Numeracy performance in sports and exercise science students at an Australian university

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There is widespread concern about falling rates of student participation in advanced mathematics at high school and declining numeracy and mathematics skills amongst students entering science degrees in Australia (Australian Academy of Science, 2006; Quinnell, Thompson & LeBard, 2013). Anecdotal evidence suggests that this problem is endemic amongst students in bioscience degrees, but the impact of high school study of mathematics on numeracy performance in these students is not clear.

To investigate this further, we tested the numeracy performance of 401 students enrolled in a Sports and Exercise Science degree in 2016 and explored the association between numeracy performance and four background characteristics, including high school study in mathematics. The numeracy test was designed to assess learning expected in primary school and early years of high school up to Year 10. Numeracy performance was based on answers to 39 multiple-choice questions (1 mark each) and represented by the total score out of 39. Numeracy questions focused on rational number, ratios, rates, basic algebra and graph interpretation. Several questions tested aspects of proportional reasoning, while others were contextualised to human movement and physiology. Background questions (5-point scale) focused on highest level of mathematics studied at high school, self-perception of mathematics proficiency, perceived importance of mathematics to a sports and exercise science degree, and likelihood of seeking help with mathematics.

Students from first (n = 212), second (n = 78) and third (n = 111) years of the degree completed the test. The distribution of numeracy test scores for the entire cohort was negatively skewed with a median[IQR] score of 27[11]. There were small but significant differences in test scores between Year 1 and Year 3 students (median [IQR]: 26 [10] *vs* 28 [8]). There were significant associations between test scores and the highest level of mathematics studied ($P < 0.05$), being lowest in students who studied Year 10 Mathematics (20 [9]), intermediate in students who studied Year 12 General Mathematics (26 [8]), and highest in two groups of students who studied higher-level Year 12 mathematics (31 [9], 31 [6]). Approximately 17 % of students achieved a test score of less than 20 out of 39. There were significant associations between test scores and level of self-perception of mathematics proficiency and also likelihood of seeking help with mathematics, but not with perceived importance of mathematics to the degree.

These findings provide evidence of extensive problems with simple numeracy and mathematics skills amongst Sports and Exercise Science students, and show that the level of mathematics studied in high school is a critical factor determining the overall level of numeracy performance.

Australian Academy of Science (2006). Mathematics and Statistics: Critical Skills for Australia's Future. Melbourne, University of Melbourne. 58 pages.

Quinnell R, Thompson R, LeBard RJ. (2013). It's not maths; it's science: exploring thinking dispositions, learning thresholds and mindfulness in science learning. *International Journal of Mathematical Education in Science and Technology* **44**(6): 808-816.