

# RELATIONSHIP BETWEEN MATHEMATICAL CONFIDENCE AND ACADEMIC PERFORMANCE AMONG UNDERGRADUATE BIOLOGY STUDENTS

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## Background

The interconnectivity between the nature and origins of mathematics and science cannot be overstated. However, studies over the past decade have shown that approx. 50% of life science students lack confidence in their mathematical abilities (Tariq, 2002; Quinnell & Wong, 2007; McMullan et al., 2012; Markovina et al., 2015), and as a result, often adopt a rigid attitude to learning mathematics. This is particularly problematic in undergraduate life sciences, when the focus shifts to data handling and calculations. It was hypothesised that this 'rigidity' (low confidence) would relate to lower academic performance in biology and mathematics.

## Aims

This study was framed using Bandura (1977)'s self-efficacy theory and aimed to determine whether low mathematical confidence amongst undergraduate biology students would relate to low academic performance in biology mathematics.

## Design and methods

Students enrolled in an introductory biology course ( $n=254$ ) at a major research focused university were surveyed as to their attitudes to mathematics, using a modified version of the Fennema-Sherman Attitude Scale (5-point Likert items). Based on their responses to the confidence sub-scale, students were categorised as either possessing 'low' (mean Likert score  $<3.5$ ) or 'high' ( $>3.5$ ) confidence, they were then matched to their mean final grades in mathematics and biology, and compared using a student's independent samples t-test.

## Results

No differences were found between students who possessed 'low' or 'high' mathematical confidence, in terms of mean final grades in biology. Interestingly, for mathematics, students who were categorised as possessing 'high' mathematical confidence, achieved significantly lower grades compared to those students who possessed 'low' mathematical confidence. In other words students who were less mathematically confident, achieved significantly higher grades relative to their more mathematically confident peers.

## Conclusions

The recognition that students possess a high degree of additional complexity, with regards to the learning of mathematics and biology, is beneficial to educators. Such that more effective learning and teaching interventions may be developed, to encourage students to develop attitudes to learning that relate to improved educational outcomes.

## References

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