

Tailoring mindset interventions for first-generation college students: A cultural fit approach

Adriana L. Germano

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Sapna Cheryan

Stephanie Fryberg

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Adriana L. Germano

University of Washington

**Abstract**

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Adriana L. Germano

Chair of the Supervisory Committee:  
Sapna Cheryan, Associate Professor  
Department of Psychology

First-generation (FG) college students, students who are the first in their family to attend college, are more likely to face academic challenges relative to continuing-generation (CG) students. Growth mindset interventions, which commonly consist of motivating messages about growing students' brains and ultimately intelligence, may be one solution to bridging this achievement gap. However, research suggests that the culturally independent focus of these interventions (e.g., growing your intelligence helps *you to reach your goals*) may undermine their full potential for FG students. FG students have culturally interdependent self-views, making them more likely to think about educational goals within the context of family and community, rather than individualism. Across two studies, we tested whether an interpedently tailored cultural growth mindset intervention (e.g. growing your intelligence *helps you to help your people*) would yield increased academic persistence in FG students, relative to a classic growth mindset intervention. Findings between Studies 1 and 2 were mixed. In Study 1 we found that a culturally tailored mindset intervention was marginally better than a classic mindset intervention in improving FG students' academic persistence. However, in Study 2, we found no effect of either intervention in improving FG students' academic persistence. Both studies demonstrate that there is still more to learn in regard to tailoring academic interventions. These studies provide a first step in understanding how to better tailor growth mindset interventions to FG students.

*Keywords:* culture, first-generation college students, growth mindset interventions

## Tailoring Mindset Interventions for First-Generation College Students: A Cultural Fit Approach

“Why is the [college] dropout rate so high, particularly among first-generation students? ... First-generation students beat enormous odds by even enrolling in a four-year degree program. Yet 30 percent of first-generation freshmen drop out of school within three years. ... Helping students to enter college isn’t enough. For higher education to fulfill its promise as an engine of economic mobility, we need to get [first-generation] students across the finish line to graduation.”

— *The New York Times* (2016)

The academic challenge facing first-generation (FG) college students, students whose parents did not attend a four-year college or university, is not just how to get into college, but how to graduate from one. Throughout the U.S., FG students enroll in colleges and universities with the goal of obtaining a four-year degree, however once there, FG college students are much more likely to drop out compared to continuing-generation (CG) college students (Engle & Tinto, 2008; Pascarella, Pierson, Wolniak, & Terenzini, 2004). This dilemma poses the question: What specifically can be done to ensure that FG students are able to persist in college environments?

Psychological research on student achievement has established that the motivation to persist through academic challenges, whether that be college itself or the coursework within a “make it or break it” class, is not something students either have or don’t have, but is a mindset that can be developed (Dweck, 2006; Dweck, Chiu, & Hong, 1995). This line of research, known as *growth mindset theory*, has successfully shown that students’ mindsets regarding their academic abilities can be shaped through academic interventions. In these interventions students

are taught that intelligence and academic ability are not innate traits that only some students have, but can be “grown” through persistent and continued practice (Blackwell, Trzesniewski, & Dweck, 2007; Dweck, 2006; Paunesku et al., 2015; Yeager et al., 2016). With this research in mind, it is possible that the academic differences we see between FGs and CGs in their ability to make it through college is not due to something inherently different between both student groups, but may be due to how FG students perceive their ability to “grow” and improve their academic performance within the larger cultural context of higher education.

Increasing FG students’ perceptions of their ability to grow academically may be a key step in bridging academic gaps between FG and CG students. However, how to best deliver this message to FG students is less clear. Prior research exploring how cultural differences contribute to the college generational achievement gap has demonstrated that delivering academic messages in a culturally relevant format to FG students, where community is emphasized over individualism, can help to improve academic performance (Stephens, Fryberg, Markus, Johnson, & Covarrubias, 2012). This prompts the question: Will delivering an academic intervention aimed at increasing FG students’ mindsets regarding their ability to academically grow, in a culturally relevant format, help to close the gap between FG and CG students? To examine this question, we must first explore growth mindset theory.

### **Growth Mindset Theory**

At the core of growth mindset theory is the concept that intelligence and scholastic ability are not stable traits, but can be modified and enhanced through one’s experiences (Blackwell et al., 2007; Dweck, 2006; Dweck et al., 1995; Yeager & Dweck, 2012). This line of work has demonstrated that whether one views intelligence as a malleable or fixed trait can have enormous implications on one’s views of their abilities and academic outcomes (Martin, 2015). Students

who view intelligence as malleable, as opposed to fixed, demonstrate increased persistence with challenging tasks (Mueller & Dweck, 1998) and higher grade point averages (GPAs) (Blackwell et al., 2007; Paunesku et al., 2015; Yeager et al., 2016; Yeager & Dweck, 2012). This research has also importantly revealed that viewing intelligence as fixed is not a static belief. Using growth mindset interventions, individuals can be taught to view intelligence as a “grow-able” trait, shifting them away from fixed beliefs (Blackwell et al., 2007; Paunesku et al., 2015; Yeager et al., 2016; Yeager & Dweck, 2012).

For the past decade, growth mindset interventions have demonstrated great strides in augmenting student performance both in the short and long-term (Blackwell et al., 2007; Mueller & Dweck, 1998; Yeager & Dweck, 2012). In these interventions students learn that with practice and continued effort, they can grow their intelligence in any domain. This deceptively simple message has demonstrated the ability to greatly improve students’ perceptions of their own abilities and in improving student motivation during difficult academic transitions (Blackwell et al., 2007), an issue of particular relevance to FG students (Engle & Tinto, 2008; Pascarella et al., 2004).

### **Tailoring Growth Mindset Interventions for FG Students**

Given the unique challenges FG students face relative to CG students: increased difficulty transitioning to college environments (Engle & Tinto, 2008; Pascarella et al., 2004), lower grades, and a greater likelihood of attrition during the first three years of college (Engle & Tinto, 2008; Padgett, Johnson, & Pascarella, 2012; Pascarella et al., 2004), growth mindset interventions may be an optimal solution. Prior growth mindset research has established the benefits of these interventions in aiding at-risk student groups, particularly minority and low income students (Blackwell et al., 2007), however, whether FG students would experience the

benefits of a growth mindset intervention remains unexplored. With this in mind, we must first determine the efficacy of mindset interventions for FG students by closely examining their content and framing. Prior academic research examining the college generational achievement gap has established the significant role cultural differences play in perpetuating this gap (Stephens, Fryberg, Markus, et al., 2012). Keeping culture in mind when considering FG students is necessary.

### **Cultural Differences in College Generational Status**

Cultural research has demonstrated two methods in which the self can be conceptualized—either through *independence*, where the self is understood through its distinction from others, or *interdependence*, where the self is understood through its close connections and relationships with others (Markus & Kitayama, 1991). Whether one holds an independent or interdependent self-view largely depends on the cultural context they were reared in. Independence has been found to be the predominate self-view among Whites and CG college students and interdependence has been found to be most common among racial and ethnic minorities (e.g., Asian) and FG college students (Markus & Kitayama, 1991; Stephens, Fryberg, Markus, et al., 2012; Stephens, Markus, & Fryberg, 2012). However, while we can easily identify groups where each self-view is most common, it should be noted that interdependence and independence are not dichotomous constructs; individuals are often a mixture of each self-view, with particular social contexts making one self-view more salient than the other.

Both interdependence and independence have been found to critically impact behavior and how one thinks about the world (Haidt, Koller, & Dias, 1993; Kim, Sherman, & Taylor, 2008; Markus & Kitayama, 1991; Stephens, Fryberg, & Markus, 2012). Differences in self-view have been found to influence how integrated the concepts of community and family are with

one's goals and motivation, where for interdependent individuals, family and community are central motivators (Markus & Kitayama, 1991). Differences have also been observed regarding how one speaks of and thinks about their achievements. For those with interdependent self-views, the journey to success is not viewed as an endeavor to be completed alone, as it is with those who are independent, but instead success is viewed as something that many individuals are a part of (Markus, Uchida, Omoregie, Townsend, & Kitayama, 2006). Weaving these findings together, it is evident that cultural differences may be behind several of the academic differences we see between CG and FG students, particularly underlying the motivation to attend school and what it means to do well while there.

### **Cultural Matching and Growth Mindset Interventions**

At the root of mindset interventions is the highly culturally independent message that “growing your intelligence helps *you to reach your goals*”. This independent emphasis, where the benefits of a students' hard work serve to help just themselves, is not the optimal way to reach FG students (Markus et al., 2006; Stephens, Fryberg, Markus, et al., 2012). While FG students may still benefit from growth mindset interventions with this framing, research examining the college generational achievement gap demonstrates that “culturally matching” academic messages with FG students' interdependent self-views could yield stronger academic outcomes (Stephens, Fryberg, Markus, et al., 2012).

Research on cultural matching has demonstrated that the context in which academic interventions are delivered matters (Stephens, Fryberg, Markus, et al., 2012; Stephens, Hamedani, & Destin, 2014). The notion that tailored growth mindset interventions may prove more effective is additionally supported by recent research with high school students. In this work researchers found that revising mindset interventions for better student fit improved student

grades (Yeager et al., 2016). One successful mindset revision tested by this team was an interdependent approach, whereby students were told that growth mindsets could be used to give back to their communities. While this approach was tested with predominantly middle class high school students, a population that by definition is far different from FG students (Pascarella et al., 2004), this finding is a promising start in understanding the benefits of making interventions culturally self-relevant. When academic information is made self-relevant to FG students in an interdependent format, we see large academic gains (Stephens, Fryberg, Markus, et al., 2012) and improved academic performance relative to receiving academic information in an independent format. Piecing this information together, it is possible then that tailoring the messages of growth mindset interventions to be more interdependent (e.g. growing your intelligence *helps you to help your people*) and enhance their cultural matching for FG students, could increase intervention benefits and help to increase FG students' persistence through academic challenges. Uniting cultural matching and growth mindset theories in one intervention would not only help to extend each theory, but would also create a tailored intervention for FG students best able to address head on the issue of FG college attrition.

### **Present Research**

In the present studies, we theorized that the optimal academic intervention for addressing the college generational achievement gap would be a novel intervention that motivated FG students in a culturally relevant way. To test this theory, we exposed participants in experimental conditions to growth mindset interventions either with the classic individualist “growing your intelligence *can help you to reach your goals*” message or with a novel culturally tailored interdependent message “growing your intelligence *can help you to help your people*”. Building on prior cultural research on college generation status (Stephens, Fryberg, Markus, et al., 2012),

we predicted that while both mindset interventions would be beneficial for CG and FG students, the culturally interdependent mindset intervention (*cultural mindset*) would yield greater academic benefits for FG students relative to the classic, more independent, mindset intervention (*classic mindset*). We expected that the individual condition would still be beneficial for FG students because of its growth mindset message, which would still encourage students to view challenges as opportunities for growth. However, we expected that through cultural matching, the interdependently tailored intervention would better resonate with FG students, causing the message to seem more self-relevant and increase the strength of the message to students. By comparing the cultural mindset intervention with a classic version, we tested a novel, and directly tailored, method of academic motivation for FG students.

### **Study 1**

In Study 1, we had two primary aims. First, to determine if our cultural mindset intervention was able to similarly increase one's growth mindset to same degree as a classic mindset intervention. Second, to examine whether our tailored intervention was able to better increase FG students' academic persistence than a classic mindset intervention. In this study we tested whether a cultural mindset intervention would demonstrate better increased academic persistence than a classic mindset intervention for first-generation college students. This experiment took the form of a 2 (college generation status: first-generation vs. continuing-generation) X 3 (intervention type: cultural mindset vs. classic mindset vs. control) between-subjects factorial design.

### **Methods**

#### **Participants**

We recruited 431 undergraduate students (166 men, 230 women) from the University of Washington Subject Pool. All participants were invited online to participate in a thirty-minute study in exchange for extra credit in their Introductory Psychology or Research Methods courses. Mean age of participants was 18.93 years ( $SD = 1.1$ ; range = 18-22 years). Participants were of primarily White (40.4%) and Asian (38.5%) descent. Of the participants, 28.8% reported being first-generation college students. Participants who were not in their first or second year of college<sup>1</sup> ( $n = 24$ ), did not complete the study ( $n = 51$ ), failed the attention check ( $n = 38$ ), or did not appear to take the study seriously, e.g. listing *Endor* as place of birth, ( $n = 1$ ), were dropped from the analysis, yielding 323 participants in the final analysis. Of the final sample of 323 participants (135 men, 188 women), 24.8% reported being International students, 27.9% reported being first-generation college students. Of our first-generation college students, 43% were Asian and 27% White. Our continuing-generation sample was 55% White and 41% Asian. Participants were randomly assigned to one of the three experimental conditions.

### **Stimulus Materials**

Participants read a picture story about a young child, either a boy or girl, discovering a talking machine on the beach. The story described the child's excitement in finding out that the machine could teach her about her brain and its abilities. In the story, the child asks the machine questions about her brain and its functions. What questions the child asked differed from condition to condition.

**Control condition.** In the control condition the child asks the machine to tell her how brain helps her to learn. The story continues with the machine's explanation of neurons and how they communicate with one another:

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<sup>1</sup> Prior research using growth mindset interventions has typically focused on student groups undergoing academic transitions (Blackwell, Trzesniewski, & Dweck, 2007), due to this we made the a priori decision to constrain our sample to first and second year undergraduate students.

Your brain is made up of cells. Millions and millions of them that send signals all over your body! Each cell talks to each other through its axons and dendrites. These are like the cell's arms and hands. They pass along signals in your brain to communicate!

**Classic and cultural mindset condition.** In both intervention conditions, the child asks the machine if anyone can become smart. The machine responds the same way in both intervention conditions telling the child that everyone has the ability to grow their intelligence:

Your brain works just like the muscles in your arms and legs. To exercise your arms and legs you have to walk, run, and jump. To exercise your brain, you have to get active and seek out new information. You have to learn, learn, learn!

The difference between the cultural and classic interventions was rooted in the framing of the message. In the cultural mindset condition, the story had three additional pages framing the story as a message coming from a community elder, where the path to learning was seen to be a tool for helping one's community. These pages bookended the story in its beginning and end to help give the intervention's message an interdependent context for FG students. The images on these three additional pages also helped to solidify the interdependent nature of the message through showing children and elders interacting together. This aided in giving a community and family context to the intervention's message.

## **Measures**

**Math performance.** To measure the intervention's impact on academic performance, participants completed a series of 10 multiple choice math questions following the intervention. Each question was shown individually accompanied by six choices, five that were possible answer choices and a sixth choice that read "I've given this question my best effort, but cannot seem to figure it out".

Prior to their use, these math questions were evaluated by research assistants as ones that students in their first and second school years at University of Washington would be capable of completing.

**Academic persistence.** Because a major feature of the college generational achievement gap is the fact that FG students are more likely to drop out of college than CG students, we wanted to understand how the intervention would impact students' motivation and persistence. To determine this, we evaluated how often students picked the sixth, or "I give up", answer choice during the math task. Through selecting this answer choice, participants indicated that they were no longer interested in working towards a solution of the problem and were giving up on the question. Due to this, we operationalized selecting this answer choice as lower academic persistence.

**Book rating.** After reading the intervention story, we asked participants to evaluate how much they had enjoyed the book they read. This was done to ensure that the content across all three stories was consistent and that any intervention differences we received were not as a result of one book being more entertaining. Participants rated the story through selecting the number of stars they would rate the book with on a one-to-five scale, anchored by *hated it* (1) and *loved it* (5).

**Theory of intelligence.** Our primary measure of participants' views towards intelligence and whether it was fixed or malleable was measured using Dweck's (1999) Theory of Intelligence Scale, which consisted of eight items (e.g., "To be honest, you can't really change how intelligent you are.") measured on a six-point Likert scale anchored by *strongly agree* (1) and *strongly disagree* (6). Higher scores on this scale indicate views that intelligence is

malleable and can “grow”, whereas lower scores indicate viewing intelligence as fixed and unable to altered. Internal reliability (Cronbach’s  $\alpha$ ) was .80.

## **Procedure**

After completing informed consent, participants were told that our research team was developing materials to be used with young students in schools and that were interested in receiving their feedback. Participants were then randomly assigned to read one of three children’s picture stories (control, classic, cultural). The gender of the main character in the story was matched with each participant’s own indicated gender. This was done to increase the relevancy of the story to participants and control for gender effects. After reading the story, participants then rated how much they had enjoyed reading it on a scale of one-to-five stars. Following the intervention portion of the study, participants were then told they would now begin a second part of the study examining students’ problem solving strategies. At this point in the study, to examine participants’ post-intervention academic persistence, participants completed a series of ten multiple choice math questions. After completing the math question portion the study, the survey moved into its final segment where participants completed the Theory of Intelligence Scale and basic demographics, including their college generation status, measured by level of parental education.

## **Results**

### **Manipulation Checks**

**Book Rating.** A one-way ANOVA examining whether mean ratings for each condition’s book varied revealed a significant effect between the control and cultural conditions  $F(2, 322) = 5.25, p = .006$ , such that participants in the control condition, regardless of college-generation status, liked the book less ( $M = 2.96, SD = .141$ ) than participants in the cultural mindset ( $M =$

3.4,  $SD = .121$ ) condition. There was no difference in liking, regardless of college-generation status, between the classic mindset condition ( $M = 3.03$ ,  $SD = .133$ ) and the control and cultural conditions. However, examining this effect by condition and college-generation status, yields null results,  $F(2, 322) = .538$ ,  $p = .353$ , indicating that there was no difference by college-generation status in terms of how much students enjoyed the books. It should be noted that a score of 2.96 is close to a value of 3 stars, indicating liking the book.

**Theory of Intelligence.** To determine whether participants in intervention conditions were more likely to endorse statements that intelligence could grow and was not fixed, we ran a one-way ANOVA examining whether mean scores on the Theory of Intelligence scale varied by condition,  $F(2, 322) = 7.42$ ,  $p = .001$ , revealing a significant difference between control and intervention condition means; control ( $M = 4.511$ ,  $SD = .953$ ); classic ( $M = 4.837$ ,  $SD = .851$ ); cultural ( $M = 4.968$ ,  $SD = .883$ ). We dummy coded our condition variables, with our mindset conditions as reference groups, to probe this effect and found, as expected, no significant difference between either of our mindset conditions on theories of intelligence,  $F(1, 322) = .673$ ,  $p = .412$ . Examining how the control condition compared to our mindset intervention means revealed a significant difference in theories of intelligence,  $F(1, 322) = 13.676$ ,  $p = .000$ , demonstrating as predicted, that participants in the intervention conditions were more likely to endorse growth mindset statements than those in control.

### **Academic Persistence**

After plotting our data to see if they were normally distributed, and observing that they were not, and were strongly negatively skewed, we submitted the data to the non-parametric test for count data, a negative binomial logistic regression. In this test we examined number of math

questions given up on by condition (control vs. classic mindset vs. cultural mindset) by college generation status (first-generation vs. continuing generation).

We expected to see three results. First, that when in the control condition, FG students would be more likely to have selected that they had given up on math questions relative to CG students. Second, that FG students in both intervention conditions should have given up significantly less than FG students in the control condition. And lastly, that FG students in the cultural mindset condition would be least likely of all three conditions to give up on math questions. Results significantly supported our first two predictions and marginally supported our third prediction, see Figure 1.

Our results revealed a significant interaction between college generation status and condition on the number of math questions given up on ( $\chi^2(2, N = 323) = 9.38; p = .009$ ), such that FG students in the control condition were more likely to give up than any other group, however when in the intervention conditions, the achievement gap between CG and FG students diminished. Central to our theory was whether a culturally tailored mindset intervention would yield improved academic outcomes for FG students than a classic intervention. After probing our interaction through dummy coding to determine differences between both interventions, we found a marginal difference between conditions ( $\chi^2(2, N = 323) = 3.41; p = .065$ ). These results suggest that a cultural mindset intervention may be marginally better for FG students than a classic mindset intervention and that regardless of intervention type, receiving a mindset intervention was beneficial for FG students in increasing the tendency to persist and in diminishing achievement gaps.

To verify that our intervention worked best for FG students and that this was not due to a confound of race and culture, we tested our model for an interaction of race (Asian vs not Asian)

and condition. We found no significant effect of this model ( $\chi^2(2, N = 323) = 1.260; p = .533$ ), thus, revealing that our intervention effects were as a result of our participants being first-generation, and not due to other interdependent group memberships.

### **Discussion**

We tested whether an interdependently tailored growth mindset intervention could better increase FG student's academic persistence relative to a classic mindset intervention. Study 1's findings suggest that tailoring mindset interventions to be more interdependent can lead to improved academic persistence for FG students. However, our analyses revealed intervention differences to be marginal.

There were two aims of Study 1. Our first aim was to determine whether a culturally tailored growth mindset intervention was able to increase participants' growth mindsets similar to a classic mindset intervention. Our second aim was to examine whether a cultural growth mindset intervention was better able to improve FG students' persistence relative to a classic mindset intervention.

We tested our first aim using the Theories of Intelligence scale. Our analyses successfully demonstrate that a culturally tailored mindset intervention was able to increase participants' growth mindsets similar to a classic mindset intervention. These findings suggest that participants took in the cultural intervention similarly to the classic mindset intervention. To test our second aim, we examined participants' persistence by measuring the number of math questions participants gave up on. Our results show that both cultural and classic interventions were successfully able to decrease the number of math questions FG students gave up on, thereby increasing persistence, however, the cultural condition was able to improve FG students' persistence marginally more than the classic condition.

To identify if other interdependent student groups may have benefited from the intervention, we compared Asian and Non-Asian participants' post-intervention persistence and found no effect of condition. These results demonstrate that our intervention worked best for our target student population of FG students, rather than interdependent students at large.

In examining our marginal difference between conditions on persistence, we re-examined our choice to use a math-based task. We selected math as the subject area we were most interested in growing students' persistence in because of its direct importance to academics, however, it is possible that participants may have come into the study with preconceived notions of their math abilities due to years of previous math courses. Pairing this insight with our observed marginal difference between conditions, a better test of persistence may be one that tests a seemingly neutral academic domain that participants would be less likely to have encountered in school.

A second reason for our marginal effects between conditions may be that our two intervention conditions were not different enough. Our cultural and classic intervention conditions contained identical intervention messages, and only differed in three additional pages added to the cultural condition. These three pages contained the interdependent message that working hard in school can be a way to help your family and community. It is possible that the addition of just three pages, while the rest of the story remained identical between both intervention conditions, was too subtle of a change. A more interdependent version could use interdependent language and imagery throughout the entirety of the story, opposed to just on a few pages.

The results of Study 1 provided clues regarding tailoring mindset interventions to their targeted student populations. We found that increasing the interdependent content of mindset

interventions did not minimize intervention effects and increased FG student persistence in academic tasks. Because intervention differences were marginal in Study 1, our goal for Study 2 was to strengthen Study 1's intervention message to be more interdependent and to test persistence in a more neutral academic context than mathematics

## Study 2

The overall aim of Study 2 was to test a stronger version of our intervention to further differentiate the effects between the cultural and classic conditions. Our first step in strengthening our intervention in Study 2 was to look beyond math. In selecting a new method for testing persistence, we considered the fact that in Study 1, participants may have entered the study with preconceived notions of their math abilities. To avoid these trappings, we opted to test persistence in a format that would be unfamiliar to students, but still retain a cognitive foundation. This led us to choose Tangram puzzles. Tangram puzzles are solved by putting together geometric shapes to create figures. These puzzles have been used in other research as a measure of academic performance and persistence (Stephens, Fryberg, Markus, et al., 2012).

In this study, we also sought to strengthen the differences between intervention conditions to create a more interdependent cultural intervention than that used in Study 1. Previous literature shows that FG students are not motivated to do well in college to just improve themselves, but to improve their families and communities as well (Covarrubias & Fryberg, 2015; Stephens, Fryberg, & Markus, 2012; Stephens et al., 2014). To better connect with FG students' motivations for learning, we increased the frequency of interdependent language throughout the cultural intervention, changing the language to be less "you"-focused and more "we"-focused, e.g. "As long as *we* don't give up, *our* brains will get stronger". We also changed the images of the story's characters in the cultural condition from White children and their

families to Asian children and their families. We decided to use images of Asian families based on the demographics of Study 1, which showed that Asian students made up one of the dominant groups of our FG student sample. We theorized that increasing the propensity of interdependent language and making the characters in the book more similar to participants would increase its relevancy to FG students.

## **Methods**

### **Participants**

Five hundred and five University of Washington undergraduate students participated in a thirty-minute lab study in exchange for extra credit in their Introductory Psychology or Research Methods courses. Seventy-three participants indicated that they were not born in the U.S. and they were subsequently left out of our analyses.<sup>2</sup> The mean age of our final sample of 432 participants (262 women, 270 men) was 18.93 years old ( $SD = .99$ ; range = 18 - 29 years). Participants were of primarily Asian (50.5%) and White (37.5%) descent and 37.5% reported being first-generation college students. Of our sample of first-generation college students, 54.9% reported being of Asian descent and 22.8% reported being of White descent. Participants were randomly assigned to one of three conditions.

### **Stimulus Materials**

Similar to Study 1, participants first read one of three randomly assigned intervention books (Cultural Growth Mindset, Classic Growth Mindset, or Control) followed by an academic persistence task and post-intervention survey measures.

**Intervention Books.** Both the Classic and Control condition books remained the same as in Study 1. However, for Study 2, we made several changes to the Cultural condition book. We

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<sup>2</sup> We anticipated that FG students born outside of the U.S. would have different experiences in college than U.S. born FG students and made the a priori decision to exclude foreign born FG students from our sample.

increased the Cultural book's interdependent message by changing all language in the book to reflect growing your brain to be a communal rather than individual activity and changed the characters presented in the story to be Asian to better reflect one of our largest FG student groups from Study 1.

## Measures

**Academic Persistence Task.** To test our effect in a more general academic domain, we used Tangram puzzles. Participants were asked to complete as many tangrams as they could in 10 minutes and to indicate with a checkmark on the corner of the page next to "attempted" if they had tried a puzzle but couldn't figure it out. As a measure of persistence, we were most interested in the number of puzzles participants attempted within the time period.

**Book rating.** Similar to Study 1, we measured participants' ratings of the intervention books they read on a one-to-five scale, anchored by *hated it* (1) and *loved it* (5).

**Theory of Intelligence.** Similar to Study 1, we measured participants' beliefs that they could grow their intelligence on the Theory of Intelligence Scale

## Procedure

Procedures for Study 2 followed that of Study 1 with a few main exceptions. First, rather than completing the study online, participants completed the study in the laboratory under the instruction of a female experimenter who was blind to participants' study condition. Second, after receiving the intervention, participants completed tangram puzzles, instead of math questions, as a measure of academic persistence. After letting the experimenter know they had finished reading the intervention story, participants received a bag of tangram seven pieces and two booklets. One of the booklets contained nine different tangram puzzles and the second booklet was blank for participants to trace their solved puzzles onto. Participants were instructed

by the experimenter to create as many puzzles as they could within 10 minutes. Using a timer, the experimenter timed the participant outside of the study room. After the 10 minutes were up, the experimenter returned to the study room, collected the participants' tangram materials, and set up the post-intervention survey measures.

## Results

### Manipulation Checks

**Book Rating.** A one-way ANOVA examining whether mean ratings for each condition's book varied revealed no significant effects  $F(2, 429) = 1.79; p = .17$ , such that, participants in the Control ( $M = 3.26, SD = 0.72$ ), Classic Mindset ( $M = 3.43, SD = 0.86$ ), and Cultural Mindset ( $M = 3.35, SD = 0.76$ ). We interpreted these results to mean that participants across conditions enjoyed the intervention books at equal amounts.

**Theory of Intelligence.** To determine whether after being exposed to our newly adjusted Cultural Mindset condition was able to increase participants' growth mindsets, we ran a one-way ANOVA examining whether mean scores on the Theory of Intelligence scale varied by condition,  $F(2, 429) = 1.37; p = .26$ , revealing no significant differences between conditions and participants' beliefs that they could grow their intelligence. Our primary research question rested on whether a culturally tailored mindset intervention could yield better results for FG students, however, these results demonstrate that neither intervention condition was able to increase students' growth mindsets.

### Academic Persistence

After observing our data were normal, we ran a univariate ANOVA examining the interaction between college generational status (first-generation vs continuing-generation) and condition (Control, Classic Mindset, Cultural Mindset) on participants' academic persistence.

Similar to Study 1, we expected to see three results. First, we expected that when in the control condition, FG students would be less likely to attempt tangram puzzles relative to CG students. Second, we predicted that FG students in both intervention conditions would attempt significantly more tangram puzzles than FG students in the control condition. And last, we predicted that FG students in the cultural mindset condition would attempt more tangram puzzles than in other conditions. In other words, in our control condition we expected to find results paralleling the observed persistence gap between FG and CG students, with both interventions to attenuate this gap, and the cultural condition attenuating the gap best. Results supported our first prediction, but not our second and third predictions, see Figure 2.

Supporting our first prediction of a gap in persistence between FG and CG students, we found a main effect of college generational status, ( $F(1, 432) = 6.198; p = .01$ ), such that CG students attempted significantly more Tangram puzzles than FG students. However, we found no interaction between college generational status and condition on persistence with tangrams attempted, ( $F(2, 431) = 0.1; p = .90$ ), such that neither intervention influenced the number of tangram puzzles FG and CG students attempted. These results suggest that while our tangram task was able to capture the persistence gap between FG and CG students, neither intervention was able to effectively attenuate this gap.

### **Exploratory Analyses**

Due to the discrepant results we found in Studies 1 and 2 in our intervention's ability to improve FG persistence, we decided to further explore our data and examine how exactly the changes we made to the intervention used in Study 2 influenced our findings. We did this by focusing on what we identified as the single largest change to the intervention in Study 2, changing the families portrayed in the culture condition book from White to Asian. While

intended to make the cultural intervention's images of family more self-relevant to our largest participant demographic, we may have inadvertently altered the way Asian and Non-Asian participants took in the intervention's mindset message.

Similar to as in Study 1, we tested whether our cultural intervention had been more effective for Asian relative to Non-Asian participants, and ran a second set of analyses on our main outcome variable of number of tangrams attempted. Using a univariate ANOVA, we examined the interaction between race (Asian vs Non-Asian) and condition (Control vs Classic Mindset vs Cultural Mindset) on the number of tangram puzzles attempted. We found no main effect of race ( $F(1, 432) = 2.7; p = .10$ ) or condition ( $F(2, 431) = 0.68; p = .5$ ) on the number of tangrams attempted. However, we did find a significant interaction of race and condition on the number of tangrams attempted ( $F(2, 431) = 3.64; p = .03$ ), such that, Asian participants in the classic mindset condition completed fewer tangram puzzles than when in the control or cultural conditions, see Figure 3. Using dummy coding, we probed this interaction and found a marginal difference between the classic and control conditions for Asian participants ( $F(1, 195) = 3.33; p = .07$ ). While compelling, we are unable to attribute this marginal difference to the changes we made to the intervention, as it was only in the cultural intervention that we made changes to the race of the characters. Since the control and classic condition books remained the same between Studies 1 and 2, it is possible that this marginal effect is due simply to noise in the data and further investigation is needed.

### **Study 2 Discussion**

The goal of Study 2 was replicate Study 1's findings with a stronger, more interdependent, intervention able to significantly increase FG student persistence relative to a classic mindset intervention. However, in this experiment we were unable to successfully

replicate our Study 1 findings. In Study 2 we were unable to demonstrate that an interdependently tailored growth mindset intervention could improve FG student persistence better than control or classic conditions.

In Study 1, we found significant differences between intervention and control conditions on the Theories of Intelligence Scale, demonstrating intervention effects in increasing participants' self-perceptions regarding their ability to grow their intelligence. However, in Study 2 we did not find any significant differences between control and intervention conditions on Theories of Intelligence. In other words, participants in intervention conditions were no more likely to endorse a growth mindset than participants in the control condition. Similarly, the intervention effects we saw in Study 1 in increasing FG student academic persistence did not hold in Study 2. In Study 2, we found no difference between control and intervention conditions in increasing FG student academic persistence.

It is possible that both null effects on the Theory of Intelligence Scale and academic persistence were closely related. If participants in intervention conditions did not increase their growth mindsets, it follows then, that they should perform no differently than control participants on a growth mindset task measuring persistence. A second reason for our observed null results may stem from the persistence task itself. In Study 2 we changed our intervention task to an academically neutral task of tangrams puzzles. It is possible that in Study 2 participants did not extrapolate the intervention's message of growing their brains and embracing new learning opportunities to tangram puzzles as much as they did to math in Study 1. A final reason for the differences in theories of intelligence between Studies 1 and 2 may be that in changing the content of the books to be more visually appealing and likeable, participants missed the actual content and message of the intervention.

Because our results from Study 2 contrasted with what we found in Study 1, we explored the data further to determine if the intervention had been successful for other student groups. With the changes we made to Study 2's cultural condition in changing its characters from White to Asian, we made a post-hoc hypothesis that perhaps the culturally tailored intervention had worked best for Asian relative to Non-Asian participants. After running our analyses, we found a significant difference between Asian and Non-Asian participants on academic persistence. Probing this interaction, we found that Asian participants had marginally higher persistence in the control condition relative to the classic mindset condition, and found no effect of the cultural condition. Since these differences were marginal, and in Study 1 we observed no intervention effects in comparisons between Asian and Non-Asian participants, we do not think these differences can be meaningfully attributed to the intervention. Further research will be needed to determine how the classic and control conditions influenced Asian participants.

### **General Discussion**

The present research began with the idea that culturally tailoring growth mindset interventions to be more interdependent could increase their efficacy for interdependent student groups, specifically, FG college students. To test this, we developed a culturally tailored growth mindset intervention for FG students and examined whether this intervention would better improve FG students' persistence through academic challenges relative to a classic mindset or control intervention. The results of both Studies 1 and 2 were mixed. In Study 1, a culturally tailored intervention was marginally better than a classic mindset intervention in increasing FG students' academic persistence. However, in Study 2, we found no effect of either intervention or control conditions on FG students' persistence.

Although we found discrepant results across both studies, these results remain noteworthy. Both studies demonstrate that there is still more to learn regarding the nuances of creating tailored academic interventions, however, the results of Study 1 remain promising, while inconclusive. These studies provide a first step in understanding how to better tailor growth mindset interventions to FG students.

As growth mindset interventions continue to be a popularized academic intervention due to their ease in dissemination and effectiveness (Paunesku et al., 2015; Yeager et al., 2016), it is important to understand when and how to best harness their effects. Understanding that a growth mindset intervention, either classic or cultural, can improve FG students' academic persistence is of great relevance. To reduce FG student college attrition, improving how FG students think about their ability to persist and continue learning through challenges is key.

### **Limitations and Future Directions**

The present research has many limitations. First, due to discrepant intervention outcomes between Studies 1 and 2, the benefits for FG students in Study 1 are difficult to interpret. It is possible that the differences we see between Studies 1 and 2 can most meaningfully be attributed to differences in how persistence was measured across both studies. In opting to select a subtler measure of persistence in Study 2, it is possible that participants missed the connection between the intervention and the tangram task. Returning to a more explicitly "academic" measure of persistence, as in Study 1, may be the best option for future intervention research.

Second, in both studies we administered the intervention, persistence task, and post-intervention surveys in one sitting, leading us to only be able to measure short-term intervention effects. Future research should consider follow-up studies with participants and grade collection

to ascertain a better measure of the intervention's ability to improve FG students' persistence through college.

Third, across both studies, our sample contained a relatively low number of FG college student participants. In our final sample of participants, only 27.9% (Study 1) and 37.5% (Study 2) of our participants were FG college students. However, it should be noted that first-generation college students are a difficult to recruit student population due to their minority status on college campuses. While a greater number of first-generation students may have been desirable, it may not have been feasible.

Despite these limitations, we believe that our findings are still compelling and useful to others. Our results not only demonstrate a first success in increasing FG students' views of their academic abilities, but also lay the ground work for future cultural interventions. For example, one such intervention could expand on previous research examining cultural differences in motivation to determine if messages from important adults in the student's life would render stronger intervention outcomes than if students felt as though they were learning the intervention's message out of their own volition (Iyengar & Lepper, 1999).

## **Conclusion**

Using two variations of a growth mindset intervention, classic and cultural, the present research provides insight into methods for improving FG students' academic persistence and motivation. Our research suggests that variation in academic persistence between FG and CG students may be due to differences in students' beliefs regarding their intelligence. This finding is notable because it highlights the use of growth mindset interventions as a possible method of improving FG students' persistence with challenging tasks, and possibly college itself.

While we did not find significant differences between interventions across both studies, this research demonstrates the potential for using culturally tailored mindset interventions with FG students. When first-generation students in Study 1 were exposed to an intervention tailored to be more interdependent in its content, this intervention had a marginally greater impact on their desire to persist through challenging academic content than when if they were exposed to an intervention with a culturally independent framing. This finding is promising, in that it is a simple amendment to an already brief academic intervention. While we did not see similar results in Study 2, this difference highlights an opportunity to better understand tailored interventions. With some further testing, it is possible that a culturally tailored mindset intervention could have the potential to make lasting impact in first-generation students' academic trajectories.

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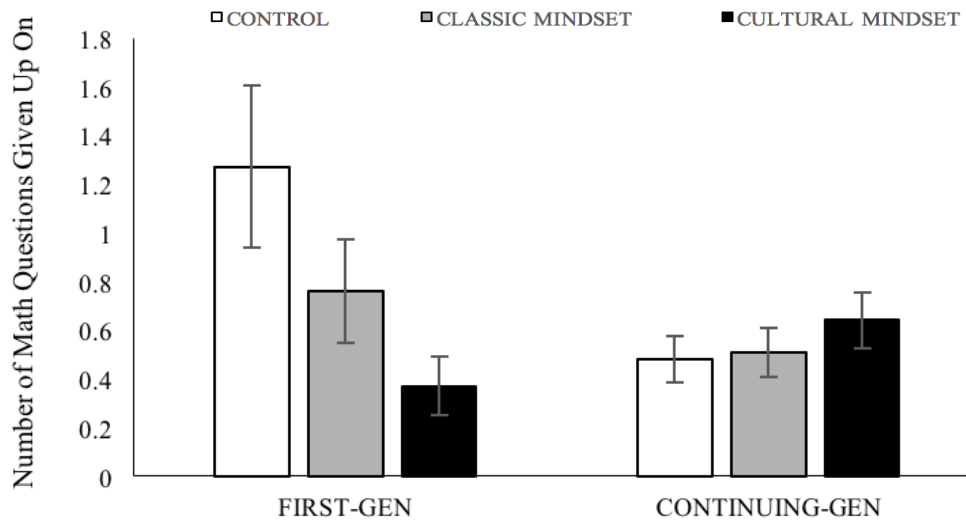
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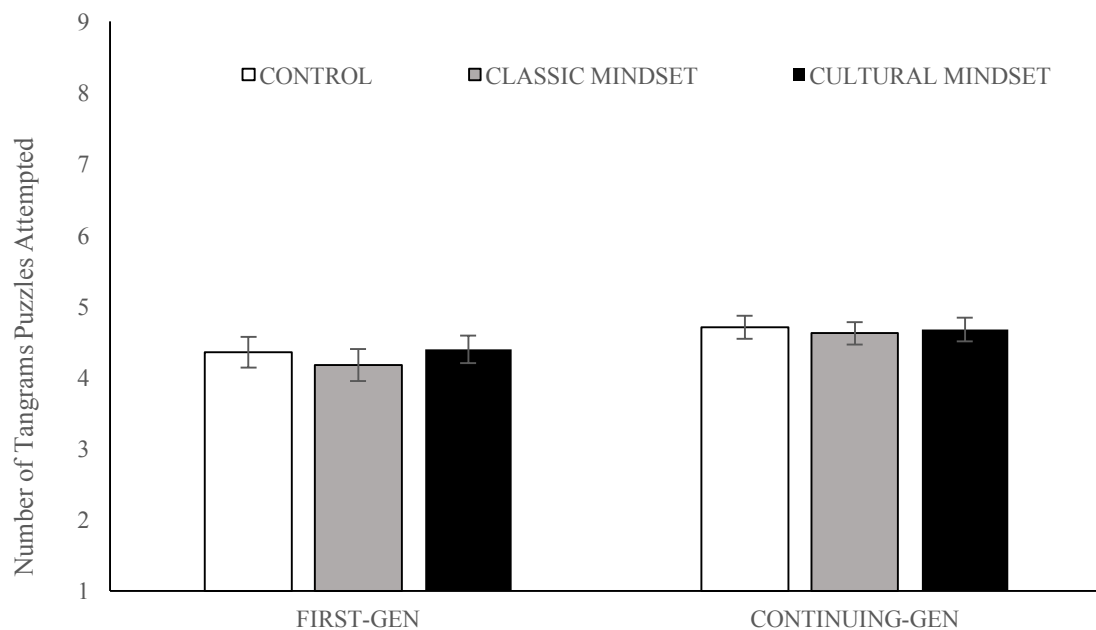
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Figure 1

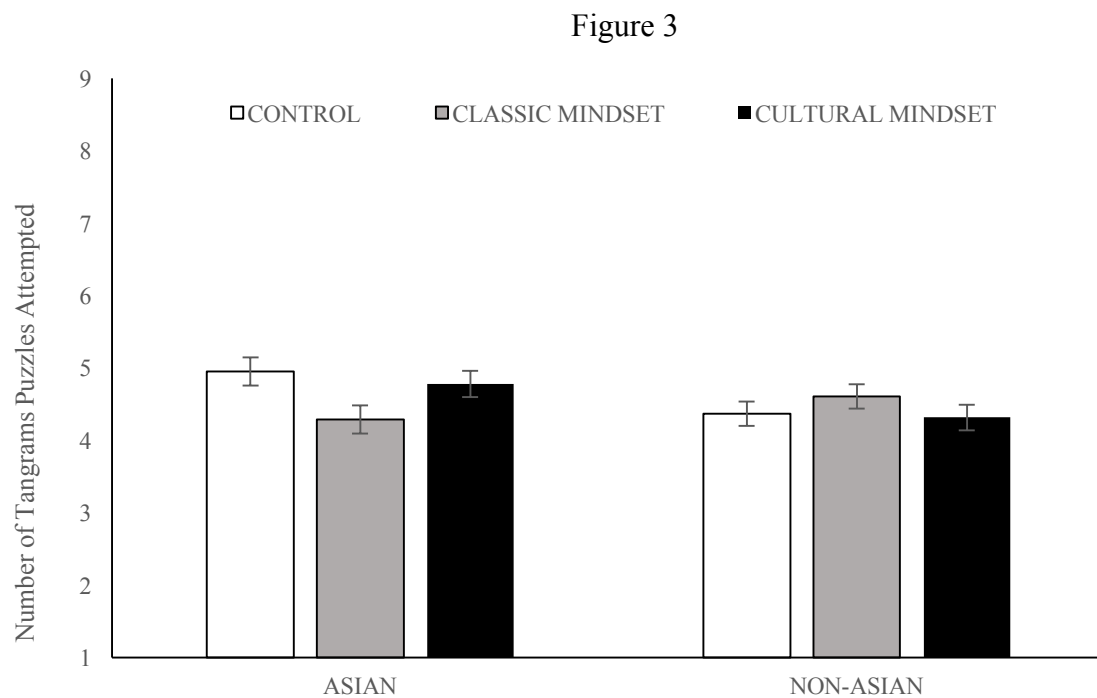


*Figure 1.* Average number of math questions given up on compared by college generation status and intervention type. Error bars indicate standard error for each mean.

Figure 2



*Figure 2.* Average number of Tangrams attempted compared by college generational status and intervention type. Error bars indicate standard error for each mean.



*Figure 3.* Average number of Tangrams attempted compared by Asian and Non-Asian participants and intervention type. Error bars indicate standard error for each mean.