# Investigating the Impacts of a Semester Long Growth Mindset Intervention on Students' Academic Success in a Human Anatomy Course

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## Abstract

Human anatomy and physiology are challenging courses for many undergraduate students often leading to low rates of academic success and persistence. Implementation of growth mindset strategies has shown promise in improving academic success in challenging courses; however, few studies have focused specifically on anatomy and physiology courses. To investigate the impact of growth mindset interventions on academic success, lab sections of a human anatomy course were randomly assigned to an intervention or control group. Five growth mindset interventions were integrated into course material for the intervention group at multiple points over the course of the semester. Performance on quizzes and exams, and overall academic success were compared between the groups. The intervention group increased scores in their growth mindsets and performance on low-stake assessments. There was no difference between performance on high-stake assessments and overall academic success. Potential future studies should focus on understanding the impacts this intervention has on specific participant demographics. https://doi.org/10.21692/haps.2021.032

**Key words:** mindset, academic success, anatomy

## Introduction

Retention and persistence of students at the college level has become a concern nationwide. In fact, a staggering 40 percent of students who start at a four-year college fail to earn a degree after six years (Hussar et al. 2020). Many factors play into students persisting to graduation with an emphasis in recent years being placed on non-cognitive factors, such as student motivation and beliefs about themselves, versus cognitive factors such as intelligence (Dweck et al. 2014). The summation of non-cognitive factors that lead to persistence is called academic integrity and it can promote long-term learning and achievement.

One model of academic integrity that focuses on non-cognitive factors is the Theory of Action model (Snipes et al. 2012). This model describes relationships between academic mindsets, academic behaviors and learning strategies, and learning and academic outcomes. Our current study focuses on the mindset component of this theory, and specifically utilizes Dweck's growth mindset model (Dweck 2008). This model originally categorized students' mindset into two categories: a fixed mindset or a growth mindset but this dichotomy was later revised into a spectrum where individuals can hold aspects of both types of mindset with one being more prominent that the other (Dweck 2015). In general, students who hold a fixed mindset view intelligence as a fixed quantity they possess, while students who hold a growth mindset view intelligence as a malleable quantity that can be increased with effort.

Research (Heikkilä et al. 2011; Yeager and Walton 2011) suggests that students who hold growth mindsets when presented with a challenging course will succeed more often when compared to students with a fixed mindset because they incorporate the ideals of grit (Duckworth et al. 2007) and hope (Snyder et al. 2002). Grit refers to the determination of a student to stay focused and succeed when faced with adversity. Hope or hopeful thinkers (Snyder et al. 2003) are people who can establish clear goals, find multiple paths to their desired outcome, and persevere when faced with adversity. In summary, students who exhibit grit, have a growth mindset, and are hopeful thinkers will develop multiple pathways to success in the face of adversity and will know that their effort is more important than their intelligence since they will learn more from concepts that are more challenging.

Much of the research utilizing growth mindset interventions have focused on K–12 education with high degrees of success (Andersen and Nielsen 2016; Blackwell et al. 2007; Dweck 2008; Dweck et al. 2014). Sisk et al. (2018) conducted a set of meta-analyses, one focused on pre-existing mindsets and their effect on academic achievement, and the other focused on mindset interventions and academic outcomes. The meta-analysis that focused on interventions (n=29) found that 12% of the studies showed a positive effect from the mindset interventions while 86% showed no effect and 2% showed a negative effect.

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At the post-secondary level, growth mindset studies demonstrated similar success rates as compared to K–12 education. There are varying degrees of success with some studies showing positive effects of growth mindset interventions (Cavanagh et al. 2018; Lisberg and Woods 2018; Nallapothula et al. 2020) while other showed little to no effect (Brez et al. 2020; Sisk et al. 2018). A recent study focusing specifically on STEM disciplines, however, had promising results. Hacisalihoglu and colleagues (2020) found that freshmen STEM students enrolled in a course that introduced the concept of a growth mindset had significantly higher growth mindset scores and semester GPAs during their first two semesters compared to students who were not enrolled in the course.

The interventions used to facilitate changes in students' growth mindset vary widely in the literature base with no common implementation style. Blackwell et al. (2007) used an eight-session workshop to introduce middle school students to the notion of the brain being malleable and saw increases in their math achievement. Aronson et al. (2002) implemented a "pen pal" writing exercise where older students wrote to middle school age children describing how intelligence is malleable. At the end of the academic year, they found that GPAs rose for student who received the letter compared to students who did not.

One course sequence where college students can face adversity is anatomy and physiology (Higgins-Opitz and Tufts 2014; Michael 2007; Vitali et al. 2020). The national average failure rate for this course is over 50 percent for first-time enrolled students (Hopper 2011). Students who do poorly in a challenging course may subsequently change majors or fail to enroll in successive semesters. Several studies have shown that academic success in basic science courses, of which human anatomy and physiology courses are part, is correlated with several factors such as increased GPA and early success in nursing programs (Anderton et al. 2016; Lewis and Lewis 2000; Wolkowitz and Kelley 2010; Wong and Wong 1999). Interestingly, the literature base is lacking studies investigating the use of growth mindset interventions and academic success specifically in human anatomy and physiology courses.

The purpose of this study was to investigate the impact of a semester long growth mindset intervention on students' academic success in a large lecture human anatomy course. Specifically, the research questions were:

1) Does involvement in the intervention cause a change in the students' mindset?
2) Does the involvement in a growth mindset intervention cause a difference in student performance compared to students who do not participate?
3) How does involvement in growth mindset interventions affect academic success between students who participate and those who do not?

For the purposes of this study, student performance was defined as scoring higher on assessments while academic success was defined as earning a C in Human Anatomy. This threshold was used because multiple programs who utilize this course in their degree program require at least C to graduate.

## Methods

*Ethical Research Statement*

The research protocol and its amendments were approved by the Institutional Review Board of the University of Central Missouri (UCM IRB 1253). The researchers involved in the study were trained through the Collaborative Institutional Training Initiative (CITI). Data collection and analysis followed all guidelines of IRB and CITI.

*Study Context and Data Collection*

The study took place during the 2019 spring and fall semesters of University of Central Missouri's human anatomy course. This is a one semester course and consists of one 50-minute lecture and two 110-minute laboratory sessions each week. The lab sections (n = 7) of the course were randomly assigned to either a control group (n = 3) or an intervention group (n = 4). All lab sections, regardless of assignment, were taught by the same faculty member, used all the same course materials, and were assessed in the same way.

In general, the first lab of the week was an instructional lab with the second lab being a recitation lab. The instructional labs had an initial teaching period of 20–45 minutes. The recitation labs provided students with student-centered activities to reinforce the content introduced during the prior instructional lab. The only difference between the groups was that the intervention group took part in five growth mindset focused interventions during the lab periods over the course of the 16-week semester.

The assessments for the course included thirteen low-stake weekly lecture quizzes, four practical exams, and a comprehensive lecture final exam. Each practical exam consisted of 100 short answer identification questions over the course content for the unit. The lecture quizzes consisted of multiple-choice questions answered through a clicker student response system at the start of each lecture. The total number of questions and point value varied per quiz depending on the amount of material covered in the previous lecture. The comprehensive lecture exam consisted of 100 multiple choice questions worth 1.25 points each.

*Growth Mindset Interventions*

The five growth mindset interventions were delivered at the beginning of one of the labs for the week. A timeline for the implementation and corresponding assessments can be found in Table 1.

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| Intervention | Approximate duration of intervention (minutes) | Implementation | Assessments taken during intervention |
|---|---|---|---|
| 1 | 7–10 | Week 1: First day of lab | N/A |
| 2 | 25 | Week 1: Next lab period | Quiz 1–3, Practical 1 |
| 3 | 5–10 | Week 4: Lab following practical 1) | Quiz 4–8, Practical 2 |
| 4 | 5–10 | Week 9: Prior to last day to drop | Quiz 9–13, Practical 3 |
| 5 | 5–15 | Week 15: Last day of lab | Practical 4, Lecture Final |

***Table 1.*** *Intervention and assessment timeline.*

The first intervention consisted of students taking an adapted version of Dweck's Mindset Instrument (DMI) to identify their initial mindset, and a set of videos and readings to introduce students to the concept of neuroplasticity and academic success. The growth mindset quiz (Diehl 2008) is based on the DMI which has a high reliability (α = 0.94–0.98). It consists of a set of 20 questions that places the student's mindset into one of four categories: a strong fixed mindset (0–20), a fixed mindset with some growth ideas (21–33), a growth mindset with some fixed ideas (34–44), and a strong growth mindset (45–60 points). In general, a higher score indicates a tendency for a growth mindset while a lower score indicates a more fixed mindset.

The second intervention began with a short lecture to formally introduce them to the ideas of hope and a growth mindset. Throughout this lecture, students completed a worksheet with course goals and "I will" statements (Appendix 1) to help them succeed in the course. These goals and statements formed the basis for implementing a plan to succeed in the course. Students also identified course "accountability partners" that they shared these statements with, in order to increase their own accountability in the course. In most cases, students within their lab group were identified as an accountability partner.

The third intervention charged the students with discussing and reflecting on their progress towards their course goals and "I will" statements. This was done in conjunction with their accountability partner to increase their buy in and to develop multiple pathways of success toward their goals. During these discussions each student identified study methods and course concepts where improvement was being made as well as ineffective study methods or particularly difficult course concepts. These discussions culminated in developing a modified pathway for continuing to meet their course goals.

The fourth intervention was similar to the third intervention except students shared their progress with the entire class instead of their accountability partner. This enabled a much broader perspective on how they would reach their goals and stay motived in the course. The final intervention had students reflect on their progress during the semester and completing the DMI again. A worksheet with six open ended questions was administered to facilitate reflection. These questions focused on identifying their motivations in the course, ways they overcame obstacles in the course, and advice for future students in the course. For specific intervention documents and detailed instructions see https://tinyurl.com/2p9cfdxe.

*Data Analysis*

To assess if involvement in an intervention caused a change in student growth mindset, DMI scores were evaluated using a linear-mixed effect model. Fixed effects included assessment period pre-intervention or post-intervention, the treatment type (growth mindset or control), and the interaction between assessment period and treatment type. Since each student completed the DMI twice, a categorical variable considering each participant was included as a random effect within the model. Measures of variance and covariance were estimated using restricted maximum likelihood and degrees of freedom for each fixed effect were calculated using Satterthwaite approximation.

To determine if the involvement in growth mindset interventions caused a difference in student performance, course assessments were evaluated using linear mixed-effect models. Assessments were separated into low- (quiz) and high-stake (practical and final exam) methods of evaluation. Since growth mindset interventions were not distributed evenly throughout the semester, some intervention periods included multiple assessments that were worth varying point values. To allow for comparability of assessment scores across intervention periods, assessment totals were converted into proportions ranging from 0 to 1 by summing student scores and dividing by the total number of available points, within an intervention period.

Both low- and high-stake assessments were negatively skewed and were subsequently arcsine transformed to meet the assumption of normality for further analyses. Treatment type (growth mindset or control) and intervention period were treated as categorical variables and considered as additive fixed effects in each model. Participant number was

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considered as a random effect. Coefficient estimates for the transformed data were subsequently back transformed and estimates were considered as proportions of correct answers provided by students at each intervention period.

To investigate if involvement in growth mindset interventions influenced academic success, course passing rates were evaluated using logistic regression. Student success was treated as binomial variable (1 = achieved a C or higher, 0 = achieved a D or lower) while treatment type (growth mindset or control) was treated as a categorical variable in the model. All data, within this study, were analyzed in R version 4.0.5 using a confidence interval of 95% and a significance level of 0.05.

## Results

*Study Population*

In total, 111 students completed human anatomy during the spring and fall semesters of 2019. Individuals in the control group (n = 63) and growth mindset treatment group (n = 48) were representative of the student body that typically complete this course. Both control and treatment groups were predominantly comprised of female students (n = 58, n = 35, respectively) as compared to male students (n = 5, n = 13, respectively). Both groups were also predominantly composed of Caucasian-American students (n = 46, n = 36, respectively) as compared to other ethnicities and nationalities (n = 17, n = 12, respectively). Disparity in total number of students in each group are attributed to two IRB guidelines: 1) the voluntary nature of the study; and 2) no compensation (i.e., extra credit) being offered for participation.

Results for the DMI analysis demonstrated a marginally significant interaction between treatment type and the DMI testing period ($t_{109} = 1.96$, $P = 0.05$). There was no difference in DMI scores between the growth mindset and control group during the pretest (average = 40.5 and 40.3, respectively); however, there was a marginal difference between the two treatments during the posttest (average = 42.7 and 40.3, respectively). The average value for each group fell into Dweck's "growth mindset with some fixed ideas" category, however, an assessment of the 95% confidence intervals demonstrated that the growth mindset posttest DMI scores also fell into Dweck's "strong growth mindset" score range (see Fig 1.).

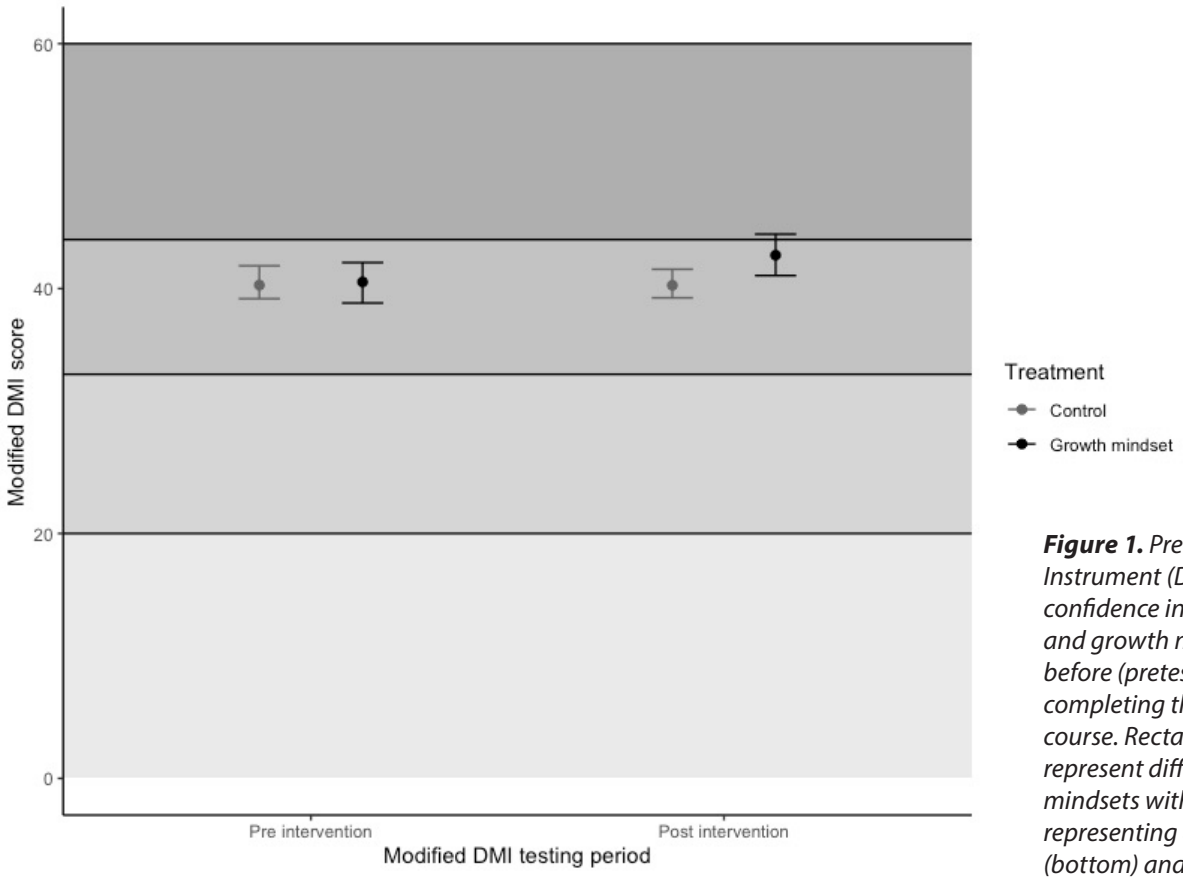


***Figure 1.*** *Predicted Dweck Mindset Instrument (DMI) scores with 95% confidence intervals for control and growth mindset students before (pretest) and after (posttest) completing the Human Anatomy course. Rectangular shadings represent different levels of growth mindsets with the lightest rectangle representing a strong fixed mindset (bottom) and the darkest rectangle representing a strong growth mindset (top).*

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For the low-stake assessments, quiz scores significantly increased after each successive intervention period regardless of whether a student was in the control or treatment group (period 2 to 3, $t_{220} = 8.81$, $P < 0.001$; period 3 to 4, $t_{220} = 2.14$, $P = 0.03$). When holding the intervention period constant, the growth mindset treatment significantly increased quiz scores as compared to the control group $t_{109} = 2.15$, $P = 0.03$. Back transformation of the predicted values at each intervention period revealed that growth mindset intervention significantly improved average quiz scores by 5.1 points during intervention period 2 (66.8 and 61.7, respectively), by 4.5 points during intervention period 3 (78.5 and 74.0, respectively), and by 4.3 points during intervention period 4 (81.1 and 76.8, respectively; Figure 2). The marginal coefficient of determination demonstrated that the intervention period and treatment alone explained 19% of the variation in quiz scores. The conditional coefficient of determination demonstrated that inclusion of the random effect increased the amount of variation explained by the model to 59%.

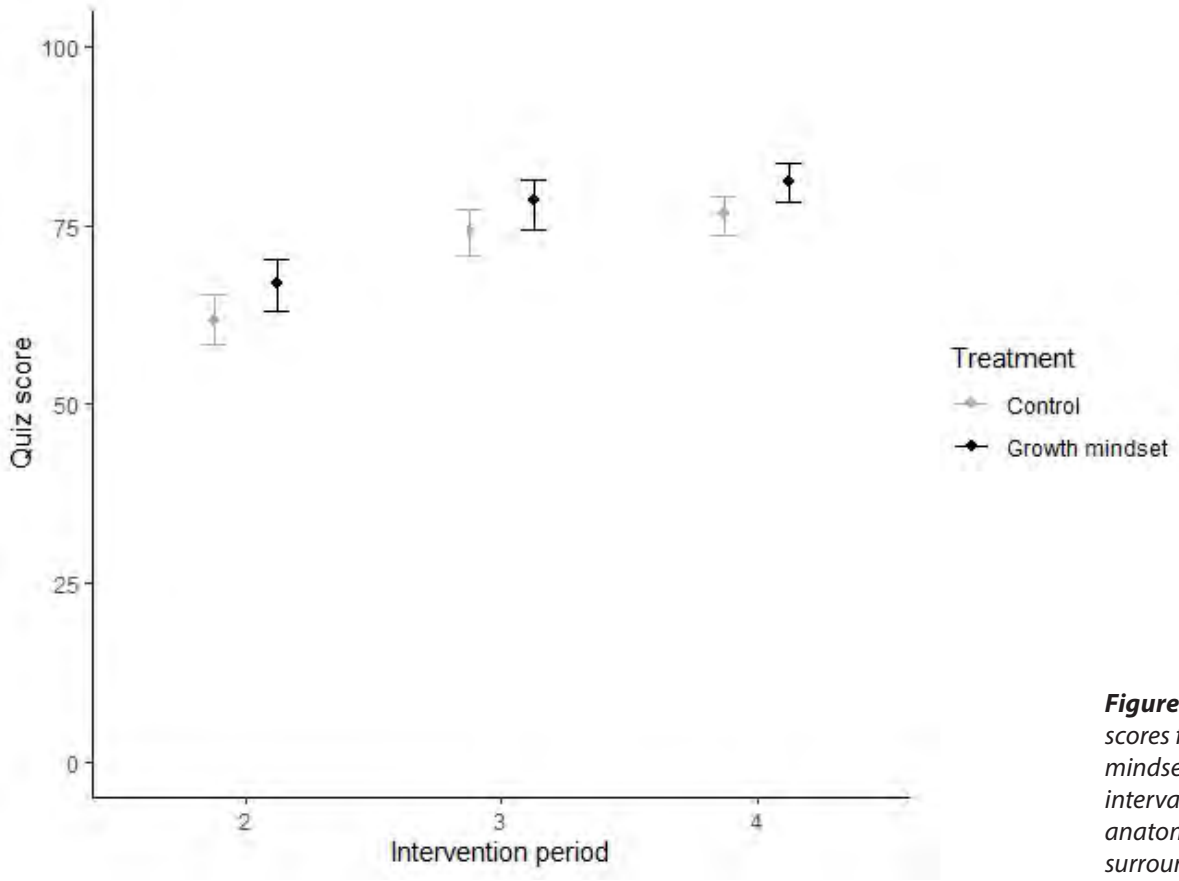


***Figure 2.*** *Predicted quiz scores for control and growth mindset students at three intervals within a human anatomy course. Bars surrounding the dots represent the 95% confidence interval for quiz scores.*

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For the high-stake assessments, average practical scores increased significantly between intervention period 2 to 3 (exam 1 and 2), $t_{330} = 11.84$, $P < 0.001$, with no significant change in practical scores thereafter (period 3 to 4, $t_{330} = 1.28$, $P = 0.20$; period 3 to 5, $t_{330} = 0.83$, $P = 0.41$). When holding the intervention period constant, the growth mindset treatment did not significantly increase practical scores as compared to the control group $t_{109} = 0.77$, $P = 0.44$. Back transformation of the predicted values at each intervention period revealed that growth mindset intervention marginally improved average practical scores by 2.4 points during intervention period 2 (65.2 and 62.8, respectively), by 2.1 points during intervention period 3 (79.4 and 77.3, respectively), by 2.0 points during intervention period 4 (80.7 and 78.7, respectively), and by 2.1 points during intervention period 5 (80.2 and 78.2, respectively, Fig 3.). When considering the fixed effects treatment type and intervention period alone, 13% of the variation in test scores were explained by the model. Inclusion of the random effect increased the amount of variation explained by the model to 76%.

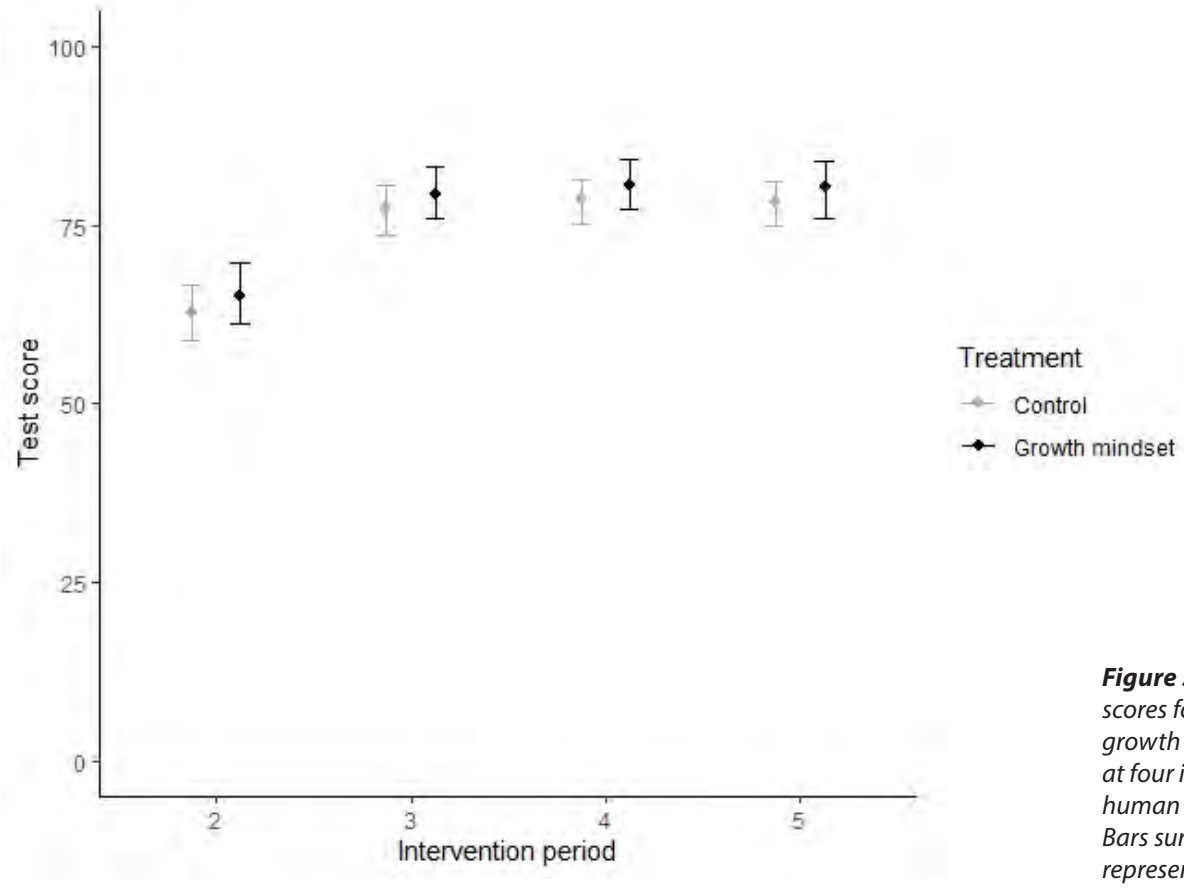


***Figure 3.*** *Predicted practical scores for control and growth mindset students at four intervals within a human anatomy course. Bars surrounding the dots represent the 95% confidence interval for practical scores.*

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The logistic regression assessing impacts of the growth mindset intervention on academic success demonstrated no significant difference between the growth mindset and control group ($z_{110} = 0.73$, $P = 0.47$). Both groups had a similar probability of achieving a C or higher in the class (92% and 87%, respectively).

## Discussion

The results of the current study support findings from previous studies that growth mindset interventions have varying levels of success at the college level (Sisk et al. 2018). The interventions in this study did show the ability to increase the mindset of participants just as Hacisalihoglu et al. (2020) found using the same instrument. However, the participants in their study were enrolled in a semester long course specifically designed to teach about growth mindset. The current study utilized five, low time commitment interventions to achieve comparable results. These findings could be quite attractive to instructors who do not want to create an entirely new course or use an exceedingly large amount of instructional time to implement a learning intervention. In total, a minimum of 45 minutes, with the majority dedicated to intervention 2, would need to be dedicated during the entire semester to modify mindsets.

Differences in students' performance were seen between the two groups on some assessments. The highest level of success for the growth mindset treatment group was seen in the low stakes assessments yet this success did not translate to improved outcomes on high stakes assessments. These results are consistent with work published by Reuter and colleagues (2021) where students saw highest level of success on low stakes assessments but not on high stakes assessments when utilizing a mindfulness intervention instead of a growth mindset intervention. It is promising that the growth mindset group scored higher on low-stake assessments than the control and showed a trend toward improved outcomes on the high-stakes, recognizing that the results were not statistically significant for the latter.

Additionally, regardless of group assignment, all students in the study achieved increases in their quiz scores over the duration of the semester. Anecdotally this could be attributed to students not preparing adequately at the beginning of the semester but developing better study methods or increasing their study time to succeed in the course as the semester progressed. Farkas et al. (2016) found a significant correlation with the amount of time students studied and their success in an anatomy and physiology course.

Unfortunately, the increases in scores on the low-stake assessments did not translate into differences in success between groups in the course. There are two possible explanations for this outcome. The scores on the low-stake assessments made up the minority of points (~25%) in the overall course grade. If a student underperformed on the high-stakes assessments, performance on low-stake assessments could be overshadowed by total course points. Secondly, most participants in the study succeeded in the course. Only 8% of the growth mindset group and 13% of the control group failed to succeed in the course. This is contrary to extant literature reporting high failure rates in anatomy and physiology (Hopper 2011). Indeed, the data for this study only included individuals who completed the course and does not represent individuals who withdrew from the course or did not volunteer for the study.

The linear-mixed effects models demonstrated that much of the variation within the dependent variables (assessment scores) was attributable to the participants themselves. Inclusion of the participant as a random effect increased the explanation of variation by 40% for low-stake assessments and by 63% for high-stake assessments. It is likely that some of the variance explained by the random effect could be attributed to measurable variables within each participant (e.g., sex, gender, nationality, and socioeconomic status). Future studies should focus on teasing out this variation to identify if and how the intervention could impact students based on demographic characteristics.

Within the experimental group, the study was limited to students who volunteered to participate in the growth mindset activities. The willingness to be part of extra activities, could, unintentionally, select for individual students who were seeking to achieve better scores within the class. A larger sample size would allow for deeper analysis of the data and the potential to investigate the impacts of the interventions on different demographic characteristics.

## Conclusion

The implementation of the growth mindset intervention is unique in that the intervention steps span the entire semester and does not represent a one-shot introduction at the beginning of the semester. The current study is one of the only studies to utilize this type of growth mindset intervention in a human anatomy course with the results showing promise for modifying student mindset towards a more growth mindset orientation and increasing student performance on some assessments. The overall increases in performance, ultimately, did not translate to a higher academic success compared to students in the control since there are other factors influencing academic success besides involvement in the interventions.

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## About the Authors

Parker Stuart is an assistant professor of biology and teaches an undergraduate human anatomy course to pre-health professions. He also teaches a general education A&P course. Daniel Wolcott is an assistant professor of biology and teaches courses in ecology and biostatistics. He contributed the statistical analysis for the study.

## Literature Cited

Andersen SC, Nielsen HS. 2016. Reading intervention with a growth mindset approach improves children's skills. *Proc Natl Acad Sci* 113(43):12111–12113. https://doi.org/10.1073/pnas.1607946113

Anderton RS, Evans T, Chivers P. 2016. Predicting academic success of health science students for first year anatomy and physiology. *Int J High Educ* 5(1):250-260. https://doi.org/10.5430/ijhe.v5n1p250

Aronson J, Fried CB, Good C. 2002. Reducing the effects of stereotype threat on African American college students by shaping theories of intelligence. *J Exp Soc Psychol* 38(2):113–125. https://doi.org/10.1006/jesp.2001.1491

Blackwell LS, Trzesniewski KH, Dweck CS. 2007. Implicit theories of intelligence predict achievement across an adolescent transition: A longitudinal study and an intervention. *Child Dev* 78(1):246–263. https://doi.org/10.1111/j.1467-8624.2007.00995.x

Brez C, Hampton EM, Behrendt L, Brown L, Powers J. 2020. Failure to replicate: Testing a growth mindset intervention for college student success. *Basic Appl Soc Psych* 42(6):460–468. https://doi.org/10.1080/01973533.2020.1806845

Cavanagh AJ, Chen X, Bathgate M, Frederick J, Hanauer DI, Graham MJ. 2018. Trust, growth mindset, and student commitment to active learning in a college science course. *CBE Life Sci Educ* 17(1):ar10. https://doi.org/10.1187/cbe.17-06-0107

Diehl E. 2008. Motivating Students with Mindset coaching and How Brains Work (Dweck). [accessed 2021 Aug 27]. https://classroom20.com/forum/topics/motivating-students-with

Duckworth AL, Peterson C, Matthews MD, Kelly DR. 2007. Grit: perseverance and passion for long-term goals. *J Pers Soc Psychol* 92(6):1087-1101. https://doi.org/10.1037/0022-3514.92.6.1087

Dweck CS. 2008. Mindset: The new psychology of success. Random House Digital, Inc.

Dweck CS. 2015. Carol Dweck revisits the growth mindset. *Educ Week* 35(5):20–24.

Dweck CS, Walton GM, Cohen GL. 2014. Academic tenacity: Mindsets and skills that promote long-term learning. Seattle (WA): Bill & Melinda Gates Foundation.

Farkas GJ, Mazurek E, Marone JR. 2016. Learning style versus time spent studying and career choice: Which is associated with success in a combined undergraduate anatomy and physiology course? *Anat Sci Educ* 9(2):121–131. https://doi.org/10.1002/ase.1563

Hacisalihoglu G, Stephens D, Stephens S, Johnson L, Edington M. 2020. Enhancing undergraduate student success in STEM fields through growth-mindset and grit. *Educ Sci* 10(10):279. https://doi.org/10.3390/educsci10100279

Heikkilä A, Niemivirta M, Nieminen J, Lonka K. 2011. Interrelations among university students' approaches to learning, regulation of learning, and cognitive and attributional strategies: a person oriented approach. *High Educ* 61(5):513–529. https://doi.org/10.1007/s10734-010-9346-2

Higgins-Opitz SB, Tufts M. 2014. Performance of first-year health sciences students in a large, diverse, multidisciplinary, first-semester, physiology service module. *Adv Physiol Educ* 38(2):161–169. https://doi.org/10.1152/advan.00067.2013

Hopper M. 2011. Student enrollment in a supplement course for anatomy and physiology results in improved retention and success. *J Coll Sci Teach* 40(3):70–79.

Hussar B, Zhang J, Hein S, Wang K, Roberts A, Cui J et al. 2020. The condition of education 2020. NCES 2020-144. Jessup (MD): National Center for Education Statistics.

Lewis C, Lewis JH. 2000. Predicting academic success of transfer nursing students. *J Nurs Educ* 39(5):234–236. https://doi.org/10.3928/0148-4834-20000501-10

Lisberg AE, Woods BC. 2018. Mentorship, mindset and learning strategies: An integrative approach to increasing underrepresented minority student retention in a STEM undergraduate program. *J STEM Educ* 19(3):14-20.

Michael J. 2007. What makes physiology hard for students to learn? Results of a faculty survey. *Adv Physiol Educ* 31(1):34–40. https://doi.org/10.1152/advan.00057.2006

Nallapothula D, Lozano JB, Han S, Herrera C, Sayson HW, Levis-Fitzgerald M, Maloy J. 2020. M-LoCUS: A scalable intervention enhances growth mindset and internal locus of control in undergraduate students in STEM. *J Microbiol Biol Educ* 21(2):30. https://doi.org/10.1128/jmbe.v21i2.1987

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Reuter P, Sillevis R, Weiss V. 2021. Can mindfulness practice improve short-term retention in a science course? *HAPS Educ* 25(1):7–12. https://doi.org/10.21692/haps.2021.001

Sisk VF, Burgoyne AP, Sun J, Butler JL, Macnamara BN. 2018. To what extent and under which circumstances are growth mind-sets important to academic achievement? Two meta-analyses. *Psychol Sci* 29(4):549–571. https://doi.org/10.1177%2F0956797617739704

Snipes J, Fancsali C, Stoker G. 2012. Student academic mindset interventions. A review of the current landscape. San Francisco (CA): Stupski Foundation.

Snyder CR, Lopez SJ, Shorey HS, Rand KL, Feldman DB. 2003. Hope theory, measurements, and applications to school psychology. *School Psychol Quart* 18(2):122. https://doi.org/10.1521/scpq.18.2.122.21854

Snyder CR, Parenteau SC, Shorey HS, Kahle KE, Berg C. 2002. Hope as the underlying process in the psychotherapeutic change process. *Int Gestalt J* 25(2):11–29.

Vitali J, Blackmore C, Mortazavi S, Anderton R. 2020. Tertiary anatomy and physiology, a barrier for student success. *Int J High Educ* 9(2):289–296. https://doi.org/10.5430/ijhe.v9n2p289

Wolkowitz AA, Kelley JA. 2010. Academic predictors of success in a nursing program. *J Nurs Educ* 49(9):498–503. https://doi.org/10.3928/01484834-20100524-09

Wong J, Wong S. 1999. Contribution of basic sciences to academic success in nursing education. *Int J Nurs Stud* 36(4):345–354. https://doi.org/10.1016/S0020-7489(99)00032-2

Yeager DS, Walton GM. 2011. Social-psychological interventions in education: They're not magic. *Rev Educ Res* 81(2):267–301. https://doi.org/10.3102%2F0034654311405999

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## APPENDIX

My Goals / "I Will" Plan

Name_____ Student ID_____ Class_____Date_____

**Goal Setting:** Setting goals helps keep you on track and motivated. For this activity, think about your goals for this class; anticipate obstacles blocking your goals; think about resources (both internal and external) to help you overcome the obstacles; and list them in the spaces provided below. Then, use these goals to stay on track during the semester.

**Growth Mindset Score** _____

**My Goal/Reason for Being in College:**

At UCM , I will complete a degree/certificate in _____ in _____ months/years with at least a _____ Grade Point Average. I will use the content I learn in college to help me _____ _____.

**My Goals for this Class:**

1. **I will** earn at least a _____ grade in this class.
   **I will** use the content and skills learned in class to prepare me for _____.
   **I will** spend at least _____ hours each week completing the work/studying for this class.
   **I will** visit the learning commons at least _____ times this semester.
   **I will** not miss more than _____ session(s) of this class this semester.
   **I will** …….
   **I will** ……..
2. In this class **I will** use what I have learned from past successes when struggling with obstacles. The personal qualities and external resources that have previously helped me succeed are:
   1.
   2.
   3.
   4.
   5.
3. I will use the resources listed below and/or visit with the individuals listed below for help, especially when I see indicators that I am struggling or losing motivation:
   1.
   2.
   3.
   4.
   5.
4. My class accountability partners are:_____and_____
   My personal accountability partners are:_____and_____
5. ***I will** place this in my notebook or textbook and review it weekly.

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