



Academic achievement and depressive symptoms: Are fixed mindsets distinct from negative attributional style?



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ABSTRACT

Over the last thirty years, there has been an explosion of research on “mindset” theories of personal attributes such as intelligence (Dweck, 1988). Research shows that individuals who believe that their attributes are fixed (rather than changeable) are more likely to have negative academic outcomes and negative moods. However, it remains unclear if these mindset theories represent a novel construct or if they overlap with the cognitive theories of depression which were theorized a decade earlier. According to the cognitive theories, people who attribute negative life events to stable and global (i.e., unchangeable) causes are more likely to become helpless and develop depression. The purpose of the current study was to test whether the newer mindset theories provide an incremental advance in knowledge or are more likely specific instances of a more general negative attributional style. To this end, we conducted a two time-point prospective study with 130 undergraduates. Contrary to hypotheses, results showed that intelligence mindset was distinct from negative attributional style. However, intelligence mindset did not demonstrate predictive or incremental validity; it did not predict end of semester GPA, dropping a class or depressive symptoms. In contrast, negative attributional style predicted both dropping a class and increases in depressive symptoms. Theoretical and practical implications of these findings are discussed.

According to “mindset” theories (also called implicit theories), people differ in their perceptions of the malleability of personal attributes such as personality and intelligence. These individual differences in beliefs about malleability (also known as mindsets) are hypothesized to be related to academic and emotional outcomes. According to Dweck (1999), individual's mindsets form a framework for interpreting and responding to adversity (Dweck, 1999; Dweck & Leggett, 1988; Molden & Dweck, 2006). One specific mindset that has received a considerable amount of empirical attention is that of intelligence (see Sisk, Burgoyne, Sun, Butler, & Macnamara, 2018 for review). The intelligence mindset theory has two components that lie on a continuum: entity and incremental. Individuals with an entity mindset believe that intelligence is a fixed trait and difficult to change, whereas those with an incremental mindset believe that intelligence is malleable and can be changed with effort. Having greater entity than incremental beliefs about intelligence is thought to be maladaptive because it encourages people to believe that they cannot change their intelligence, thus limiting a person's ability for intellectual growth and improvement. For example, students with greater entity beliefs of intelligence may attribute academic setbacks and challenges to a low level of intelligence that is hopeless to change, but those with greater incremental beliefs

may view the same setbacks as opportunities to develop new skills and build intelligence.

Research has generally supported the mindset theory of intelligence. According to a meta-analysis by Burnette, O'Boyle, VanEpps, Pollack, and Finkel (2013), “...mind-sets matter. That is, implicit theories are indeed consequential for self-regulatory processes and goal achievement” (p. 680). Prospective longitudinal studies consistently find that those with greater entity than incremental beliefs about intelligence have worse academic outcomes; the effect sizes found in these studies range from small to medium. For example, Blackwell, Trzesniewski, and Dweck (2007) found that 7th graders with greater entity mindset of intelligence had a flat trajectory of academic achievement (grades) throughout junior high school whereas as those with greater incremental mindset had an upward trend in grades throughout that same time period (see Henderson & Dweck, 1990 for a similar finding). In addition to predicting concrete quantitative outcomes like grades and GPA, individuals with greater incremental mindset are more likely than those with greater entity mindset to focus on goals aimed at increasing their ability as opposed to goals aimed at documenting their ability (Dweck & Leggett, 1988). This indicates that a person's mindset not only influences quantitative outcomes but also qualitative outcomes

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that impact the way in which they think about their ability to change their intelligence. It is important to note, however, that studies using experimental designs (in which mindsets are directly manipulated) tend to show smaller effect sizes and more circumscribed effects than the longitudinal correlational studies in this area (Yeager et al., 2018). In intervention studies, the positive findings tend to hold in low, but not high, achieving students.

Over the last decade, research on mindsets has surged in popularity and has also grown in scope. Recent mindset work not only focuses on beliefs about intelligence, but also a variety of other human characteristics such as personality and morality. It also been extended to include predictions regarding emotional outcomes. Entity beliefs about personal characteristics are thought to be related to negative emotional outcomes such as depression and anxiety (Burnette et al., 2013). For example, a recent meta-analysis showed a positive association between entity theories of personal traits—namely intelligence, personality, and peer relationships—and youth mental health problems (Schleider, Abel, & Weisz, 2015). Similarly, Miu and Yeager (2014) showed that a brief intervention teaching an incremental mindset of personality reduced the incidence of clinically significant levels of self-reported depressive symptoms nine months post-intervention.

Despite the popularity and increasing number of studies on mindsets, it remains unclear if the mindset hypothesis represents a novel advancement for understanding academic and affective responses or if it overlaps with previous work on cognition and emotion. In the 1970s, researchers proposed the cognitive theories of depression (e.g., Abramson, Seligman, & Teasdale, 1978; Beck, 1976; Ellis, 1962). According to the hopelessness theory of depression (Abramson, Metalsky, & Alloy, 1989), people who attribute negative life events to stable (consistent over time) and global (affects many areas of their life) causes are more likely to develop hopelessness and depressive symptoms than people who generate unstable, specific attributions about negative life events. In other words, people who attribute the causes of negative events to fixed and unchangeable factors are at heightened risk for depression. For example, if a student attributes a bad test grade to low intelligence, and they believe that intelligence is stable over time (i.e., unchangeable) and global, then they are at heightened risk for depression (see Haefel et al., 2008 for review). This negative attributional style vulnerability factor appears to overlap extensively with mindset theories. Indeed, an examination of the items on the intelligence mindset questionnaire shows that participants are specifically asked to rate the extent to which they believe intelligence is stable/unchangeable over time (e.g., “You have a certain amount of intelligence, and you really can't do much to change it”; “Your intelligence is something about you that you can't change very much”; “You can learn new things, but you can't really change your basic intelligence”).

The purpose of the current study was to test whether or not the newer mindset theories represent a distinct construct or are more likely specific instances of a more general negative attributional style (as theorized a decade earlier by the cognitive theories of depression). We theorize that the negative effects of having an entity mindset of intelligence are not necessarily due to beliefs about intelligence per se, but rather because people with an entity mindset also have a more general negative attributional style. In other words, measures of mindsets are inadvertently identifying individuals who have a negative attributional style. Even though the mindset measures do not assess all of the elements featured in the attributional theories of depression, we suspect that individuals who make stable attributions about intelligence are also inclined to make similarly stable (and also global) attributions about other factors in their world. Indeed, prior research shows that the different facets of cognitive vulnerability tend to correlate and load onto a general negative cognitive vulnerability factor (Haefel, 2010; Haefel et al., 2008; Hankin, Lakdawalla, Carter, Abela, & Adams, 2007). This suggests that those who make stable attributions about a specific area of their life such as intelligence, are also generating

similarly negative inferences in response to a variety of other life situations. Our hypothesis is also justified by the fact that mindset theories were derived from Dweck's (1986) (e.g., Tsujimoto et al., 2018; Weiner, 1985; Wilson & Linville, 1982) seminal work on motivational processes in learning, which were based partially on the attribution theories of depression (specifically, learned helplessness theory). This early work focused on understanding children's attributions for failure (i.e., attributing poor academic performance to effort or ability). Further, the interventions created by Dweck borrowed directly from cognitive therapy for depression (also based on the cognitive theories of depression), which focuses on the cognitive restructuring of attributions. It was only more recently that the emphasis changed to children's beliefs/mindsets about the stability of self-concepts such as intelligence and personality.

It remains unclear if the proliferation of these mindset theories are novel contributions to the field or a reinvention of work derived from attributional theory. For example, Schroder, Moran, Donnellan, and Moser (2016) found that although the different mindset domains (e.g., intelligence, personality, morality, etc.) are distinguishable from one another, it appears that there is a “global dimension that captures whether a person tends to adopt a growth versus fixed mind-set regardless of domain.” We contend that this more global dimension is a negative attributional style. This may explain why prospective longitudinal designs examining the correlation between mindset and academic outcomes yield more consistent and stronger effects than experiments in which mindset is manipulated. Interventions targeting a particular mindset may not be effective if that mindset represents a more general underlying style (that is not modified by the intervention).

In summation, we contend that intelligence mindset is a subset of a negative attributional style. We hypothesize that people who tend to believe their intelligence is stable have a more general tendency to attribute other self-concepts and the causes of events in their lives as stable and unchangeable. Thus, we predicted that intelligence mindset and negative attributional style would be highly correlated. Second, we predicted that both intelligence mindset and negative attributional style would predict changes in end of semester grade point average (GPA), whether or not a student dropped a course, and changes in depressive symptoms during high stress (King, 2017). However, intelligence mindset would not exhibit incremental predictive validity. That is, we did not expect intelligence mindset to predict unique variance (unaccounted for by negative attributional style) in academic and mood outcomes when the two constructs were tested simultaneously in a regression equation.

We hypothesized that negative attributional style, a risk factor for depression, would predict academic outcomes for a couple of reasons. First, research shows that depression is associated with academic impairment. Students with depressive symptoms report decreased interest in school, more missed classes, and decreased academic productivity (e.g., Heiligenstein & Guenther, 1996). Hysenbegasi, Hass, and Rowland (2005) found that depression was associated with a half a letter grade decrease in student GPA. Second, there are at least two studies showing that negative attributional style predicts poor academic outcomes. Peterson and Barrett (1987) showed that college freshmen with a negative attributional style were less likely to have specific academic goals, less likely to seek academic advising, and had lower grades than freshmen with a more adaptive attributional style (i.e., those who made unstable causal attributions). Similarly, Nolen-Hoeksema, Girgus, and Seligman (1986) showed that negative attributional style was associated with achievement related problems. Specifically, they report that negative attributional style predicted children's self-reported helpless behaviors in the classroom as well as teachers' ratings of helplessness. These results are consistent with our hypothesis that the explanatory power of intelligence mindset to predict negative academic outcomes could be due to it being a proxy for negative attributional style.

To test our hypotheses, we conducted a two time-point prospective study with 130 undergraduate participants. Analyses tested the correlation between intelligence mindset and negative attributional style as well as their incremental validity (when pitted against each other) for predicting academic outcomes and changes in depressive symptoms. Such comparisons can help constrain the production of constructs and theories that overlap with existing constructs and theories as well as lead to important integrations of parallel literatures. Philosophers of science such as Meehl (1978) (see also Popper, 1959) have argued that psychology has failed to develop a cumulative knowledge base, in part, because of the proliferation of theories. Meehl (1978) has stated that in psychology, "...theories rise and decline, come and go, more as a function of baffled boredom than anything else; and the enterprise shows a disturbing absence of that cumulative character..." (p. 807). This indifference has created a field in which theories are studied in isolation, overlap in conceptual and predictive value, and are never refuted because the same concepts continue to be reinvented over time. Pitting theories against one another, like in the current study, is one strategy for building knowledge and possibly falsifying redundant theories.

1. Method

1.1. Participants

Participants were 130 undergraduates (94 female, 36 male; M age = 18.91, SD = 1.08) recruited from a medium sized private university in the Midwestern United States. All participants were volunteers from the University's Psychology research participant pool. Students enrolled in psychology courses are required to enroll in at least one of the available psychology studies listed online; students received either course credit or extra credit points for their participation. The ethnicity of the sample was: 64% Caucasian, 20% Hispanic, 13% Asian, 3% African American. Nearly half of the participants (n = 53) reported their major as psychology or neuroscience and behavior. Business was the next most popular major (n = 17), followed by the pre-professional medical school major (n = 15), and "undecided" (n = 8). The average ACT score reported in this sample was 33, which is greater than the average ACT score of 21 in the United States (ACT, Inc., 2016). The average GPA in this sample was 3.48 ("B+" average), which is similar to the average GPA of 3.30 for students attending private four-year colleges in the United States (Rojstaczer, Stuar, & Healy, 2010).

All procedures were approved by the institution's human subject review board and consistent with human subject guidelines (participants were all volunteers and provided informed consent). The questionnaire was completed confidentially, but not anonymously. Participants included a phone number in the case that they needed to be contacted due to high levels of suicidal ideation. In accordance with the IRB protocol, participants who reported high levels of suicidality (a score of "3" on the suicide item of the BDI) were contacted by a clinical psychologist (in this case, the PI) to ensure that they were not at imminent danger of self-harm, and then given contact information for three mental health facilities (one on-campus and two off-campus). No participants met the criteria for being contacted. After the BDI was checked for suicidality scores, any identifying information was deleted making the data set anonymous.

1.1.1. Power analysis

The sample size of 130 was used for the statistical power analyses (Zhang & Yuan, 2015) and a 2-predictor variable equation was used as a baseline (main effect of TOI or CSQ and baseline control variable for the T2 dependent measure). The recommended effect sizes used for this assessment using multiple regression were as follows: small (R^2 = 0.05), medium (R^2 = 0.15), and large (R^2 = 0.26). The alpha level used for this analysis was p < .05. The analysis showed that the statistical power for this study was 0.80 for detecting a small to medium

effect.

1.2. Measures

1.2.1. Negative attributional style

The Cognitive Style Questionnaire (CSQ; Haefffel et al., 2008) was used to assess negative attributional style (as featured in the hopelessness theory of depression). It is the most commonly used measure of the negative attributional style construct featured in the hopelessness theory of depression (Haefffel et al., 2008). The CSQ is a self-report questionnaire that presents participants with 12 hypothetical negative events (6 achievement and 6 interpersonal). Participants imagine the events happening to themselves and then make ratings on the three vulnerability dimensions featured in the hopelessness theory of depression – stability and globality, probable consequences of each event, and the self-worth implications of each event. An individual's CSQ score is their average rating across these three dimensions (stability and globality, consequences, and self-worth characteristics) for the 12 hypothetical negative life events. The current study focused on the CSQ achievement subscale as it is most applicable to academic outcomes. Scores can range from 1 to 7, with higher scores reflecting greater levels of negative attributional style. The CSQ has good internal consistency, reliability, and validity (see Haefffel et al., 2008 for review). Coefficient alpha for the CSQ achievement subscale was 0.86.

1.2.2. Depressive symptoms

The Beck Depression Inventory (BDI; Beck, Rush, Shaw, & Emery, 1979) was used to assess depressive symptoms. The BDI is a 21-item self-report questionnaire. Scores are created by summing the items (range 0–63) with higher scores indicating greater levels of depressive symptoms. The BDI has demonstrated strong reliability and validity (Beck, Steer, & Garbin, 1988). Coefficient alpha for the BDI was 0.87 at Time 1 and 0.88 at Time 2.

1.2.3. Implicit theories of intelligence

Consistent with prior research, the Theory of Intelligence (TOI; Hong, Chiu, Dweck, Lin, & Wan, 1999) was used to measure individuals' propensity to have an entity mindset of intelligence or an incremental mindset of intelligence. Participants were asked to consider 6 statements about their beliefs about their intelligence and rate how strongly they agree or disagree on a 6-point scale. There are no cut-offs for incremental or entity categories. Rather, the scale is analyzed as a continuous construct with scores ranging from 0 to 6. Ratings were coded and reverse coded so that a higher score indicates more of an incremental mindset (i.e., a belief that intelligence is malleable). Coefficient alpha for the TOI was 0.94.

1.2.4. Academic outcomes

Grade point average (GPA) and whether or not a participant dropped a course during the study time frame were assessed. They reported whether or not they dropped a course at Time 2 (the end of the semester). Participants rated the item as either "yes" or "no" (responses were then coded as 0 or 1; 0 = did not drop a course and 1 = did drop a course). Overall GPA was self-reported at the start of the study and end of semester GPA was obtained from the registrar. GPA scores ranged from 0 to 4 (0 = "F", 1 = "D", 2 = "C", 3 = "B", 4 = "A").

1.2.5. Academic stress

Participants self-reported if they were "experiencing significant stress about their academic performance this semester." Participants rated the item as either "yes" or "no". Academic stress was assessed in order to test the negative attributional style by stress interaction hypothesis. The hopelessness theory posits a vulnerability-stress interaction by which negative attributional style is most likely to lead to depressive symptoms in the presence but not absence of stress.

1.3. Procedure

The study used a 3-month prospective longitudinal design. The three-month time frame was used for two primary reasons. First, this time frame mapped onto the length of the academic semester. It was necessary to administer measures at the start of classes, and then again at the end of the semester after grades were received. Second, the time frame provided ample time for individual differences to emerge in the outcome variables of interest (specifically, decisions to drop a course as well as changes in depressive symptoms). At the University in which the study was conducted, students are allowed to drop a course anytime during the first two months of the semester. The three-month time frame covers the entire “drop period.” The three-month time frame was also chosen because it has been used in prior research testing the effects of attributional style on prospective changes in depressive symptoms (e.g., Haefffel & Hames, 2014; Sasso, Giovanetti, Schied, Burke, & Haefffel, 2019).

At baseline (approximately 2–4 weeks after the start of the semester), participants were administered an informed consent form, a brief demographics questionnaire, and measures assessing mindsets of intelligence (TOI), negative attributional style (CSQ), perceived academic stress, and depressive symptoms (BDI). Participants also self-reported their ACT scores at baseline, which was used as a covariate in analyses. At the end of the semester, approximately 3 months later, the participants were administered a questionnaire asking if they had dropped any courses and were again administered the measures of academic stress and depressive symptoms. One hundred twenty-five of 130 participants completed all Time 1 and Time 2 measures at both time points (96%). Completers and non-completers did not differ on any of the baseline measures.

2. Results

Means, standard deviations, and inter-correlations of study measures are summarized in Table 1. An analysis of the distribution of scores (see Fig. 1) shows that there were a relatively large range of scores on both measures.

2.1. Correlation between intelligence mindset and negative attributional style

Contrary to hypotheses, TOI scores and CSQ achievement scale scores were not highly correlated ($r = -0.21$; shared variance = 4%) indicating that they are likely measuring distinct constructs.

Table 1
Means, standard deviations, and correlations.

	1	2	3	4	5	6	7	8	
1 ACT score	–								
2 GPA	0.42	–							
3 TOI	–0.14	0.00	–						
4 CSQ	0.16	0.05	–0.21	–					
5 BDI T1	–0.02	0.05	–0.10	0.32	–				
6 Stress T1	–0.14	–0.19	–0.04	0.13	0.22	–			
7 BDI T2	–0.04	0.10	–0.17	0.28	0.70	0.16	–		
8 Stress T2	–0.06	–0.14	–0.04	0.02	0.18	0.44	0.17	–	
9 Dropped course	–0.05	–0.24	–0.09	0.22	0.22	0.08	0.15	0.30	–
Mean	32.56	3.48	3.72	4.13	9.00	0.71	6.61	0.75	0.21
SD	2.00	0.35	0.98	0.81	6.71	0.46	5.87	0.43	0.41

Note. $N = 130$. ACT = American College Testing score; GPA = Grade Point Average; TOI = Theory of Intelligence measure; CSQ = Cognitive Style Questionnaire Achievement Subscale; BDI T1 = Beck Depression Inventory at Time 1; Stress T1 = Perceived academic stress at Time 1; BDI T2 = Beck Depression Inventory at Time 2; Stress T2 = Perceived academic stress at Time 2.

Higher scores on the TOI indicate greater incremental beliefs (i.e., intelligence is malleable). Higher scores on all other measures indicate greater levels of the construct being measured. Correlations in bold are significant at the 0.05 level.

2.2. Predicting end of semester GPA

We hypothesized that individuals with greater entity beliefs (i.e., lower TOI scores) and greater levels of negative attributional style (i.e., higher CSQ achievement subscale scores) would be more likely to have lower end of semester GPAs than those with greater incremental beliefs of intelligence and less negative attributional style. Hierarchical multiple regression was used to test the hypothesis (see Table 2). Results showed that neither the TOI nor CSQ achievement subscale were significant predictors of end of semester GPA. The only significant predictor of end of semester GPA was baseline GPA. As expected, higher overall GPA scores at baseline predicted higher end of semester GPA scores. Note that TOI also was not a significant predictor of GPA when entered in the absence of CSQ score and vice versa. Similarly, an exploratory analysis testing the TOI \times Stress interaction did not yield statistically significant findings.

2.3. Predicting dropped courses

We hypothesized that individuals with greater entity beliefs (i.e., lower TOI scores) and greater levels of negative attributional style (i.e., higher CSQ achievement subscale scores) would be more likely to drop a course than those with greater incremental beliefs of intelligence and less negative attributional style. Logistic regression was used to test the hypothesis (see Table 2). Results showed that baseline GPA and CSQ achievement subscale scores were the only significant predictors of whether or not a student dropped a course. Those with lower GPA scores were more likely to drop a course than those with higher GPA scores. And, those with higher CSQ scores were more likely to drop a course than those with lower CSQ scores. Note that TOI also was not a significant predictor of dropping a course when entered in the absence of CSQ score. Similarly, an exploratory analysis testing the TOI \times Stress interaction did not yield statistically significant findings.

2.4. Predicting depressive symptoms

We hypothesized that individuals with greater entity beliefs (i.e., lower TOI scores) and greater levels of negative attributional style (i.e., higher CSQ achievement subscale scores) would be more likely to experience increases in depressive symptoms than those with greater incremental beliefs of intelligence and less negative attributional style. Hierarchical multiple regression was used to test the hypothesis (see Table 2; note that change in perceived stress from pre-to-post was operationalized as a standardized residual from regressing T2 perceived stress scores onto T1 perceived stress scores). Results showed that baseline depression scores and the negative attributional style-stress

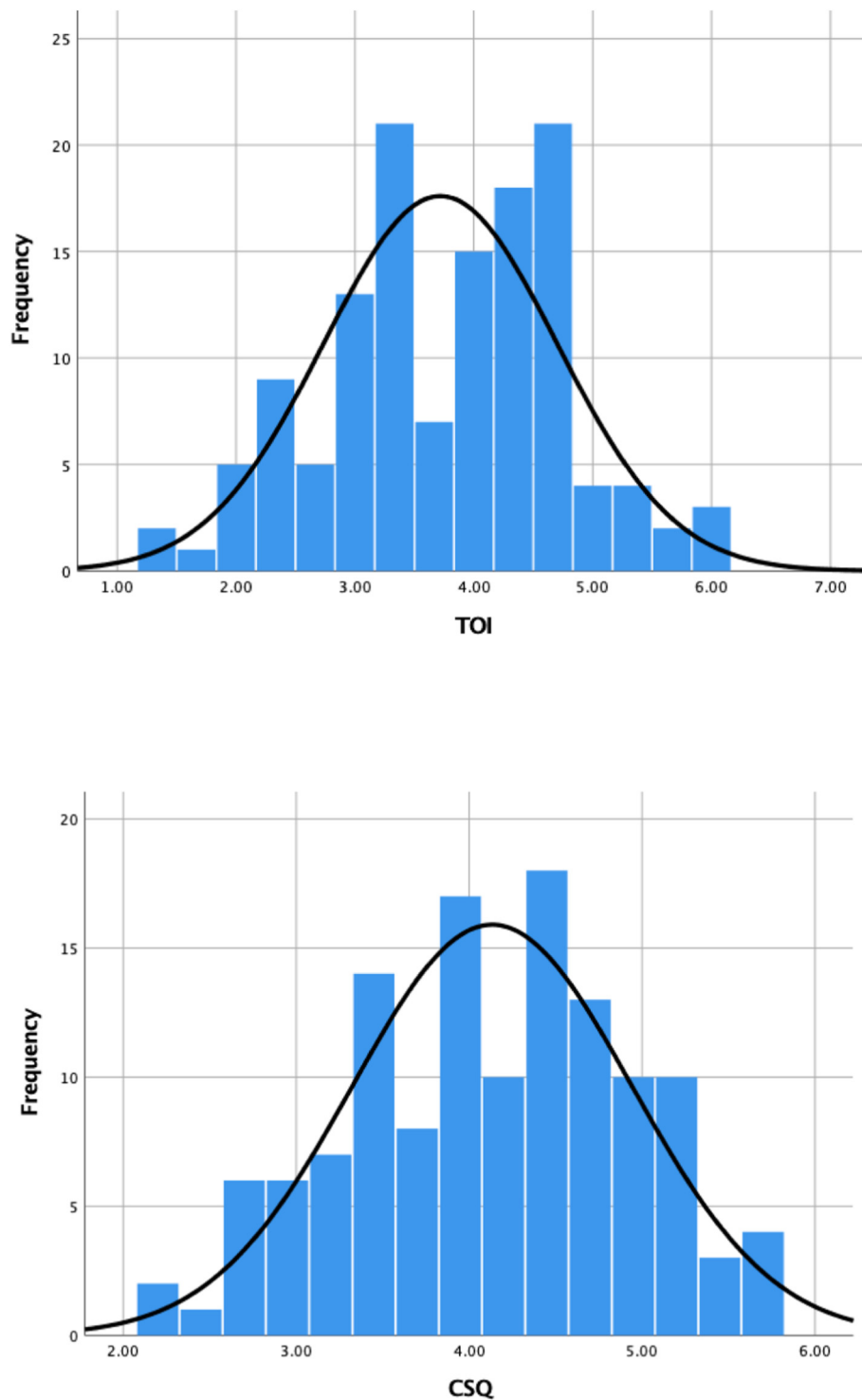


Fig. 1. Distribution of scores on the Theory of Intelligence (TOI) and the Cognitive Style Questionnaire (CSQ).

interaction were significant predictors of prospective changes in depressive symptoms. As expected, those with greater baseline depression scores also had greater levels of depression at time 2. To examine the interaction effect, we conducted a simple slope analysis (Cohen, Cohen, West, & Aiken, 2003) which showed that the gradient of the simple slope for those with “high” and “low” levels of perceived stress was significantly different depending on level of negative attributional style ($t = 17.33; p < .001$). As predicted, participants with high levels of negative attributional style and an increase in perceived stress experienced the greatest levels of depressive symptoms at the end of the

prospective interval (controlling for initial symptom levels). Note that the $TOI \times Stress$ interaction was not a significant predictor of prospective changes in depressive symptoms.

2.5. Post-hoc analysis

Prior work suggests that mindset theories of intelligence are most likely to show an effect on academic outcomes in low academically achieving samples. Thus, we conducted an exploratory analysis in which we examined the interaction of TOI and student achievement

Table 2
Cognitive vulnerability and theory of intelligence predicting academic and depressive symptom outcomes.

Predictor	<i>b</i>	<i>SE</i>	<i>pr</i>	<i>t</i>	<i>p</i>	R ² change
DV: semester GPA at Time 2						
Step 1						0.34*
ACT	0.04	0.02	0.22	1.91	0.06	
GPA T1	0.55	0.11	0.52	5.27	< .001	
Step 2						0.01
CSQ	-0.01	0.04	-0.03	-0.25	0.80	
TOI	0.02	0.03	0.07	0.60	0.55	
DV: dropped a course						
Step 1				Wald	Exp(B)	
ACT	0.04	0.15	0.08	1.04	0.78	
GPA T1	-1.79	0.73	6.06	0.17	0.01	
Step 2						
CSQ	0.88	0.35	6.34	2.41	0.01	
TOI	-0.19	0.26	0.53	0.83	0.93	
DV: depressive symptoms at T2						
Step 1						0.51*
ACT	-0.22	0.24	-0.08	-.91	0.37	
GPA T1	1.72	1.23	0.13	1.39	0.17	
BDI T1	0.61	0.06	0.71	10.79	< .001	
Step 2						0.02
CSQ	0.63	0.52	0.11	1.21	0.23	
TOI	-0.55	0.28	-0.13	-1.38	0.17	
Stress change	0.40	0.38	0.10	1.04	0.30	
Step 3						0.02*
CSQ × stress change	1.22	0.50	0.22	2.43	0.02	

Note. ACT = American College Testing score; GPA T1 = Overall Grade Point Average at T1; TOI = Theory of Intelligence measure; CSQ = Cognitive Style Questionnaire Achievement Subscale; BDI T1 = Beck Depression Inventory at Time 1; Stress Change = Perceived stress residual change score.

* $p < .05$.

(participants who scored in the bottom half of the sample on both GPA and ACT scores versus those who scored in the top half of the sample on both GPA and ACT). Results showed that the effect of intelligence mindset on future GPA (and dropping a course) did not change as a function of prior achievement status ($t = 0.89, p = .37$).

3. Discussion

The purpose of the current study was to test if mindset about intelligence represents a novel construct or if it should be considered a specific instance of a more general negative attributional style as theorized by the cognitive theories of depression (e.g., Abramson et al., 1978; Beck, 1976). Results showed that the mindset theory of intelligence (as measured by the TOI) is distinct from the negative attributional style construct featured in the hopelessness theory of depression (as measured by the CSQ). However, the TOI did not demonstrate predictive or incremental validity. The TOI did not prospectively predict end of semester GPA, dropping a class, or changes in depressive symptoms. The CSQ achievement scale predicted dropping a class and prospective changes in depressive symptoms during times of perceived academic stress.

Contrary to predictions, TOI scores were weakly correlated with CSQ scores ($r = -0.2$). This indicates that people's perceptions about the malleability of intelligence do not generalize to the inferences that they generate for negative events in their life. In other words, if an individual believes that intelligence is unchangeable, it does not mean that he or she is also more likely to view the causes of other personal or environmental variables as unchangeable. These results indicate that mindset about intelligence is a distinct construct from the negative attributional style that confers risk for depression. That said, it remains unclear if other mindset domains (e.g., beliefs about the stability of personality or mental illness), which may not overlap with intelligence

mindset, are related to attributional style and the general factor found by Schroder et al. (2016).

In our study, TOI did not demonstrate incremental or predictive validity. Intelligence mindset was not a significant predictor of academic outcomes (end of semester GPA or dropping a class) or future depressive symptoms. This finding is consistent with at least a handful of other studies (e.g., Dixon, Roberson, & Worrell, 2017; Furnham, Chamorro-Premuzic, & McDougall, 2003; Hwang, Reyes, & Eccles, 2019; Rienzo, Heather, & Wilkinson, 2015) and two recent meta-analyses showing that in experimental designs in which intelligence mindset is directly manipulated, its effect on future academic outcomes tends to be small. Effect sizes in these studies are particularly small for students performing at a high academic level. For example, Paunesku et al. (2015) found that mindset interventions tend to be most beneficial for poorly-performing students. Similarly, Yeager et al. (2018) found that an online growth-mindset intervention was only effective for students who were at significant risk for compromised well-being. These findings are consistent with the conclusions of those of Sisk et al. (2018) who found a weak relationship between mindset and academic achievement, but stated that mindset interventions may still be effective for at-risk subgroups (see also Burns & Isbell, 2007). Thus, it is possible that the TOI might have performed better if we had tested our hypotheses in a sample that was less academically high-achieving (Hwang et al., 2019). However, recent work suggests that even among low-achieving samples, the effect of mindset may not add incrementally to the prediction of achievement when controlling for socioeconomic status (SES). Specifically, Dixon et al. (2017) noted that the impact of growth mindset on achievement may be "exaggerated" as a result of not controlling for SES.

The CSQ was a significant predictor of depressive symptoms, which is consistent with prior research (see review by Haefel et al., 2008). This was among the first studies to show that the CSQ could also predict academic related outcomes. Specifically, the CSQ achievement subscale was a significant predictor of whether or not participants dropped a course (even after controlling for initial GPA and ACT scores). We suspect that the effect of the CSQ might be mediated by hopelessness. Students with a negative attributional style become hopelessness about their ability to improve their grade and, in turn, drop the course. It may be fruitful for future research to use a three-time point study in which possible mediators of the effect of CSQ on dropping a course (e.g., hopelessness beliefs) could be measured and tested.

These results raise the following question: why would a measure of vulnerability to depression be a better predictor of academic outcomes than a measure of intelligence mindset, which was specially theorized to be a predictor of academic outcomes? The most parsimonious explanation is that individual differences in how people think about academic stress is more important for predicting their achievement (and depressive symptoms) than individual differences in how people think about the stability of their intelligence. Indeed, the results of the current study combined with recent experimental work raises concerns about the predictive validity of intelligence mindset. However, as Swann, Chang-Schneider, and McClarty (2007) warn, it may be premature to totally dismiss intelligence mindsets before considering the "match" between the TOI and the outcomes to be predicted. Under what conditions might we expect a fixed mindset about intelligence be most predictive? According to mindset theory, an entity mindset is detrimental because it is more likely than an incremental mindset to lead people to adopt a performance rather than mastery orientation. This theory is typically applied to all students, regardless of contextual factors. However, it is possible that having an entity mindset is not always maladaptive. For example, if someone has high intelligence (or perceives being of high intelligence) and is generally doing well academically, then having the fixed mindset may actually lead them to persist during adversity because they are confident in their intellectual abilities (Castles, 2012; Eccles & Wigfield, 2002). However, if one is of low intelligence (or perceives themselves as low intelligence), then

believing intelligence is fixed is likely to be detrimental during times of adversity because they are helpless to improve their intellectual abilities. This reasoning is consistent with research indicating that the mindset theories of intelligence are most likely to show an effect on academic outcomes in low academically achieving samples (perhaps those who question their intellectual abilities). That said, the post-hoc exploratory analysis in which we examined the interaction of TOI and student achievement (participants who scored in the bottom half of the sample on both GPA and ACT scores versus those who scored in the top half of the sample on both GPA and ACT) showed that the effect of intelligence mindset on academic outcomes did not change as a function of prior achievement status. However, it is important to remember that the “low-achieving” subset of in the current sample is still higher achieving than most students at in United States colleges.

This study had both strengths and limitations. It was the first to test the incremental validity of the TOI measure over what was hypothesized to be a highly similar construct. Such comparisons have the potential to constrain the production of overlapping constructs and theories as well as indicate points for integration. Further, the study used a prospective longitudinal design, which enabled us to establish temporal precedence for the effect of mindset theory and negative attributional style on two academic outcomes as well as changes in depressive symptoms. The study also had limitations. First, we used a sample of highly motivated and high-achieving undergraduate students, which raises questions about generalizability of our findings to at-risk student populations. Further, we only examined outcomes for a single academic semester. It is possible that the effect of an entity mindset of intelligence could emerge over a longer prospective interval. Additionally, the current study used a measure of stress that consisted of a single self-report item. It will be useful for future research to use a measure of stress that is more comprehensive in scope. Finally, the sample tended to have low levels of depressive symptoms, so it is unclear if results would generalize to populations with clinically significant levels of depression.

The results may have practical implications. If colleges want to improve academic outcomes, then it may be preferable to target negative attributional style rather than intelligence mindsets. Reducing negative attributional styles is more likely to benefit students emotionally and academically (e.g., Seligman, Schulman, DeRubeis, & Hollon, 1999) than changing their beliefs about intelligence. That said, it may be difficult to overcome the popularity of the fixed mindset hypothesis. The mindset hypothesis has received an incredible amount of attention from administrators, teachers, and laypeople. A Google search for intelligence mindsets has > 100 times the number of hits (45,000,000 hits) as a search for negative attributional style (400,000 hits). Thus, getting universities to attend to the sizeable body of research on attributional style may be difficult relative to their exposure to articles on intelligence mindsets.

In conclusion, this study examined whether mindset theories are a specific instance of the vulnerability construct featured in the cognitive theories of depression or a truly unique construct. Results showed that the mindset theory of intelligence is distinct from negative attributional style. However, intelligence mindset, as measured by the TOI, did not exhibit predictive or incremental validity for academic and depressive outcomes. This finding adds to a growing literature suggesting that trying to change entity mindset theories of intelligence may have limited real world value.

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