INTERNATIONAL JOURNAL OF ACADEMIC RESEARCH IN PROGRESSIVE EDUCATION & DEVELOPMENT

OPEN ACCESS JOURNAL

Vol 12, Issue 3, (2023) E-ISSN: 2226-6348

The Relationship between Algebraic Achievement and Attitude towards Algebra

Siti Hajar Aisyah binti Kassim[1], Teoh Sian Hoon[2], Koo Ah Choo[3]

[1]Sekolah Menengah Kebangsaan Taman Mutiara Rini 2 Off, Jalan Hang Jebat, Mutiara Rini, 81300 Skudai, Johor, Malaysia, [2]Faculty of Education, Universiti Teknologi MARA (UiTM), Malaysia, [3]Faculty of Creative Multimedia, Multimedia University, Malaysia

To Link this Article: http://dx.doi.org/10.6007/IJARPED/v12-i3/19181 DOI:10.6007/IJARPED/v12-i3/19181

Published Online: 15 October, 2023

Abstract

Algebra is commonly regarded as one of the most challenging topics in mathematics courses, resulting in nationwide learning difficulties. Achievement in algebra is a significant concern in Malaysia, particularly among secondary school students. Until today, as one of the primary educational objectives is to teach students to think mathematically and employ algebraic reasoning in real-world problem-solving contexts, the development of algebraic skills through mathematics education is crucial. The purpose of this study was to examine the relationship between the achievement and attitudes of Form Four students towards learning algebra. A correlational research design was used to collect quantitative data using a mathematics test with nineteen problems in four domains: variables, expressions, equations, and word problems. In addition, the students were given a survey regarding their attitudes towards algebra learning. A total of 200 Form Four students participated in the written test. The primary findings revealed that Form Four students' overall algebraic performance was below average at 49.30%. On average, female students performed marginally better than male students on the algebra test, achieving a score of 51.23 %. The results indicate that there were no significant differences in the algebraic achievement between female and male students. The findings demonstrated that students' attitudes towards algebra study have a substantial and positive effect on their algebraic performance. In addition, the study revealed a weakly positive relationship between algebraic achievement and attitude towards algebra learning. Therefore, educators and policymakers can prioritize creating effective algebra teaching strategies and fostering positive attitudes towards learning algebra among students. This will benefit both male and female students in developing a positive attitude towards the subject, leading to algebraic success and improvement of mathematics education.

Keywords: Algebraic Achievement, Attitudes, Relationship, Gender, Algebraic Thinking Test

Background of the Study

While the world is becoming more technologically advanced, the use of mathematics and algebra are increasingly relevant. Mathematics is the foundation of all other studies for science and technology development.

Algebra is commonly regarded as one of the more challenging topics in mathematics courses, resulting in nationwide learning difficulties. The topics such as linear algebra are considered complex and comprehensive for higher learning at university level (Singh, Tuli & Manti, 2021). Singh et al. further explained that students need to deal with theorems and abstract concepts and symbolic representation for this subject, that makes the topic challenging. Achievement in algebra is a significant concern in Malaysia, particularly among secondary school students. Until today, as one of the primary educational objectives is to teach students to think mathematically and employ algebraic reasoning in real-world problem-solving context (Grønmo, 2018). The development of algebraic skills through mathematics education is crucial.

The main purpose of this study was to examine the relationship between the achievement and attitude of Form Four students towards learning algebra. Other research objectives are to examine the differences in gender for students' achievement and attitude in algebra. The research questions are as follows:

The Research question 1(a): What is the level of students' achievement in algebra among male and female students?

Research question 1(b): Is there any significant difference in the algebraic achievement between male and female among Form Four students?

Research question 2(a): What is the level of students' attitude (self-confidence, value, enjoyment, and motivation) towards learning algebra?

Research question 2(b): Is there any significant difference in students' attitude towards learning algebra between male and female among Form Four students?

Research question 3: Is there any significant relationship between students' algebraic achievement and attitude towards learning algebra among Form Four students?

Literature Review

Algebraic skills are essential for students to develop mathematical thinking tools and study fundamental algebraic concepts. These skills act as a foundation for formal algebra, which is studied at higher levels. Algebra is one of the key chapters of the mathematics curriculum in Malaysia. It is formally introduced to students in elementary school, and the curriculum continues in secondary school. Significant emphasis is placed on the significance of algebraic skills for a deeper understanding of algebraic knowledge (Mulligan & Mitchelmore, 2009; Mustaffa et al., 2018). However, many students find algebra to be a daunting subject and struggle to transition from arithmetic thinking to algebraic thinking (Mullen, 2022). Research has shown that students encounter difficulties in understanding algebraic concepts and fail to develop algebraic skills, which can result in poor academic performance (Kieran, 1996; Macgregor & Stacey, 1997; Van Amerom, 2002; Sari & Fiantika, 2018). Moreover, students perceive algebra as a challenging and abstract subject, which may further hinder their progress in developing algebraic skills (Gunawardena, 2011; Kamol & Har, 2010; Kaput, 2008; Najihah et al., 2015). Hence, this study aimed to identify the level of achievement and attitudes in the learning of algebra among secondary school students. In addition, the relationship between algebraic achievement and attitude towards learning algebra was investigated.

Recent research has highlighted the increasing importance of mathematics achievement, particularly in the context of STEM education, which has led to more attention being given to secondary school students (Bicer & Capraro, 2019). Within mathematics, algebra is considered crucial for evaluation and can serve as a foundation for higher-level

mathematics and other STEM disciplines (Ovez & Uyangor, 2012). However, developing a solid understanding of algebra may require more effort. The importance of teachers in creating an appropriate learning environment has been emphasized in recent studies, along with the observation of students' knowledge construction (Arnawa et al., 2021; Hunter, 2014; Leite et al., 2022). Thus, it is essential to prioritize the development of students' algebraic skills to ensure success in STEM education and beyond.

Based on research findings, it appears that male and female students perform similarly across many academic domains. However, some studies suggest that female students may outperform their male counterparts in algebra (Rabab'h et al., 2015). Nonetheless, mastering algebra can be challenging for all students, as it involves working through complex and sometimes lengthy procedures when further knowledge is explored (Bergstra et al., 2001). Nevertheless, with dedication and persistence, students can overcome these obstacles and achieve success in their studies. Therefore, developing a positive attitude towards learning is essential for students to succeed in algebra. Research has identified several attitude attributes that play major roles in students' success in algebra, including self-confidence (Kunhertanti & Santosa, 2018), value (Rach, 2023), enjoyment, and motivation (Li et al., 2021).

To gain confidence in learning mathematics, students need to eliminate anxiety and be motivated to persist in their studies (Dowker et al., 2016). The enjoyment of learning can help students find the subject interesting or enjoyable, leading to better performance and persistence (Villarreal-Lozano et al., 2022). In addition to attitudes, specific algebraic learning tools and strategies have been found to be helpful in developing positive attitudes towards algebra (Cabrera, 2017; Esperanza et al., 2016). However, there are many other ways to promote positive attitudes towards learning algebra, and further research is needed to identify effective strategies for developing these attitudes.

Methodology

This study employed a correlation research design to investigate the relationship between algebraic achievement and attitudes towards learning. A total of 200 students randomly selected from a public secondary school in Malaysia. A test on algebra and attitude questionnaire were administered to the target samples for the data collection. There were 19 items in the test. It was adapted from a thesis (Gunawardena, 2011). Among the items were as follows:

Question 1

Ahmad sells y donuts. Maria sells three times as many donuts as Ahmad. A donut costs RM3.50.

a) Name a variable in this problem.

b) Name another variable in the problem.

c) Name something in the problem that is not a variable.

Question 2

There are n girl scouts in a parade. There are 8 girls in each row. Write an algebraic expression to find out how many rows of girl scouts are marching in the parade.

Question 3

What does yz mean? Write your answer in words.

For the reliability test, Split-half test was conducted. The split-half reliability coefficient for the preliminary trial was 0.66. After the improvement and adjustment of the test items, the final reliability test was 0.8. It showed an adequate level of reliability, the test was reliable. On the other hand, there were 49 items in the questionnaire on attitudes. The questionnaire

was adapted from Tapia and Marsh's work (2004). The reliability indicated a strong overall Cronbach's alpha value of 0.969. The items were validated by two experts. Among the items were "*Algebra is a very worthwhile and necessary content to be learnt*.", "*I want to develop my algebraic skills*.", and "*I get a great deal of satisfaction out of solving an algebra problem.*". The rating scales used in this questionnaire were ranged from "1" for "strongly disagree" to "10" for "strongly agree".

Findings

Analysis of Students' Achievement in Algebraic Test

Finding: Research Question 1(a)

The following analyses were conducted to answer the following research question:

Research question 1(a): What is the level of students' achievement in algebra among male and female students?

Table 1

Descriptive statistics for algebraic test scores between gender

Gender	N	Mean	Std. Deviation
Male	92	47.03	22.096
Female	108	51.23	21.805
Total	200	49.30	21.984

Maximum score of the test: 100

Table 1 shows the mean algebraic test scores for males and females are 47.03 and 51.23, respectively, with an overall mean of 49.30 and a standard deviation of 21.984. This suggests that female students performed slightly better than male students on the algebra test, averaging 51.23 percent compared to 47.03 percent. The greater standard deviation of male students indicates that male students' algebra test scores were more dispersed than female students' scores.

Finding: Research Question 1(b)

The following analyses were conducted to answer the following research question:

Research question 1(b): Is there any significant difference in the algebraic achievement between male and female among Form Four students?

To investigate if there exist significant differences between these scores, an independent sample t-test was used.

The following hypotheses served as the foundation for the analysis:

Hypotheses:

Ho: There is no significant difference in the algebraic achievement between the male and female students.

H1: There is a significant difference in the algebraic achievement between the male and female students.

Table 2
t-test between the male and female students' scores in algebraic thinking test

	Gender	N	Mean	Std. Deviation	t	df	Sig. (2-tailed)
Score	Male	92	47.03	22.096	-1.349	198	.179
	Female	108	51.23	21.805			

Maximum test score: 100

To determine if there was a significant difference between the algebraic achievement of male and female students, an independent sample t-test was conducted, and the results are presented in Table 2. The t-test indicated that there was no statistically significant difference in algebraic achievement between the male and female students (t (198) = -1.349, p = 0.179), where the p value is more than alpha value, 0.05. Therefore, the null hypothesis was not rejected, suggesting that the abilities of female and male students in algebraic achievement were not different. This study found that there was no significant difference in the algebraic achievement between male and female of Form Four students. The results suggest that both male and female students have most likely similar abilities in this subject, and gender does not play a significant role in determining algebraic achievement.

Analysis of Students' Attitude towards Learning Algebra
Finding: Research Question 2(a)

The following analyses were conducted to answer the following research question:
Research question 2(a): What is the level of students' attitude (self-confidence, value, enjoyment, and motivation) towards learning algebra?

Table 3
Descriptive statistics of each dimension of attitudes

Dimensions	N	Mean	Std. Deviation
Confidence	200	5.25	2.859
Enjoyment	200	5.17	2.805
Value	200	5.77	2.809
Motivation	200	5.36	2.750
Total	200	5.39	2.806

Total maximum score: 10

Table 3 displays the mean scores that Form Four students who participated in this study rated for each aspect of how they felt about studying algebra. The overall descriptive statistics illustrate a moderate degree of attitude**,** in the dimensions of confidence, enjoyment, value and motivation towards algebra. Among these dimensions, "value" is slightly higher compared to other dimensions and "enjoyment" towards algebra being the lower rating. The overall mean score of all dimensions is 5.39 (standard deviation = 2.806). The highest rating is "10" which indicated strongly agree, hence the respondents showed moderate agreement on their attitudes towards learning.

Finding: Research Question 2(b)

The following analyses were conducted to answer the following research question:

Research question 2(b): Is there any significant difference in students' attitude towards learning algebra between male and female among Form Four students?

To investigate if there exist significant differences between these scores, an independent sample t-test was used.

The following hypotheses served as the foundation for the analysis:

Hypotheses:

Ho: There is no significant difference in students' attitude towards learning algebra between male and female among Form Four students.

H1: There is a significant difference in students' attitude towards learning algebra between male and female among Form Four students.

Table 4

t-test between male and female students' scores in attitude towards algebra

	Gender	N	Mean	Std. Deviation	t	df	Sig. (2-tailed)
Attitude	Male	92	5.4004	1.6394	-.847	198	.398
	Female	108	5.6953	2.9764			

This study examined any difference in attitudes towards learning algebra between male and female students. The findings indicated that the female students had a slightly more positive attitude towards algebra (M = 5.6953, SD = 2.9764) than the male students (M = 5.4004, SD = 1.6394). Nevertheless, the independent sample t-test in Table 4 indicates that there was no significant difference in the attitudes of female and male students towards algebra. Therefore, the null hypothesis was not rejected. These findings suggest that, on average, female students did not significantly show a significantly more positive attitude towards algebra than male students. This has important implications for educators, as it highlights the need to foster a positive attitude towards mathematics and algebra among all students, regardless of their gender.

The Relationship between Algebraic Achievement and Attitude towards Algebra

Finding: Research Question 3

The following analyses were conducted to answer the following research question:

Research question 3: Is there any significant relationship between students' algebraic achievement and attitude towards learning algebra among Form Four students?

Ho: There is no significant relationship between students' algebraic achievement and attitude towards learning algebra among Form Four students.

H_1: There is a significant relationship between students' algebraic achievement and attitude towards learning algebra among Form Four students.

Table 5
Pearson correlation analysis between students' algebraic achievement scores and attitude towards learning algebra among Form Four students

		Score	Attitude
Score	Pearson Correlation	1	.273**
	Sig. (2-tailed)		.000
	N	200	200
Attitude	Pearson Correlation	.273**	1
	Sig. (2-tailed)	.000	
	N	200	200

**. Correlation is significant at the 0.01 level (2-tailed).

The findings (Table 5) suggest that there was a significant relationship between students' algebraic achievement scores and their attitude towards learning algebra. The Pearson product correlation analysis showed a low positive correlation between the two variables, which was statistically significant (r = 0.273, p-value = .000). This means that improving one's attitude towards learning algebra can lead to higher algebraic achievement scores.

To further explore the relationship between the two variables, a regression analysis was conducted. The results in Table 6 show that the attitude towards learning algebra significantly predicted algebraic achievement scores (F = 15.898, p=0.000).

Table 6
ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	7148.616	1	7148.616	15.898	.000[b]
	Residual	89031.384	198	449.653		
	Total	96180.000	199			

a. Dependent Variable: Algebraic achievement

b. Predictors: (Constant), Attitude

The R^2 value (Table 7) of 0.074 indicated that 7.4% of the variance in algebraic achievement scores was explained by attitude towards learning algebra.

Table 7
Regression analysis between students' algebraic achievement and attitude towards learning algebra among Form Four students

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.273[a]	.074	.070	21.205

a. Predictors: (Constant), Attitude

Moreover, the regression coefficient (Table 8) for attitude towards learning algebra was 2.444, indicating that for every unit increase in attitude scores, there was a 2.444-point increase in algebraic achievement scores. This coefficient was statistically significant (t = 3.987, p = .00), indicating that attitude towards learning algebra had a positive impact on students' algebraic achievement

Table 8
Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	35.712	3.723		9.592	.000
	Attitude	2.444	.613	.273	3.987	.000

a. Dependent Variable: Algebraic achievement

Overall, these findings suggest that improving students' attitude towards learning algebra could lead to higher algebraic achievement scores. However, it is important to note that attitude towards learning algebra explained only a small portion of the variation in algebraic achievement scores.

Discussion and Conclusion

Descriptively, the findings suggest that female students performed slightly better than male students on the algebra test, but the difference was not significant. But the finding showed that there was no significant difference in algebraic performance between male and female students. This result was consistent with previous research and suggested that both male and female students have similar potential to excel in math (Else-Quest, Hyde, & Linn, 2010; Hyde, 2014; Stoet & Geary, 2018). Particularly, learning algebra and solving algebraic questions would remain difficult and challenging if students held negative attitudes. Nevertheless, recent studies have continued to report mixed results. It was reported that female students tended to outperform male students in high school and college (Hyde et al., 1990). These findings suggested that gender differences in math performance may vary across different contexts and cultures, as shared in empirical data (Pina et al., 2021; Ullah, 2019). It is important to note that gender is just one of many factors that can influence math performance, and educators should focus on addressing all factors that may contribute to disparities in math achievement.

The moderate levels of confidence, enjoyment, and motivation to learn algebra among Form Four students suggested that there was room for improvement in these areas. Research has shown that improving students' attitudes towards math and increasing their motivation can lead to improved math performance (Hwang & Son, 2021; Fonseca, 2012). Motivation is also a significant factor in explaining why females outperform males in mathematics (Volchok, 2019). Hence, it revealed that even though there was no significant difference in attitudes between male and female students, continuing to give motivation to students eased their positive perception of difficult procedures in mathematics. Therefore, educators should consider strategies to enhance students' confidence, enjoyment, and motivation to learn algebra. The finding that there was no significant difference in attitudes

towards algebra between male and female students suggests that both genders need to be targeted equally when promoting a positive attitude towards math.

Nevertheless, the significant correlation between algebraic achievement and attitudes highlights the importance of fostering positive attitudes towards math to support student success in this subject. This finding is consistent with previous research indicating that a positive attitude towards math is a critical factor in improving math achievement. Therefore, educators should consider strategies to promote a positive attitude towards math, such as emphasizing the relevance of math to students' daily lives, providing opportunities for hands-on learning, and celebrating student successes in math.

Conclusion

By addressing students' attitudes towards math and promoting a growth mindset, educators can support all students in achieving their full potential in algebra and other math subjects. Theoretically, fostering a positive attitude towards math is critical for improving math achievement and educators should focus on strategies to promote a positive attitude towards math among all students.

Acknowledgement

The authors gratefully acknowledge the generous financial support provided by the Faculty of Education at Universiti Teknologi MARA (UiTM), which has contributed to the publication of this study.

Corresponding Author

Teoh Sian Hoon, Faculty of Education, Universiti Teknologi MARA (UiTM), Malaysia.
Email: teohsian@uitm.edu.my

References

Arnawa, I. M., Yanita, Y., Yerizon, Y., Ginting, B., & Nita, S. (2021). Does The Use of APOS Theory Promote Students' Achievement in Elementary Linear Algebra? *International Journal of Instruction*, *14*(3), 175–186. https://doi.org/10.29333/iji.2021.14310a

Bergstra, J. A., Ponse, A., & Smolka, S. A. (Eds.). (2001). *Handbook of Process Algebra*. Elsevier. https://doi.org/10.1016/B978-0-444-82830-9.X5017-6

Bicer, A., & Capraro, R. M. (2019). Mathematics achievement in the secondary high school context of STEM and non-STEM schools. *School Science and Mathematics*, *119*(2), 61–71. https://doi.org/10.1111/ssm.12321

Cabrera, F. R. (2017). Outcomes-Based Education (OBE): Its Effect to the Mathematics Performance, Mathematics Skills and Attitudes Towards Mathematics of the BSCS Students. *Advanced Science Letters*, *23*(2), 1081–1084. https://doi.org/10.1166/asl.2017.7502

Dowker, A., Sarkar, A., & Looi, C. Y. (2016). Mathematics Anxiety: What Have We Learned in 60 Years? *Frontiers in Psychology*, *7*. https://doi.org/10.3389/fpsyg.2016.00508

Esperanza, P., Fabian, K., & Toto, C. (2016). *Flipped Classroom Model: Effects on Performance, Attitudes and Perceptions in High School Algebra* (pp. 85–97). https://doi.org/10.1007/978-3-319-45153-4_7

Fonseca, J. R. S. (2012). Students' Attitudes Toward Math Learning. In *Encyclopedia of the Sciences of Learning* (pp. 3214–3219). Springer US. https://doi.org/10.1007/978-1-4419-1428-6_1078

Grønmo, L.S. (2018). The Role of Algebra in School Mathematics. In: Kaiser, G., Forgasz, H., Graven, M., Kuzniak, A., Simmt, E., Xu, B. (eds) Invited Lectures from the 13th International Congress on Mathematical Education. ICME-13 Monographs. Springer, Cham. https://doi.org/10.1007/978-3-319-72170-5_11

Gunawardena, E. (2011). *Secondary school students' misconceptions in algebra (Doctoral Thesis)*. https://tspace.library.utoronto.ca/handle/1807/29712

Hunter, J. (2014). Developing learning environments which support early algebraic reasoning: a case from a New Zealand primary classroom. *Mathematics Education Research Journal*, *26*(4), 659–682. https://doi.org/10.1007/s13394-013-0093-4

Hwang, S., & Son, T. (2021). Students' Attitude toward Mathematics and its Relationship with Mathematics Achievement. *Journal of Education and E-Learning Research*, *8*(3), 272–280. https://doi.org/10.20448/journal.509.2021.83.272.280

Hyde, J. S., Fennema, E., & Lamon, S. J. (1990). Gender differences in mathematics performance: A meta-analysis. *Psychological Bulletin*, *107*(2), 139–155. https://doi.org/10.1037/0033-2909.107.2.139

Kunhertanti, K., & Santosa, R. H. (2018). The Influence of Students' Self Confidence on Mathematics Learning Achievement. *Journal of Physics: Conference Series*, *1097*, 012126. https://doi.org/10.1088/1742-6596/1097/1/012126

Leite, W. L., Xing, W., Fish, G., & Li, C. (2022). Teacher strategies to use virtual learning environments to facilitate algebra learning during school closures. *Journal of Research on Technology in Education*, 1–15. https://doi.org/10.1080/15391523.2022.2110335

Li, Q., Cho, H., Cosso, J., & Maeda, Y. (2021). Relations Between Students' Mathematics Anxiety and Motivation to Learn Mathematics: a Meta-Analysis. *Educational Psychology Review*, *33*(3), 1017–1049. https://doi.org/10.1007/s10648-020-09589-z

Mullen, J. (2022). Subtracting Barriers to Multiply College Algebra Success Rates. *Tech from the Heart*. https://www.insight.com/en_US/content-and-resources/tech-journal/winter-2022/tech-from-the-heart-subtracting-barriers-to-multiply-college-algebra-success-rates.html

Mulligan, J., & Mitchelmore, M. (2009). Awareness of pattern and structure in early mathematical development. *Mathematics Education Research Journal*, *21*(2), 33–49. https://doi.org/10.1007/BF03217544

Mustaffa, N., Said, M. N. H. M., Ismail, Z., & Tasir, Z. (2018). Framework of Integrating Algebraic Thinking in Problem-Based Learning via Online Environment for School Students. *2018 IEEE International Conference on Teaching, Assessment, and Learning for Engineering (TALE)*, 372–378. https://doi.org/10.1109/TALE.2018.8615390

Ovez, F. T. D., & Uyangor, S. M. (2012). Evaluation of 12th Grade of Secondary Mathematics Curriculum: Algebra Learning Domain. *Procedia - Social and Behavioral Sciences*, *46*, 2156–2162. https://doi.org/10.1016/j.sbspro.2012.05.445

Pina, V., Martella, D., Chacón-Moscoso, S., Saracostti, M., & Fenollar-Cortés, J. (2021). Gender-Based Performance in Mathematical Facts and Calculations in Two Elementary School Samples From Chile and Spain: An Exploratory Study. *Frontiers in Psychology*, *12*. https://doi.org/10.3389/fpsyg.2021.703580

Rabab'h, B. S. H., Veloo, A., & Perumal, S. (2015). *The role of difficulty and gender in numbers, algebra, geometry and mathematics achievement*. 050076. https://doi.org/10.1063/1.4915709

Rach, S. (2023). Motivational states in an undergraduate mathematics course: relations between facets of individual interest, task values, basic needs, and effort. *ZDM –*

Mathematics Education, *55*(2), 461–476. https://doi.org/10.1007/s11858-022-01406-x

Singh, G., Tuli, N., & Mantri, A. (2021). Issues and Challenges in Learning Foundation Linear Algebra Course with Technology: A Literature Review. *2021 International Conference on Advance Computing and Innovative Technologies in Engineering, ICACITE 2021*, 860–865. https://doi.org/10.1109/ICACITE51222.2021.9404699

Tapia, M., & Marsh, G. E. (2004). An Instrument to Measure Mathematics Attitudes. Academic Exchange Quarterly.

Ullah, R. (2019). Boys versus girls' educational performance: Empirical evidences from global north and global south. *African Educational Research Journal*, *7*(4), 163–167. https://doi.org/10.30918/AERJ.74.19.036

Volchok, E. (2019). Differences in the Performance of Male and Female Students in Partially Online Courses at a Community College. *Community College Journal of Research and Practice*, *43*(12), 904–920. https://doi.org/10.1080/10668926.2018.1556134