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Research Paper

Preadmission predictors of academic performance in a pharmacy program: A longitudinal, multi-cohort study

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ABSTRACT

Introduction: This study examined the extent to which a preadmission health science program and demographic variables predicted academic performance throughout an undergraduate pharmacy degree (BPharm) program.

Methods: A longitudinal, multi-cohort study was undertaken of 557 students admitted to the University of Otago School of Pharmacy BPharm program between 2008 and 2012, from a preceding health science year (HSFY). Preadmission baseline data including health science grade point average (GPA), sex, age, ethnicity, residency status, and high school qualifications were matched against outputs of GPA performances in all three years of the BPharm program using regression analyses.

Results: Five hundred thirty-eight students (96.6%) completed their BPharm degree. The regression models were significantly predictive of performance in the BPharm program with 57%, 43% and 38% of variances explained for GPA performance across years two, three and four, respectively ($p < 0.001$). Demographic variables including being male, being from certain minority ethnic groups or not having a specific domestic high school qualification were associated with lower GPA performances across the BPharm program compared to reference groups.

Discussion and conclusions: Determining admission from performance rankings as the single selection tool holds reasonable predictive value early in progression, however additional measures may be warranted to better predict performances extending beyond the first year of the BPharm program.

Introduction

In order for a university to deliver any health professional program at the level and quality required, it is critical that the students being admitted are likely to complete the program and then succeed within the health profession. Each program will require valid and efficient admission processes to optimize desirable outcomes and equity. It is therefore important that pathways into the system are well understood. As entry to tertiary level programs becomes more competitive, more research evidence is required to assure educators, registration bodies and the public that student selection policies are predictive of future performance. Predictive validity of high-stakes admission tests is important in order to provide assurance that test results remain relevant, reliable and add value to selection criteria.¹

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Within pharmacy education, admission criteria have been used to predict desirable outcomes including academic success in the first year of university study,²⁻⁶ success throughout the program,⁷⁻⁹ on-time graduation,¹⁰ success in clerkship training,¹¹ and meeting professional licensing standards.¹² Admission criteria have also been shown to predict undesirable outcomes such as student risks for poor academic performance, failure to graduate on-time and attrition from the program.^{5,13-16} Much of this literature contends that a priority for admission committees is to select students who will complete the program in a timely manner and graduate.^{5,14} The consequences of getting the selection “wrong” can influence university resources, loss of opportunity cost for capable but non-admitted students, attrition of graduates from the pharmacy workforce, and the quality of professional practice in communities.

The ideal selection tool is one that successfully predicts an applicant's future performance in the undergraduate program and in professional practice, screens for desirable professional attributes, allows for appropriate levels of student diversity, yet is cost-effective, and not resource-intensive.¹⁷ Since such an extensive tool does not exist, nor does there appear to be requirements for standardization of admission requirements by accrediting organizations, pharmacy schools continue to employ a variety of screening methods when selecting students. Given the “high stakes” consequences for declining a candidate's application for a place in pharmacy school, or accepting a candidate who may prove unsuitable, selection processes remain an area of controversy and debate.

Several review papers have examined the reliability and validity of common types of admission tools used to select students into various health professional courses, reporting that prior academic achievement, measured by admission grade point average (GPA), has been consistently identified as one of the best predictors of future performance.¹⁸⁻²⁰ Literature on pharmacy admissions published over the last 20 years supports such conclusions.^{4-9,21-24} Achievements in specific pre-admission science subjects, particularly chemistry, biology and mathematics, were found to predict subsequent academic performances within pharmacy programs.^{2-5,20,21,24}

The Accreditation Standards for Pharmacy Programs in Australia and New Zealand (NZ) include guidance statements for student admission processes and eligibility without stipulating specific admission measures. Accreditation guidelines support admission policies that are transparent, undergo regular review and are without bias to all potential students (while acknowledging affirmative action policies for under-represented groups).²⁵ The particular selection method(s) used by pharmacy school will therefore be based on their own perspective of the “best” way to select the most appropriate candidates.

Although pharmacy admission procedures play a major role in subsequent student performance, educators in NZ have only more recently started to gain evidence about the efficacy of the various mechanisms that are currently used for selection.^{26,27} This paper responds to the need for greater research in this area by exploring the predictive validity of performance in a pre-professional health science program on academic achievement throughout an undergraduate bachelor of pharmacy (BPharm) program.

The BPharm degree at the University of Otago is comprised of a pre-admission health science first year (HSFY) at the university, followed by competitive selection into the three-year BPharm program. Most graduates then proceed to an additional year of training (internship) while employed in pharmacy. Given successful completion of this internship, they register as pharmacists with the Pharmacy Council of NZ.

Pre-professional programs of study serve two needs: firstly, to prepare students for the curriculum of professional programs in terms of the foundational knowledge required, and secondly, to provide information used in admission processes to select applicants most likely to be successful.²⁴ Prerequisite course requirements for admission purposes remain variable among institutions. In Australasia, entry into pharmacy programs may require either a prior bachelor's degree, four semester (two-year) or two semester (one-year) university study, or acceptable course pass rates directly from high school.²⁸ Gleason et al.²⁹ identified a trend for Doctor of Pharmacy (PharmD) programs within the United States (US) to either require or prefer three years of postsecondary education or a bachelor's degree from applicants.²⁹ While half of the students enrolled in PharmD programs may already possess a bachelor's degree regardless of prerequisite requirements,³⁰ debate continues as to the merits for inclusion of such a prerequisite to all PharmD programs.³¹⁻³³ Proponents argue that this has become necessary in order to deliver the strong science foundation needed for student pharmacists while providing space in pharmacy curricula to address new pharmacy education standards expanding on clinical sciences and experiential learning.³² Entry by bachelor's degree is claimed to help unify admission processes amongst pharmacy education programs, is on par with admission requirements into other health professional programs and will admit students who, by their maturity, have a broader perspective.³² However, there is disagreement among academic deans who believe their own pre-professional programs (two-year, three-year, or bachelor's degree) are valid and of preferable duration,³⁴ with the arguments against longer programs including risk of not wishing to pursue a graduate-entry pharmacy degree when choice exists, student fatigue and substantial tuition and living costs.^{31,32,34} Determining the prerequisite subject components required for a foundation in pharmacy education also remains controversial.³⁴ High school or post-secondary subjects in chemistry, biology, physics, mathematics, and English are common prerequisites in Australasian pharmacy programs²⁸ and appear similar to prerequisite subjects required in other international programs.^{23,29} Inclusion of non-science courses, such as those in humanities, have also been commented on for their potential to enhance future professional abilities and contributions as an informed citizen, and provide exposure to issues relating to health literacy and cultural competency.^{24,32} Given the admissions model of a one-year pre-professional HSFY that includes seven core subjects and an optional elective subject, we sought to address the following questions on the selection process: (1) Are objective measures of knowledge attained in the HSFY correlated with, and predictive of, future performances in the BPharm program?, (2) What are the relationships between admitted applicants' demographic characteristics and their academic performances in the BPharm program? and (3) Were performance outcomes of students who self-selected to take an additional course during HSFY different from students undertaking only the prerequisite HSFY requirements?

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