initially, an unbiased and unadjusted study was performed which did not consider race or gender. Against the diverse educational and socio-economic background which South African tertiary institutions face, the same data was further adjusted to incorporate the effect of race and gender on the same results. This study was also limited to the student pool at the University of the Witwatersrand as well as pertaining to the curricula of the final high school year and first-year of university of 2009 and 2010 respectively which become relevant when studying the same parameters over a longer time span when the curricula changed as desired by educational outcomes.

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