Implicit Mindsets of Intelligence, Achievement Goals,
Self-Handicapping, and Confidence

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ABSTRACT

The present study seeks to further understand the relationship between implicit mindsets about the malleability of intelligence with achievement goal orientations, academic self-handicapping behaviors, and confidence in one's intelligence among undergraduate students. A sample of 142 undergraduate students at two small, private liberal arts universities participated in this study. Using a Pearson correlation coefficient and a two-tailed test of significance, results confirmed hypotheses that having a growth mindset positively correlated with mastery-approach and mastery-avoidance achievement goals, as well as having a high confidence in intelligence. However, a growth mindset is negatively correlated with those who do not engage in self-handicapping behaviors, which refutes the first hypothesis in this study. Moreover, having a fixed mindset is positively correlated with performance-avoidance achievement goals, and having low confidence in one's intelligence, which supports the second hypothesis in this study. Yet, having a fixed mindset is negatively correlated with performance-approach achievement goals and self-handicapping behaviors; both of which refute the second hypothesis in this study. Overall, the study helps further understand the complex relationship between implicit mindsets and non-cognitive factors among undergraduate students. Using the findings in this study, college educators and professors will be better equipped to aid students who have differing mindsets and learning strategies.

Literature Review

Introduction

Over the last few decades, educational psychologists have conducted a substantial amount of research about students' academic behaviors, motivations, and mindsets. Due to the influx of information about how these factors affect students' academic experiences in school, educational reform has shifted focus from classroom curriculum and standards to students' mindsets and learning strategies (Yeager & Dweck, 2012). Implicit theories of intelligence, also referred to as implicit mindsets, are subconscious and complex views about whether intelligence is fixed or if it can be developed over time (De Castella & Byrne, 2015). Students who subconsciously possess a "fixed" mindset believe that their intelligence is unchangeable. Conversely, students who possess a "growth" mindset believe that intelligence is a malleable quality that can improve over time (Dweck, 2000).

Previous research has established that implicit mindsets about intelligence have been correlated with various cognitive and noncognitive factors. Cognitive factors refer to a students' knowledge of content in school, and are often measured by means of academic achievement, such as GPAs and standardized test scores (Farrington et al., 2012). Alternatively, noncognitive factors encompass academic behaviors, perseverance, mindsets, learning strategies, feelings about oneself, habits of self-control and social skills (Dweck et al., 2014;

Farrington et al., 2012). Implicit mindsets have been found to orient students to engage in a variety of noncognitive behaviors (Dweck & Leggett, 1988), including specific achievement goals and self-handicapping behaviors. Students who engage in self-handicapping behaviors often fabricate premeditated excuses for why they performed poorly on an academic activity (De Castella & Byrne, 2015). When comparing students with a growth mindset to those with a fixed mindset, there is an apparent difference in the types of achievement goals they hold (De Castella & Byrne, 2015; Howell & Burro, 2008; Liu, 2021), and whether or not they engage in self-handicapping behaviors - both of which influence their academic performance (Claro et al., 2016; Paunesku et al., 2015; Yeager et al., 2019). Confidence in one's intelligence is another noncognitive factor that influences students' behaviors in school. It is imperative for educators and students to have an understanding of why certain students engage in behaviors that help or hurt their academic performance, so they can work together to enable all students to reach their full potential in the classroom.

Implicit Mindsets and Academic Achievement

A large portion of research regarding implicit mindsets about intelligence correlates students' implicit mindsets with cognitive factors, which are measured by standardized tests (Claro et al., 2016), GPAs (Paunesku et al., 2015; Yeager et al., 2019), and enrollment in more challenging courses over time (Romero et al., 2014). Across all measures, researchers have found that students who possess a growth mindset experience greater academic improvement over time compared to students who possess a fixed mindset (Claro et al., 2016; Paunesku et al., 2015; Yeager et al., 2019). Due to the large amount of research that demonstrates the correlation between implicit mindsets and cognitive factors, this study focuses on the noncognitive side of implicit mindsets. The relationship and interconnectedness between cognitive and noncognitive factors facilitate learning among students (Farrington et al., 2012). Therefore, it is important to analyze the effects implicit mindsets have on both cognitive and noncognitive factors in order to understand how they influence learning among students. There is still a lot to be learned about which noncognitive factors have the greatest impact on academic achievement, as well as the relationships between different noncognitive factors.

Implicit Mindsets and Achievement Goals

Achievement goals are defined as the purpose that students engage in academic tasks (Elliot & McGregor, 2001), and are characterized by distinct "... emotional, motivational, cognitive, and behavioral outcomes" (Elliot, 2005; Pintrich, 2000; as cited in Howell & Burro, 2008). Thus, they are an impactful noncognitive factor that influences students' experiences in school. A common measure of achievement goals, called a 2 x 2 framework, distinguishes the goals into four distinct orientations: performance-approach, performance-avoidance, mastery-approach and mastery-avoidance (Elliot & McGregor, 2001). Each type of achievement goal corresponds to specific reasons why a student is motivated to engage in certain academic behaviors. Students who adopt performance-approach goals are concerned with appearing intelligent and winning positive judgments from their peers. Students who adopt performance-avoidance goals are also concerned with the perception of their intelligence, yet they want to avoid looking unintelligent among their peers. Students who adopt mastery-approach goals strive to become smarter and master material. Students who adopt mastery-avoidance goals are also concerned with becoming smarter, yet they avoid failing to master material (Dweck, 2000; Howell & Burro, 2008). For example, students who exhibit mastery-approach goals would focus on striving to receive an A, whereas students who exhibit mastery-avoidance goals would focus on avoiding receiving an F. Although there are distinct differences between the four achievement goals, students can align with multiple types at once. Furthermore, certain achievement goals tend to correspond with either a fixed or growth mindset. Students who possess a growth mindset tend to exhibit mastery goals which reinforces their belief that intelligence can improve over time through effort; whereas students who possess a fixed mindset tend to exhibit performance goals

(Blackwell et al., 2007; De Castella & Byrne, 2015; Dweck, 2000; Liu, 2021). While this relationship has been established in previous research, this study seeks to examine the relationship in conjunction with other noncognitive variables that are influenced by implicit mindsets.

Implicit Mindsets and Self-Handicapping

Self-handicapping is another noncognitive factor that influences students' performances and experiences in school. Self-handicapping is explained as maladaptive academic behaviors that create impediments to successful performance on an academic activity (Urdan & Midgley, 2001). An example scenario is as follows: A student does not understand the material on their upcoming test. Rather than preparing for the assessment, the student decides to not study. When the student receives the results of the test, they attribute their poor performance to their lack of studying, rather than the fact that they did not understand the material. In addition to a purposeful lack of studying, other self-handicapping behaviors include procrastination, lack of sleep, and substance abuse (Urdan & Midgley, 2001). These behaviors are often correlated with students who possess a fixed mindset because they seek to deflect their poor performance or 'fixed' level of ability onto an excuse because of a fear of failure and appearing unintelligent (De Castella & Byrne, 2015). If students learn to cultivate a growth mindset, they will be much less likely to self-handicap because they will view their failure as a learning experience, rather than a reflection of their intelligence (Dweck, 2000).

Implicit Mindsets and Confidence in One's Intelligence

Another noncognitive factor that influences a student's experience in school is confidence in one's intelligence. Research examining students' confidence in their intelligence, academic achievement, and implicit mindsets has found mixed results based on the type of situation the students were in. When students were in a situation without difficulties, researchers found that those who possessed strong confidence in their intelligence experienced greater academic achievement than those who lacked confidence in their intelligence (Skaalvik & Hagtvet, 1990). Yet in the face of adversity, such as a changing classroom environment or failure of a task, students with fixed mindsets and low confidence were just as likely as students with growth mindsets and low confidence to experience a drop in their academic performance (Dweck, 2000). However, students who possessed a fixed mindset and low confidence were much more likely to attribute their struggling to a "...reflection of their intelligence…" than students with a growth mindset (Dweck, 2000). Despite this, confidence in one's intelligence is an important noncognitive factor that influences students' experiences in school. Both students with fixed and growth mindsets must have confidence in their intelligence to pursue and persevere through challenging situations (Dweck, 2000).

Gap

While research has looked at the correlation between implicit theories of intelligence, achievement goals, and self-handicapping, there has been a lack of research that also introduces a measure of confidence. In addition, minimal research has investigated each of these variables in conjunction among undergraduate students. Perceived confidence in one's intelligence can moderate the relationship between mindsets and achievement goals (Dweck, 2000; Liu, 2021). Furthermore, because self-handicapping is often described as a tool to protect students' self-esteem regarding their intellectual abilities (Urdan & Midgley, 2001), a lack of confidence in one's intelligence may serve as yet another helpful indicator of these behaviors. While there is not a strong relationship between implicit theories and confidence in one's intelligence in the face of adversity, there is a correlation when students are in a situation without difficulties. These mixed results indicate that there may be other factors

in conjunction with students' implicit mindsets that may influence one's confidence in their intelligence. These potential factors could be a students' achievement goals or their likelihood to self-handicap, because they have distinct correlations with implicit mindsets and influence students' experiences in school (Blackwell et al., 2007; De Castella & Byrne, 2015; Dweck, 2000; Liu, 2021). Therefore, the inclusion of a measure of self-confidence in intelligence will provide further insight as to why there are certain relationships between implicit mindsets, achievement goals, and self-handicapping among students.

While there is some research looking at implicit theories in the context of college-aged students (Hong et al., 1999; Howell & Burro, 2008; Job et al., 2010;), the majority of research has looked at high school students (Claro et al., 2016; De Castella & Byrne, 2015; Paunesku et al., 2015; Liu, 2021; Yeager et al., 2016; Yeager et al., 2014) and middle school students (Blackwell et al., 2007; Romero et al., 2014). Previous research has established similar results among high school and middle school age groups (Blackwell et al., 2007; Claro et al., 2016; De Castella & Byrne, 2015; Liu, 2021). This study aims to investigate if there are also similar results among undergraduate students. This leads to the question: To what extent is there a correlation between implicit mindsets about the malleability of intelligence, achievement goal orientations, academic self-handicapping, and confidence in one's intelligence among undergraduate students?

With this information in mind, two hypotheses can be predicted. Undergraduate students who possess a growth mindset will be more likely to exhibit mastery-approach and mastery-avoidance goals, not engage in self-handicapping behaviors, and have high confidence in their own intelligence. Alternatively, undergraduate students who possess a fixed mindset will be more likely to exhibit performance-approach and performance-avoidance goals, engage in self-handicapping behaviors, and have low confidence in their own intelligence.

Methods

Participants and Procedures

Survey research is often used to analyze human behaviors, so it is regularly utilized in psychological research (Singleton & Straits, 2009 qtd in Ponto, 2015). Furthermore, in sources that posed similar research questions about implicit theories of intelligence, researchers often used surveys to collect their data (Claro et al., 2016; De Castella & Byrne, 2015; Howell & Burro, 2008; Liu, 2021). Some researchers examining growth mindsets administered a baseline survey, followed by growth mindset intervention that taught students about what a growth mindset is and how to cultivate one, and then a secondary survey (Brougham & Kashubeck-West, 2017; Paunesku et al., 2015; Yeager et al., 2016). While this method is effective for understanding the best ways to cultivate a growth mindset, administering a one-time survey enables one to measure the different behaviors that are influenced by implicit mindsets.

A sample of 142 undergraduate students at two small, private liberal arts universities participated in this study. The students' ages ranged from 18 years old to 39 years old (M = 20.17, SD = 2.674). Prior to data collection, ethical approval was sought from the school district's Institutional Review Board (IRB). In order to recruit participants, professors at the universities were contacted to arrange a time slot for the administration of the survey. Once a time slot was established, the participants opened the virtual survey link and were instructed to read and provide a virtual signature on the informed consent form (Appendix A). The participants were also asked to provide their age to ensure they are 18 years old or above. Once they virtually signed the consent form and provided their age, the participants were able to complete the virtual survey. The students took an average of 5 minutes to complete the survey.

Measures

Implicit Theories of Intelligence Scale

The eight-item Implicit Theories of Intelligence Scale (Dweck, 2000) was used to measure participants' implicit mindsets of intelligence (De Castella & Byrne, 2015; Dweck et al., 2000; Hong et al., 1999; Howell & Burro, 2008; Liu, 2021) (Appendix B). Four items each were used to measure growth mindset (e.g., "No matter who you are, you can significantly change your intelligence level") and fixed mindset (e.g., "You have a certain amount of intelligence, and you can't really do much to change it"). Responses were given on a 6-point Likert scale (1 = Strongly agree, 6 = Strongly disagree). The four fixed mindset scale items were reverse scored, meaning that "fixed mindset questions" received inverse Likert scales scores than "growth mindset questions". Then, participants' responses were summed across the 8 items into a cumulative score (range = 8-48). Scores ranging from 8 to 27 indicated a growth mindset, and scores 28 to 48 indicated a fixed mindset. Previous research has established internal reliability (α=.82 to .97) and strong test-retest reliability at 2 weeks (α=.80 to .82) (Dweck et al., 1995).

Achievement Goal Questionnaire

The Achievement Goal Questionnaire (Elliot & McGregor, 2001) was used to identify students as having one of four achievement goals: mastery-approach, performance-approach, performance-avoidance and mastery-avoidance (De Castella & Byrne, 2015; Howell & Burro, 2008; Liu, 2021) (Appendix C). Three items each were used to measure mastery-approach (e.g., "I want to learn as much as possible from this class."), performance-approach (e.g., "It is important for me to do better than other students."), performance-avoidance (e.g., "I just want to avoid doing poorly in this class."), and mastery-avoidance (e.g., "I worry that I may not learn all that I possibly could in this class."). Responses were given on a 7-point Likert scale (1 = Not at all true of me, 7 = Very true of me). Participants' responses were averaged across the three items for each of the goal orientations. The achievement goal with the highest average indicated which achievement goal the participant scored for, which is consistent with scoring in previous research. If two or more achievement goals had the same average, the participants scored for both goals. Previous research has established internal reliability for the four distinct achievement goal orientations: mastery-approach (α=.87), mastery-avoidance (α=.89), performance-approach (α=.92) and performance-avoidance (α= .83); thus showing that the Achievement Goal Questionnaire is a reliable and valid measure of achievement goals (Elliot & McGregor, 2001).

Self-Handicapping Questionnaire

The Self-Handicapping Questionnaire (Midgley et al., 1998) was used to measure the likelihood a student would engage in self-handicapping behaviors (De Castella & Byrne, 2015) (Appendix D). Six items were used to measure self-handicapping behaviors (e.g., "Some students put off doing their school work until the last minute so that if they don't do well on their work, they can say that is the reason. How true is this for you?"). Responses were given on a 7-point Likert scale (1 = Not at all true of me, 7 = Very true of me). Participants' responses were summed across the 5 items into a cumulative score (range = 6-42). Scores ranging from 6 to 23 indicated that the participant does not self-handicap, and scores 24 to 42 indicated that the participant does self-handicap. Research has established internal reliability (α=.84) (Midgely et al., 1998).

Confidence In One's Intelligence Scale

The Confidence in One's Intelligence Scale (Dweck, 2000) was used to measure the confidence a student has in their own intelligence (Dweck et al., 2000; Hong et al., 1999) (Appendix E). Three items were used to measure the confidence one has in their own intelligence. For each of the three items, a statement depicting high confidence was contrasted to a statement depicting low confidence (e.g., "I usually think I'm intelligent"; "I wonder if I am intelligent"). Participants were asked to choose the statement that is most true for them, and indicate how true it is for them on a scale. Responses were given on a 5-point Likert scale (1 = Very true of me, 5 = Sort of true of me). Participants' responses were summed across the 3 items into a cumulative score (range

= 3-15). Scores ranging from 3 to 9 indicated high confidence in one's intelligence, and scores from 10 to 15 indicated low confidence in one's intelligence. Previous research has established internal reliability (α= .81) and strong test-retest reliabilities (r= .83) (Hong et al., 1995).

Results

Results are divided into three sections. First, the recoding procedure for each of the surveys is outlined. Second, descriptive information regarding each of the variables in the study is presented. Third, bivariate intercorrelations between implicit mindsets and the achievement goal, self-handicapping and confidence variables are evaluated.

Recoding Procedure

Data was collected on a secure, Survey Monkey server, transferred to Google Sheets and then analyzed on Statistical Package for the Social Sciences (SPSS). Prior to running the statistical analyses, all of the survey responses were recoded. Each of the four measures had specific Likert scales and scoring procedures, which needed to be adjusted to the same standard to ensure results could be generalized between the four measures. When a participant scored for a mindset or behavior, they would receive a 1. When they did not score for a mindset or behavior, they would receive a 0. This process was completed in the exact same manner across the four measures to ensure the results were consistent and accurate. Table 1 depicts an example of the recoding procedure for the Implicit Theories of Intelligence Scale.

Table 1. Recoding Procedure

Original Scores										Recoded Scores	
Q1 (F)	Q2 (F)	Q3 (G)	Q4 (F)	Q5 (G)	Q6 (F)	Q7 (G)	Q8 (G)	Score	Growth/Fixed	Growth Mindset	Fixed Mindset
3	2	2	2	2	3	2	2	18	Growth	1	0
4	4	4	4	4	5	4	5	34	Fixed	0	1
4	4	3	5	4	5	4	4	33	Fixed	0	1
2	2	3	2	3	3	3	3	21	Growth	1	0
3	2	3	3	3	3	3	3	23	Growth	1	0

Descriptive Statistics

The frequencies, percentages, and standard deviations for each variable are presented in Table 2. Consistent with previous research (De Castella & Byrne, 2015; Dweck 1999; Dweck et. al., 1995), the majority of participants displayed a growth mindset (N=105) compared to a fixed mindset (N=37). Out of the achievement goal orientations, the most participants displayed the performance-avoidance orientation (N=88), followed by the performance-approach orientation (N=38), the mastery-approach orientation (N=34), and the mastery-avoidance orientation (N=12). Furthermore, the majority of participants did not self-handicap (N=125), compared to

those who did self-handicap (N=17). Lastly, the majority of participants had a high confidence in their intelligence (N=93) compared to a low confidence in their intelligence (N=49).
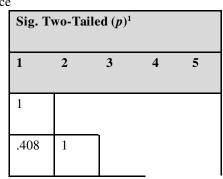
Table 2. Frequencies, Percentages, and Standard Deviations for all Variables

	Number (N)	Percentage	Std. Deviations
Growth Mindset	105	74%	.440
Fixed Mindset	37	26%	.440
Performance-approach	38	27%	.444
Performance-avoidance	88	62%	.487
Mastery-approach	34	24%	.428
Mastery-avoidance	12	8%	.279
Self-handicap	17	12%	.326
No Self-handicap	125	88%	.326
High Confidence	93	65%	.477
Low Confidence	49	35%	.477

Intercorrelations

In order to investigate the two hypotheses in this study, a bivariate Pearson correlation and two tailed test of significance were conducted. A bivariate Pearson correlation was selected because it is a measure of both the direction (positive or negative) and strength of relationship between quantitative variables measured on an interval scale (Lund Research, 2018). The Pearson Correlation produces a sample correlation coefficient, designated as r, which measures the strength and direction of linear relationships between variables (Lund Research, 2018). A bivariate Pearson correlation has also been utilized in studies with similar research questions and methodologies (Howell & Burro, 2008; Wolters, 2003). The strength of the correlation can be determined by the following guidelines: $.2 < |r| < .3$ indicates a weak correlation, $.3 < |r| < .5$ indicates a moderate correlation, and $.5 < |r| < 1$ indicates a strong correlation (Lund Research, 2018). The r values are displayed in Table 3 for the growth mindset variables and Table 4 for the fixed mindset variables. Additionally, a two-tailed test of significance was selected because the direction of association between the variables was not known prior to any of the statistical tests (International Business Machines [IBM], 2021). In a two-tailed test of significance, a null and alternative hypothesis must be stated (Lund Research, 2018). Due to the fact that there are two separate hypotheses in this study, there are two null hypotheses ($H0_1$ and $H0_2$) and two alternative hypotheses ($H1_1$ and $H1_2$).

Table 3. Pearson Correlation Coefficients & Two-Tailed Test of Significance

Correlations (r)[1]						Sig. Two-Tailed (p)[1]				
	1	2	3	4	5	1	2	3	4	5
1. Growth Mindset	1					1				
2. Mastery-approach	.070	1				.408	1			

3. Mastery-avoidance	.065	.067	1			.442	.429	1		
4. No Self-handicap	-.021	.004	**.200**	1		.802	.966	**.017**	1	
5. High Confidence	.042	.025	-.046	-.040	1	.623	.764	.589	.640	1

[1]All *r*-values in boldface are significant

[1]All *p*-values in boldface are significant at the .05 level

For the first set of hypotheses, H0[1] states that there will not be a statistically significant correlation between students who have a growth mindset and who exhibit mastery-approach and mastery-avoidance achievement goals, will not engage in self-handicapping behaviors, and have a high confidence in their intelligence. H1[1] states that there will be a significant correlation between students who have a growth mindset and students who exhibit mastery-approach and mastery-avoidance achievement goals, will not engage in self-handicapping behaviors, and have a high confidence in their intelligence. As shown in Table 3, having a growth mindset is positively correlated with mastery-approach (r=.070; p=.408) and mastery-avoidance (r=.065; p=.442) achievement goals, and high confidence in intelligence (r=.042; p=.623), yet negatively correlated with those who do not self-handicap (r=-.021; p=.802). However, none of the aforementioned correlations are statistically significant because the *r*-values are less than 0.2, and the p-values are larger than 0.05. In a two-test tail of significance, a p-value greater than 0.05 determines that the null hypothesis is supported. Thus, while there was a positive correlation between growth mindset, mastery goals and confidence in one's intelligence, the null hypothesis is supported because the correlations are not statistically significant. Out of all the variables in Table 3, the correlation between those who did not self-handicap and who exhibited a mastery-avoidance achievement goal was slightly statistically significant because the *r* -value was between .2 and .3, and the p-value of the sig. 2-tailed test was less than 0.05.

Table 4. Pearson Correlation Coefficients & Two-Tailed Test of Significance

Correlations (r)[1]						**Sig. Two-Tailed (p)[1]**				
	1	**2**	**3**	**4**	**5**	**1**	**2**	**3**	**4**	**5**
1. Fixed Mindset	1					1				
2. Performance-approach	-.069	1				.415	1			
3. Performance-avoidance	.135	**.477**	1			.110	**<.001**	1		

| 4. Self-handicap | -.021 | -.125 | .110 | 1 | | .802 | .139 | .192 | 1 | |
| 5. Low Confidence | .042 | .097 | .019 | -.040 | 1 | .623 | .253 | .819 | .640 | 1 |

[1]All *r*-values in boldface are significant

[1]All *p*-values in boldface are significant at the .01 level

For the second set of hypotheses, $H0_2$ states that there will not be a statistically significant correlation between students who have a fixed mindset and who exhibit performance-approach and performance-avoidance achievement goals, will engage in self-handicapping behaviors, and have a low confidence in their intelligence. $H1_2$ states that there will be a significant correlation between students who have a fixed mindset and students who will exhibit performance-approach and performance-avoidance achievement goals, will engage in self-handicapping behaviors, and have a low confidence in their intelligence. As shown in Table 4, having a fixed mindset positively correlated with performance-avoidance achievement goals ($r = .135$; $p = .110$) and low confidence in one's intelligence ($r = .042$; $p = .623$); yet negatively correlated with performance-approach achievement goals ($r = -.069$; $p = .415$) and self-handicapping behaviors ($r = -.021$; $p = .802$). However, none of the aforementioned correlations are statistically significant because the *r*-values are less than 0.2, and the p-values are larger than 0.05. Thus, while there was a positive correlation between fixed mindsets, performance-avoidance achievement goals and low confidence in one's intelligence, the null hypothesis is supported because the correlations are not statistically significant. Out of all the variables in Table 4, the correlation between those who exhibited a performance-approach and performance-avoidance achievement goal was moderately statistically significant because the *r*-value was between .3 and .5, and the p-value of the sig. 2-tailed test was less than 0.01.

Discussion

Implications

It was hypothesized that undergraduate students who possess a growth mindset are more likely to exhibit mastery-approach and mastery-avoidance goals, not engage in self-handicapping behaviors, and have high confidence in their own intelligence. The opposite pattern of association was expected with regard to undergraduate students who possess a fixed mindset. The Pearson correlation coefficients revealed that having a growth mindset positively correlated with mastery-approach and mastery-avoidance achievement goals, which is consistent with previous findings (Blackwell et al., 2007; De Castella & Byrne, 2015; Dweck, 2000; Liu, 2021) and supports the first hypothesis in this study. Furthermore, having a growth mindset positively correlated with having a high confidence in intelligence, which supports the first hypothesis in this study and the theory that in a situation without obstacles or difficulties, students with growth mindsets tend to have a high confidence in their intelligence (Skaalvik & Hagtvet, 1990). These findings reinforce the ideas that having a malleable view of intelligence fosters both mastery goals and a high confidence in one's intelligence. However, a growth mindset is negatively correlated with those who do not engage in self-handicapping behaviors, which contradicts previous findings (De Castella & Byrne, 2015) and refutes the first hypothesis in this study. Previous research has established that college students may engage in self-handicapping behaviors due to anxiety and negative course experience (Cano et al., 2018). These confounding variables may be one explanation for these differing results. Out of all the variables in Table 3, the correlation between those who did not self-handicap and who exhibited

a mastery-avoidance achievement goal was slightly statistically significant (r=.200; p=.017). This may be attributed to the fact that self-handicapping has been found to negatively predict a deep approach to learning (Cano et al., 2018). Students who have a mastery-avoidance achievement goal are motivated to master any material or task in front of them, so they will not engage in self-handicapping behaviors since that may jeopardize their progress in mastering material.

Moreover, having a fixed mindset is positively correlated with performance-avoidance achievement goals, which supports the second hypothesis in this study. These results reinforce the idea that those with a fixed mindset are much more likely to engage in performance-avoidance achievement goals because they did not want others to perceive them as having a fixed level of intelligence (Blackwell et al., 2007; De Castella & Byrne, 2015; Dweck, 2000; Liu, 2021). Furthermore, a fixed mindset was positively correlated with having low confidence in one's intelligence, which supports the second hypothesis in this study and the theory that in a situation without difficulties, those with fixed mindsets are more likely to have a low confidence in their intelligence (Skaalvik & Hagtvet, 1990). However, having a fixed mindset is negatively correlated with performance-approach achievement goals and self-handicapping behaviors; both of which contradict previous findings (De Castella & Byrne, 2015; Liu, 2021) and the second hypothesis in this study. These inconsistencies may be attributed to the fact that college students may be less concerned about the perception of their intelligence around peers compared to middle school or high school students, and thus do not feel the need to self-handicap. Out of all the variables in Table 4, the correlation between those who exhibited a performance-approach and performance-avoidance achievement goal was moderately statistically significant. This may be because both of these achievement goals are performance related, meaning that the students are concerned with the perception of their intelligence among peers.

This study sought to examine the influence implicit mindsets have on achievement goals, self-handicapping behaviors, and confidence in one's intelligence among undergraduate students. In doing so, this study aids to a further understanding of the complex relationship between implicit mindsets and non-cognitive factors among undergraduate students. More specifically, this study established that there was a positive correlation between those who exhibited a growth mindset with mastery achievement goals, and a high confidence in one's intelligence. Furthermore, there was a positive correlation between those who exhibited a fixed mindset with performance-avoidance goals and a low confidence in one's intelligence. With this information in mind, researchers, psychologists, and educators will better comprehend how implicit mindsets predispose students to engage in specific academic behaviors that further perpetuate students with fixed mindsets to struggle and students with growth mindsets to succeed. Using the findings in this study, college educators and professors will be better equipped to aid students who have differing mindsets and learning strategies.

Limitations and Future Research

Despite the aforementioned findings, the present study has limitations. To start, as with all self-reported survey-based studies, the results displayed may not be completely accurate representations of the actual situation or respondents' views (Ponto, 2015). Due to the fact that this study sampled participants from two liberal arts universities in the same region, a greater representation of participants could be achieved if there was a larger sample size from multiple colleges or universities. Results in future research could be more generalizable to the entire population with a larger and more diverse sample size.

A second limitation is that while this study has supported important findings within the field, a causal relationship between the variables cannot be drawn from the results. The results are limited to a correlational relationship because the data is from survey responses (Ponto, 2015). In order to combat this issue in future research, an experimental study can be conducted to test for causal relationships. For example, some researchers examining growth mindset administered a baseline survey, followed by growth mindset intervention that taught students about what a growth mindset is and how to cultivate one, and then a secondary survey (Brougham &

Kashubeck-West, 2017; Paunesku et al., 2015; Yeager et al. 2016). By examining the students' mindsets before and after the growth mindset intervention, researchers are able to determine the causal relationship between implicit mindsets, academic behaviors and improvement in academic achievement over time.

A third limitation is that the survey's scoring structure did not allow for respondents' answers to fall on a high or low spectrum. This means that the results simply determined if a participant exhibited a behavior, and did not specify how strongly, moderately, or weakly the participant aligned with the behavior. Subsequently, this study is limited from drawing conclusions between those who hold a strong growth or fixed mindset versus those who hold a moderate or weak mindset. One possible avenue for future research could examine the extent to which the strength of implicit mindsets impacts the correlation between mindsets, academic behaviors and academic achievement.

Acknowledgments

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