COMPARING PERFORMANCE ON PREDICTORS OF ACADEMIC ACHIEVEMENT AMONG YOUNG ADULTS WITH AND WITHOUT TRAUMATIC BRAIN INJURY (TBI)

by

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As members of the Master's Committee, we certify that we have read the thesis prepared by Danielle Girard, titled Comparing Performance on Predictors of Academic Achievement among Young Adults with and without Traumatic Brain Injury (TBI) and recommend that it be accepted as fulfilling the thesis requirement for the Master's Degree.

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Abstract

Purpose: We investigated if performance on established predictors of academic achievement, namely self-efficacy, self-compassion, and growth mindset differ between young adults, primarily college students, with a history of traumatic brain injury (TBI) and their peers without TBI history.

Method: Eighty-nine respondents anonymously filled out a brief online survey that included demographic questions regarding age, student status, possible TBI history and characteristics, and completion of three standardized predictive measures of academic achievement: the New General Self-Efficacy Scale (Chen et al., 2001), Self-Compassion Scale–Short Form (Raes et al., 2011), and Growth Mindset Scale (Dweck, 1999). An additional 12 participants with TBI from a previous study (Ackley, 2022) were included in our analyses. Data analyses were conducted to compare results at the group level between those participants with and without a TBI history. Additional analyses were conducted to investigate possible relationships between participant characteristics and outcome measures, as well as between the outcome scales.

Results: At the group level, respondents with a history of TBI demonstrated a statistically significant higher growth mindset than peers without a TBI history. Additionally, an age- and gender-matched comparison of a smaller subsample confirmed the group difference on growth mindset and revealed statistically significant higher self-efficacy scores among the student group with a TBI history. Neither age, nor gender were significantly related with the three outcome variables. Self-efficacy and self-compassion scores were significantly negatively correlated among all participants and growth mindset scores were not correlated with the other scales. TBI characteristics such as lifetime number of TBIs and severity of most recent TBI did not predict growth mindset scores among participants with TBI history.

Conclusion: As a group, individuals with TBI—both college students and non-students—did not demonstrate significant differences on measures of self-efficacy and self-compassion relative to uninjured peers. They also demonstrated higher growth mindset. Thus, evidence does not support the assumption that these are areas of deficit for individuals with TBI history, which suggests that the New General Self-Efficacy Scale (Chen et al., 2001), Self-Compassion Scale—Short Form (Raes et al., 2011), and Growth Mindset Scale (Dweck, 1999) are not meaningful ways of measuring progress during cognitive-linguistic treatment in college students who have sustained TBIs unless an individual demonstrates specific deficits in these areas.

Keywords: Traumatic Brain Injury, Academic Achievement, College Students, Self-Efficacy, Self-Compassion, Growth Mindset, Cognitive Rehabilitation, Cognitive-Communication Treatment

Introduction

The US Centers for Disease Control and Prevention (CDC) and World Health Organization (WHO) characterize Traumatic Brain Injury (TBI) as "an occurrence of injury to the head from physical force, to which one or more of the following symptoms or findings is attributable *(a)* decreased or altered level of consciousness or amnesia; *(b)* other neurological or neuropsychological changes; *(c)* skull fracture; *(d)* traumatic intracranial lesions; or *(e)* death" (Thurman, 2016, p. 20). TBI is a high-incidence condition affecting more than 10 million individuals worldwide. Epidemiological studies have indicated a higher incidence of TBI among young people, particularly in late adolescence. In the United States, adolescents aged 15-19 years are one of the most likely groups to have a TBI-related visit to the emergency department or hospitalization (Centers for Disease Control, 2015). Furthermore, it is possible that young adults within this age range who sustained a TBI may not encounter the full effects and challenges of their cognition until starting college due to the increased independence required for many students at this transition point (Centers for Disease Control, 2018).

TBI Sequalae and Severity Characterization

Possible TBI sequalae includes neurological, physical, and social-emotional changes (Hux et al., 2010). The presence and severity of symptoms can vary greatly between individual TBI survivors and often include changes in cognition, emotion, behavior, motor abilities, and sensation (Centers for Disease Control, 2015). Possible cognitive changes include deficits in attention, memory, executive functioning, and concentration (Hux et al., 2010). Many survivors of severe TBI report lasting deficits in these areas, which can negatively impact the academic performance and social participation of college students who experience these challenges.

Traumatic brain injuries (TBIs) are characterized as mild, moderate, or severe soon after the time of injury. This classification system uses the following criteria: structural imaging findings (e.g., computed tomography and/or magnetic resonance imaging), presence and duration of loss of consciousness, presence and duration of post-traumatic amnesia, and scoring of the Glasgow Coma Scale, which medical providers use to rate the person's eye opening, verbal response, and motor response (Centers for Disease Control, 2015). However, severity criteria alone are an insufficient predictor of outcomes, and individuals with mild TBIs (mTBIs)—also referred to as concussions—can also experience long-term symptoms that negatively impact daily functioning (Hux et al., 2017). Hux et al. (2010) highlighted that two common TBI sequelae—difficulty learning new information and difficulty applying known information in novel ways or new situations—create challenges for college students who have sustained TBIs.

TBI Impact in College Age Population

Hux et al. (2017) examined the chronic symptomatology of 118 undergraduate students with self-reported documented and undocumented mild brain injury and its possible correlations with academic outcome variables. The researchers administered a survey that asked participants about general health, daily habits, academic performance, and potential mild brain injury sequelae including physiological, cognitive, and socio-emotional complaints. The authors found that 40% of respondents reported negligible symptomatology, 49% presented with moderate chronic symptomatology, and 11% with high symptomatology. Notably, respondents with high symptomatology were five times more likely to report issues with memory, speed of processing, learning new information, and paying attention than those in the moderate or negligible symptomatology groups. Additionally, the high symptomatology class differed academically

from the other two groups, which confirmed the researchers' initial hypothesis that these individuals would likely experience greater academic challenges. Findings included significantly lower grade point averages relative to participants with moderate symptomatology and a significantly increased number of failed classes compared to both the moderate and negligible symptomatology groups. The authors stated that these findings are consistent with other researchers' findings regarding the academic performance of college students who have mild brain injury histories and the long-lasting functional impact of mild brain injuries.

Cognitive-Linguistic Treatment for College Students with TBI History

Unfortunately, current TBI sequelae management in both children and adults lacks a strong evidence base (Centers for Disease Control, 2018). This directly impacts the speech-language pathologists (SLPs) responsible for treating college students with TBI whose cognitive-communication symptoms may negatively impact their academic performance. In a recent narrative literature review of speech-language pathologists' practices regarding college students with TBI, Ackley and Brown (2020) found little evidence to support specific assessment and treatment practices. Of note, the authors stated that most of the evidence found was not experimental. Given this gap in the literature, Ackley (2022) designed a study to compare the outcomes of an established cognitive-linguistic treatment protocol (Dynamic Coaching) and a novel treatment protocol that included injury-related education for 12 college students with TBI (ages 20-24). Among the outcome measures assessed, the author was interested in each participant's likelihood of academic achievement before treatment compared to after treatment to assess whether the treatment had a positive effect on academic achievement. This was measured pre- and post- treatment using the following predictors of academic achievement: the New

General Self-Efficacy Scale (Chen et al., 2001), the Self-Compassion Scale (Raes et al., 2011), and the Growth Mindset Scale (Dweck, 1999).

Self-Efficacy in College Student Population

General self-efficacy is defined as a "relatively stable, trait-like, generalized competence belief" of one's capability to meet demands across various situations (Chen, et al., 2004). Researchers have found positive correlations between academic self-efficacy and academic achievement (i.e., higher grade point averages) among both undergraduate and masters-level students (Komarraju & Nadler, 2002; Nasir & Iqbal, 2019). Similarly, Zheng et al. (2020) found that self-efficacy was a direct predictor of first- and second-year U.S. medical students' academic achievement; however, the authors did not distinguish between general self-efficacy and academic self-efficacy concepts within their study.

Self-Efficacy in TBI Population

Evidence suggests that perceived self-efficacy for the management of cognitive symptoms may contribute to an adult with TBI's overall subjective well-being by mediating the relationship between the individual's expectations and achievements (Cicerone & Azulay, 2007). Sheenen et al. (2017) noted that perceived self-efficacy is a component of resilience, and that high self-efficacy is linked to active coping in response in adult patients with mTBI as they respond to daily troubles. Trontel et al. (2013) also found that academic self-efficacy is a significant predictor of academic continuance and academic achievement among undergraduate students with a history of mild TBI. Taken together, these studies suggest the self-efficacy is an important variable to consider in TBI management as individuals who have a history to TBI who have higher self-efficacy tend to have better well-being, coping, and academic achievement.

However, across these studies, researchers used different questionnaires and scales to assess self-efficacy, thus making it challenging to compare outcomes across studies to determine if individuals with TBI differ from the general population on these concepts.

Self-Compassion in College Student Population

Self-compassion involves regarding oneself with kindness (rather than harsh critique), understanding one's suffering as part of a common, rather than isolated, human experience, and mindfully responding to painful thoughts and feelings with a balanced view (Neff, 2003a). Researchers have found that self-compassion is an important construct for university students. Egan et al. (2022) found "strong, clear associations between better academic performance and higher resiliency, mindfulness, self-compassion and consideration of future consequences, and negative associations to procrastination" among undergraduate students in the United Kingdom. (p. 301). Furthermore, Tang (2019) found that higher self-compassion was associated with lower test anxiety among undergraduate students in Hong Kong. The author stated this finding was consistent with previous research which demonstrated that self-compassion is positively correlated with academic achievement (i.e., students with higher self-compassion tended to have higher grade point averages than those peers with lower self-compassion).

Self-Compassion in TBI Population

Desdentado et al. (2021) cited previous evidence that self-compassion may also "be a key self-construct after ABI [acquired brain injury] because it has been shown to be a helpful self-related process in alleviating emotional suffering in several clinical and non-clinical samples" (p. 900). Specifically, Desdentado et al. (2021) were interested in examining how self-compassion—along with other self-related factors (e.g., self-esteem)—impact anxiety and depressive

symptomatology in individuals with acquired brain injury (ABI), particularly given this clinical population's high rates of anxiety and depression symptoms. The researchers found that participants with ABI who scored lower in anxiety and depression symptoms, scored higher in self-compassion on Neff (2003a) Self-Compassion Scale (SCS). The authors stated that these results were consistent with previous findings, further explaining that higher self-compassion correlates to lower self-criticism and self-judgment, which leads to less distressing symptoms, such as anxiety and depression. Together, these findings suggest that self-compassion may be an influencing factor in rehabilitation and treatment outcomes for university students who have sustained TBIs as it may affect both their anxiety and depressive symptomatology and their academic performance.

Growth Mindset in College Student Population

A growth mindset is characterized by the belief that one's intelligence and ability are malleable rather than fixed and can be further developed via effort and experience (Aronson et al., 2002; Rammstedt et al., 2022). In educational contexts, growth mindset is strongly associated with an individual's ability to adapt to challenges; researchers have observed this correlation in both adolescents and adult populations (Zander et al., 2018). Aronson et al. (2002) also found that encouraging college students to view intelligence as malleable (i.e., cultivating a growth mindset) increased self-reported enjoyment and valuing of academics when compared with two control conditions. Furthermore, students who received this encouragement also achieved higher grades compared to control groups.

Growth Mindset and Resilience in TBI Population

Although extant literature does not include studies that explicitly investigated and measured the concept of growth mindset and its possible impact on TBI outcomes, researchers have cited growth mindset as a predictor of a related construct: resilience (Callahan et al., 2023). Resilience in the university context is defined as students' response to adversity "by trying new things in life, adjusting their emotions, and believing the best in the future" (Tang, 2019, p. 93). Rabinowitz and Arnett (2018) noted that researchers are increasingly interested in how positive psychology constructs such as positive affect, hope, optimism, adaptive coping style, and resilience interplay with TBI rehabilitation. Notably, the researchers mentioned that although many of these traits predict better psychosocial outcomes, individuals with TBI are less likely to demonstrate optimism, resilience, and adaptive coping strategies compared to their uninjured peers. In a systematic review examining the construct of resilience and mild TBI outcomes, Sullivan et al. (2016) explained that although researchers have theorized that this concept is related to TBI outcomes, empirical data is scarce. Across the five studies examined (from an initial 71 identified studies), researchers used self-report measures to assess resilience and its relationship to post concussion symptoms. Overall, higher trait resilience was associated with better outcomes, but Sullivan et al. (2016) cautioned readers that the evidence is insufficient grounds for strong interpretations and conclusions. One of the authors' main objections included that the studies conceptualized and operationalized resilience differently. Thus, the effect of growth mindset and related constructs (i.e., resilience) is not well understood among individuals with a history of TBI.

Predictors of Academic Achievement in College Students with TBI History

Although extant literature indicates that self-efficacy, self-compassion, and growth mindset may be relevant concepts to consider when supporting individuals with TBI, there are currently no validated predictive measures of academic achievement standardized for college students with Traumatic Brain Injury (TBI). For this reason, Ackley (2022) used the New General Self-Efficacy Scale (Chen et al., 2001), the Self-Compassion Scale (Raes et al., 2011), and the Growth Mindset Scale (Dweck, 1999) that have been widely employed with healthy college-age samples to measure likelihood of academic achievement of her participants pre- and post-treatment. Although these scales were normed for a general college population, the original studies did not explicitly exclude participants with a documented history of TBI. Therefore, the existing scales' normative data may not provide an appropriate comparison for those with a TBI history because the original data may include both individuals with and without a TBI history, rather than only individuals without a TBI history. The twelve participants in Ackley (2022) demonstrated widely variable scores pre- and post-treatment on all three predictive measures of academic achievement, which indicated that not all individuals who have experienced TBI have lower self-efficacy, self-compassion, and/or growth mindset. For example, the range of scores reported for participants on pre-test self-efficacy indicated that some participants achieved the minimum score on this scale, whereas others achieved the maximum score. This suggests significant inter-individual variability among participants with TBI history.

Results also showed that participants in the dynamic coaching treatment showed no significant change in self-efficacy following treatment, but there was a marginally significant decrease in self-efficacy among participants in the novel treatment (Ackley, 2022). Neither group showed significant change in self-compassion following treatment. Finally, participants in the

dynamic coaching model did not significantly change in growth mindset following treatment, but participants in the novel treatment demonstrated lower growth mindset post-treatment. The results of Ackley et al. (2022) suggest that treatment may impact self-efficacy and growth mindset among college students with a history of TBI; however, it remains unclear whether self-efficacy, self-compassion, and growth mindset are lower among individuals who have experienced TBI relative to peers who have not experienced TBI. If these are not areas of challenge for this population, then they may not be appropriate targets for intervention.

Study Aims & Research Questions

The current study intends to address this research gap by addressing whether young adults, who are primarily college students, with a history of TBI score differently on predictors of academic achievement when compared to a demographically similar sample that does not include individuals with TBI. Specific research questions are:

1. How does performance compare between young adults with and without TBI history on the New General Self-Efficacy Scale (Chen et al., 2001)?
2. How does performance compare between young adults with and without TBI history on the Self-Compassion Scale—Short Form (Raes et al., 2011)?
3. How does performance compare between young adults with and without TBI history on the Growth Mindset Scale (Dweck, 1999)?

These specific scales were used for two reasons a) they are the most widely used validated scales to measure these concepts (albeit normed for a general population) and b) comparisons were made between the scores of non-TBI participants of this study and participants with confirmed TBI history from Ackley (2022) to determine if statistically significant

differences exist between the two groups. Lastly, the clinical implications of using these scales as outcome measures during cognitive-linguistic treatment for college students with TBI are explored in the discussion section.

Method

All study procedures and materials were reviewed by The University of Arizona Human Subjects Protection Program and approved by the institutional review board.

Participants

Participants were recruited via intradepartmental and interdepartmental email listservs, undergraduate class postings, and flyers that were posted on campus. Interested individuals were prompted to visit the Qualtrics questionnaire directly to read the online unsigned informed consent form, which provided all study related details and the option to proceed with participation. Both recruitment materials and the informed consent webpage instructed prospective participants to contact the primary investigator (PI) directly regarding questions prior to survey completion. See Appendix A for the approved consent statement.

Inclusion criteria for this study required participants to be:

- 18 years of age or older
- English speaking (native or non-native speaker with additional languages acceptable)

This study did not have exclusionary criteria. The absence of exclusionary criteria allowed for broader data collection.

Ninety-five individuals completed the survey, but five were excluded from data analyses because their total survey duration was less than one minute. One participant was excluded from

data analyses because the individual was unsure of their TBI status, but their demographic information is included in the following descriptions. Of the 90 survey respondents including the individual who was unsure of their TBI status, 79 identified as female and 11 as male. One participant was a part-time undergraduate student, 42 participants were full-time undergraduates, 6 were part-time graduate students, 21 respondents were full-time graduate students, and 20 identified as non-students. The age range of all participants was 19-50 years (M = 24.59). The age range of participants without TBI history (n = 72) was 19-45 years (M = 24.5). For those with a TBI history (n = 17), the age range was 19-50 years (M = 24.82).

Self-reported responses regarding TBI history of participants included the following information.

TBI History

Seventeen participants reported TBI history, 72 reported no TBI history, and one reported they were unsure of TBI history. This individual who was unsure was excluded from the data analyses given that the goal of the study was to compare outcomes between those respondents with and without TBI history and this participant could not be confidently assigned to either group.

Lifetime Number of TBIs

Of the 17 of participants who reported TBI history, eight participants reported only one TBI in their lifetime, five participants reported a history of two TBIs, two participants reported three TBIs, one participant reported four TBIs, and one participant reported 10 TBIs.

Duration of Time Since Most Recent TBI

Duration of time since most recent TBI ranged from six months to 36 years, with a group average of approximately 75 months (6;3), which reduced to four years (4;5) if the average excluded the single participant whose TBI occurred 36 years ago.

Severity of Most Recent TBI

The severity of participants' most recent TBIs included 10 mild TBIs, 5 moderate TBIs, 2 severe TBIs.

Lifetime TBI Severity

Of the 11 participants who reported more than 1 TBI in their lifetime, only one of them listed a severity level that differed from their most recent TBI. The participant who sustained 10 TBIs reported that their most severe TBI was severe, whereas the most recent TBI was self-reported as moderate.

TBI Symptoms Present at Time of Study

Two participants endorsed experiencing symptoms that resulted from their TBI at the time of study participation. One participant who sustained a moderate TBI ten years ago endorsed "headache, memory loss, short attention span, learning difficulties." The other participant who sustained a moderate TBI eighteen months ago endorsed "memory loss increased impairment while drinking." One participant who sustained a severe TBI six years ago reported being unsure if they were currently experiencing symptoms from their concussion at the time of the study.

Matched Groups Selection

Because 20 respondents of this survey did not identify as students and we relied on self-reported TBI history, we identified 12 age- and gender-matched college student participants without a TBI history who could be matched with the participants from Ackley (2022) who were all students with documented TBI history. This allowed us to conduct a more focused analysis of 24 students with and without TBI history, in addition to our full analysis of the 89 participants (students and non-students). The twelve participants of Ackley (2022) were between the ages of 20 and 24, used English as their primary language, and had a documented history of TBI that had occurred within 36-months prior to study initiation. These participants were also enrolled in at least one college-level class at the time of study initiation. Refer to Table 1 for demographics of these participants. All participants' TBI severity levels, except for those of one individual, were based on documented medical records rather than self-report. Our matched participants were selected to have the same reported gender as their match from Ackley (2022) and were within two years of the matched participant's age. Note that P11 from Ackley (2022) could not be gender matched because they preferred not to identify, but all of the participants in our current data reported male or female gender.

Table 1
Age- and gender-matched college students with and without TBI history

Ackley (2022)				Matched participants			
Participant	Age	Gender	Lifetime TBIs	Participant	Age	Gender	Lifetime TBIs
P1	22	M	1	S71	22	M	0
P2	22	F	4	S5	22	F	0
P3	21	M	3	S82	20	M	0
P4	20	F	3	S7	20	F	0
P5	20	M	1	S67	20	M	0
P6	21	M	1	S12	21	M	0
P7	23	F	1	S1	23	F	0
P8	21	F	1	S19	20	F	0
P9	24	M	4	S47	26	M	0
P10	24	M	3	S88	24	M	0
P11	21	Prefer not to identify	1	S45	21	F	0
P12	21	F	1	S52	21	F	0

Note. All participants from Ackley (2022) were full-time or part-time college students with documented TBI history. Severity of most recent TBI included mild (n=10) and severe (n =2).

Procedures

Each participant independently and anonymously completed an online Qualtrics survey. The questionnaire included three main sections and required approximately 5 to 10 minutes to complete. First, all participants answered demographic questions. Second, those participants who self-reported a history of TBI were asked follow-up questions regarding the severity and occurrence of their most recent TBI and total number of TBIs sustained. Third, participants completed the same three standardized predictive measures of academic achievement that were used as outcome measures in Ackley (2022): the New General Self-Efficacy Scale (NGSE) (Chen et al., 2001), Self-Compassion Scale–Short Form (SCS–SF) (Raes et al., 2011), and Growth Mindset Scale (Dweck, 1999). Appendix B includes the questions asked in both part one

and part two of the survey, and Appendix C includes the predictive scales of academic achievement. To control for order effects, the order in which participants completed the three scales was randomized across participants.

Measures

Self-Efficacy Scale. Self-efficacy refers to "beliefs in one's capabilities to mobilize the motivation, cognitive resources, and courses of action needed to meet given situational demands" (Wood & Bandura, 1989, p.408). The New General Self-Efficacy Scale (NGSE) was developed by Chen et al. (2001). The NGSE is an eight-item self-report measure that asks individuals to rate their sense of self-efficacy across a variety of contexts (e.g., "I will be able to achieve most of the goals I have set out for myself."). Participants rate their level of agreement with each statement on a 5-point Likert scale ranging from *strongly disagree* (1) *to strongly agree* (5). The overall NGSE score is the mean of participant responses to each item. Possible NGSE scores range from 1 to 5. Refer to Table 2 for test-retest and internal consistency values for the NGSE. Of note, Chen et al. (2001) did not indicate if participants in the normative sample did or did not have history of TBI. The content validity of the NGSE was established by having two independent panels of graduate and undergraduate psychology students rate the items of the NGSE as representing the construct of general self-efficacy versus self-esteem. Graduate raters categorized 98% of the NGSE items as representing general self-efficacy, and only 2% of the items were rated as self-esteem. Similar results were found for undergraduate raters, with 87% of items rated as GSE and 11% categorized as self-esteem.

Table 2
Psychometric Properties of New General Self-Efficacy Scale (NGSE)

Study	N	Age	Mean	Test-Retest Reliability	Internal Consistency
Chen et al. (2001) Study 1	316	24	--	Time 1 vs, 2 *r* = .62 Time 2 vs. 3 *r* = .65 Time 1 vs. 3 *r* = .66	Time 1 α = .87 Time 2 α = .85 Time 3 α = .88
Chen et al. (2001) Study 2	323	23	Time 1 = 3.87 Time 2 = 3.91	*r* = *.67*	Time 1 α = .86 Time 2 α = .90
Chen et al. (2001) Study 3	54	38	Time 1 = 4.14 Time 2 = 4.16	*r* = .86	Time 1 α = .85 Time 2 α = .86
Chen et al. (2004) Sample 2	165	42	3.88	--	α = .82
Scherbaum et al. (2006)	606	college-age	3.91	--	α = .85
Van Straten et al. (2008)	1050	30-80+	3.51	--	α = .74
Alexopoulos & Asimakopoulou (2009)	551	10;4	3.69	*r* = .48	α = .67

Note. None of the listed studies specified if participants did or did not have Traumatic Brain Injury (TBI).

Self-Compassion Scale. Self-compassion refers to the ability to regard one's "feelings of suffering with warmth, connection, and concern" (Raes et al., 2011, p.250). When Neff (2003b) developed and validated the original long-form self-compassion scale (SCS), she explained how self-compassion involves understanding one's experiences of pain and suffering as connected to – rather than isolated from – the larger human experience. The scale was designed to measure participants' self-ratings of the three main components of self-compassion: self-kindness vs. self-judgement, common humanity vs. isolation, and mindfulness vs. over-identification.

The scale included 71 items across six subscales (self-kindness, self-judgement, common humanity, isolation, mindfulness, and over-identification). Participants rate their responses along a 5-point Likert scale from *almost never* (1) to *almost always* (5) (e.g., "I try to be understanding

and patient towards those aspects of my personality I don't like."). During analysis, researchers reverse score the negative subscale items (e.g., "When I fail at something important to me I become consumed by feelings of inadequacy."). On these negative subscale items, a participant response of 1 is scored as 5, a response of 5 is scored as 1, and so forth. Raes et al. (2011) constructed and validated a short-form version of the SCS (SCS–SF) with the goal of creating a more efficient but equally reliable tool. The authors established factorial (structural) validity of the short-form version of the Self-Compassion Scale (SCS) by conducting confirmatory factor analyses across three sample groups. The authors reported that the SCS–SF demonstrated a "a near-perfect correlation with the long form SCS ($r \geq 0.97$ all samples)" and maintained the original scale's six-factor structure (Raes et al., 2011, p. 252). Participants rated 12 statements on a 5-point scale in the same manner as the longer form. Total SCS–SF scores are calculated as the mean participant response after negative items have been rescored (see details above). Possible scores range from 1 to 5.

This study used the SCS-SF version to allow for direct comparison with the pre-treatment scores of the participants with TBI in the Ackley (2022) study, in which SCS-SF rather than SCS was used as an outcome measure. Refer to Table 3 for test-retest and internal consistency values for the SCS-SF. Raes et al. (2011) did not specify if normative sample participants did or did not have history of Traumatic Brain Injury (TBI).

Table 3
Psychometric Properties of Self-Compassion Scale–Short Form (SCS–SF)

Study	N	Age	Mean	Test-Retest Reliability	Internal Consistency
Raes et al. (2011)	415	20.62	3.0	--	α = .86
Garcia-Campayo et al. (2014)	271	38.43	2.82	*r* = .89	α = .85
Hayes et al. (2016)	1609	22.74	2.84[c]	--	α = .85
Alfonsson et al. (2023)	1,089	30.8	2.99	*r* = .84	α = .86
Alfonsson et al. (2023)[a]	253	25.7	2.26	--	α = .87
Alfonsson et al. (2023)[b]	151	26.6	1.88	--	α = .78

Note. None of the listed studies specified if participants did or did not have Traumatic Brain Injury (TBI).

a. Participants diagnosed with eating disorder; b. Participants diagnosed with borderline personality disorder; c. Mean value for participants without previous suicide attempt (*n* = 1318).

Growth Mindset Scale. Growth mindset is defined as the belief that a person's intelligence and aptitude are capable of change and further development (Dweck, 2006). This belief is contrasted with a fixed mindset which involves thinking that it is not possible to change one's baseline intelligence and skills. In other words, an individual with a fixed mindset about their math aptitude may believe, "I'm bad at math," with the implication of *always, regardless of how much time and effort I invest,* whereas someone with "growth mindset" may believe, "This type of math problem is challenging for me, but I think with more practice and tutoring, I can improve my ability to solve it."

The 3-item Likert scale that measures growth mindset was developed by Dweck et al. (1995) and initially called the Implicit Theories of Intelligence Scale (ITIS), which was a subset of an implicit theories test that included items to target participants' beliefs about the fixed versus malleable nature of intelligence, morality, and the world. The intelligence scale consists of three statements, phrased with fixed mindset language, e.g., "You have a certain amount of

intelligence, and you can't really do much to change it." Dweck et al. (1995) used factor analyses to determine whether the three scales of the test represented separate constructs, and confirmed that across five independent samples, the intelligence items formed a factor that was distinct from participants' beliefs about morality and the world.

Dweck (1999) later expanded it to an 8-item scale. Rammstedt et al. (2022) reported that despite being widely used in research (with the 3-item scale being the most commonly used), very little research has been conducted regarding the psychometric properties of both scale versions. This study used the 3-item version to allow for direct comparison with the pre-treatment scores of the participants with TBI in the Ackley (2022) study. On the Growth Mindset Scale, participants rate their level of agreement with each statement on a 6-point scale with 1 = strongly agree to 6 = strongly disagree. Total scores reflect participants' mean response across the three items. Possible scores range from 1 to 6. Refer to Table 4 for test-retest and internal consistency values for the Growth Mindset Scale. Dweck et al. (1995) did not state if participants of the normative sample did or did not have history of Traumatic Brain Injury (TBI).

Table 4
Psychometric Properties of Growth Mindset Scale (3-item)

Study	*N*	Age	Mean	Test-Retest Reliability	Internal Consistency
Dweck et al. (1995) Study 1	69	--	3.96	--	α = .96
Dweck et al. (1995) Study 1	62	--	3.71	*r* = .80	--
Dweck et al. (1995) Study 2	184	--	3.80	--	α = .94
Dweck et al. (1995) Study 3	139	--	3.79	--	α = .94
Dweck et al. (1995) Study 4	121	--	3.97	--	α = .96
Dweck et al. (1995) Study 5	93	--	3.73	--	α = .96
Dweck et al. (1995) Study 6	32	--	3.57	--	α =.97
Rammstedt et al. (2022)	362	17.27	3.89	*r* = .67	α = .83
Rammstedt et al. (2022)	365	43.88	3.73	*r* = .45	α = .91

Note. None of the listed studies specified if participants did or did not have Traumatic Brain Injury (TBI).

Scoring Procedures

For the New General Self-Efficacy Scale (Chen et al., 2001) all items were scored as previously described with a mean score calculated across items; a higher mean score indicated higher self-efficacy. All three items on the Growth Mindset Scale (Dweck et al., 1995) are worded negatively (i.e., fixed mindset) so the scale is reverse scored and a higher mean score represents a higher growth mindset. For the Self-Compassion Scale–Short Form (Raes et al., 2011), negatively-worded items 1, 4, 9, 11, and 12 were reverse-scored (i.e., a "strongly disagree" that would be scored as a "1" for a positively-worded item was scored as a "5" for a negatively-worded item, et al.). Thus, a higher mean score indicated higher self-compassion. We re-scored

the deidentified participant data of the 12 participants from Ackley (2022) according to this procedure to allow for comparison.

Statistical Analyses

The IBM® SPSS® 28.0.0.0 software platform was used to conduct all data analyses. As a reminder, of the 90 survey participants described in the "participants" section, the single individual who chose "unsure" for TBI status was excluded from analyses because analyses were intended to compare scores of participants with and without a TBI history. This participant who reported that they had experienced a head injury but had not sought medical care could not confidently be included in either group. Thus, the data set used for statistical analyses included a total of 89 survey participants with self-reported TBI history (n = 72) and without reported TBI history (n = 17), as well as the 12 participants with a documented TBI history from Ackley (2022). These 12 participants were included in all statistical analyses unless stated otherwise, N = 101.

Independent samples t-tests were employed to compare outcomes between participants with and without TBI history and between genders. Mean scores on outcome scales were compared between participants with a TBI history (n = 29) versus those without a TBI history (n = 72). We also compared a subset of 24 college student participants comprising 12 participants with a documented history of TBI from Ackley (2022) and 12 age- and gender-matched survey participants with no reported TBI history.

A correlational analysis was used to examine possible correlations between participant age and scores on each of the three predictive scales of academic achievement, as well as scores between scales. A linear regression analysis was conducted to determine if either of the

following two variables, severity of recent TBI or lifetime number of TBIs, predicted growth mindset among the participants with reported history of TBI.

Results

Effect of TBI Status

The results of the independent samples t-tests revealed that at the group level, participants with a TBI history had equivalent scores on self-efficacy, $t(99) = -1.60$, $p = .11$, $d = .89$, and self-compassion $t(97) = 1.14$, $p = .26$, $d = .65$, compared with participants without a TBI history. The group means differed on growth mindset: at the group level, those with reported TBI history had a statistically significant higher group mean score $t(98) = -3.97$, $p < .001$, $d = 1.31$, relative to participants with no reported history TBI history. This pattern of results remains consistent if the sample is limited to participants who are currently students. Excluding participants without TBI history who are not students ($n = 11$) and participants with TBI history who are not students ($n = 8$), led to the same results with the only significant group difference being a higher growth mindset score among participants with a history of TBI $t(79) = -3.80$, $p < .001$, $d = 1.36$.

Table 5
Comparing group means of outcome variables: TBI vs. No-TBI history

	TBI Status	N	Mean	Standard Deviation
Self-Efficacy	No TBI history	72	2.93	.92
	TBI history	29	3.24	.81
Self-Compassion	No TBI history	70	2.91	.65
	TBI history	29	2.75	.65
Growth Mindset **	No TBI history	71	2.72	1.31

	TBI history	29	3.87	1.33

Note. All parts of the Qualtrics questionnaire were optional and a few participants did not fill out all three surveys. For this reason, the number of participants without TBI history varies between scale analyses.

** Group comparison $p < .001$

Effect of TBI Status: Matched Groups

Independent samples t-tests comparing a subset of 24 participants including 12 participants with a documented history of TBI from Ackley (2022) and 12 age- and gender-matched participants without TBI history revealed group differences in self-efficacy, $t(22) = -2.69$, $p = .013$, $d = .73$, and growth mindset scores, $t(22) = -5.42$, $p < .001$, $d = 1.12$. In both cases, mean values were higher for participants with a history of TBI relative to matched participants without TBI history. The groups did not differ on self-compassion, $t(22) = .20$, $p = .84$ or mean age $t(22) = .00$, $p = 1.0$, $d = .77$.

Table 6
Comparing group means of outcome variables: Matched Groups

	TBI Status	**N**	**Mean**	**Standard Deviation**
Self-Efficacy*	No TBI history	12	2.96	.89
	TBI history[1]	12	3.76	.52
Self-compassion	No TBI history	12	2.87	.85
	TBI history[1]	12	2.81	.68
Growth Mindset **	No TBI history	12	1.97	1.03
	TBI history[1]	12	4.44	1.20

* Group comparison $p < .05$; ** Group comparison $p < .001$
[1] Pre-treatment mean scores of selected Ackley (2022) participants

Effects of other Participant Characteristics

An independent-samples t-test was used to compare means between participants who identified as male (n = 17) versus female (n = 83) and revealed that the groups were not statistically significantly different on any of the scales. However, as a group, males demonstrated a higher growth mindset group mean, which approached statistical significance, $t(97) = -1.97$, $p = .051$, $d = 1.40$. Among all participants with and without TBI history, correlational analysis indicated that age was not significantly correlated with any of the three outcome variables, $p > .05$. Among the three scales, growth mindset was not correlated with self-efficacy or self-compassion; however, self-efficacy and self-compassion scores were significantly negatively correlated $r = -.35$, $p < .001$.

TBI Characteristics and Growth Mindset Outcomes

Because the participants with TBI had higher growth mindset scores relative to peers without a history of TBI in both our full participant group and matched subgroup analyses, we explored the relationship between participants' TBI experience and growth mindset scores. A linear regression including data from the 29 participants with a reported history of TBI was conducted with growth mindset as the dependent variable and lifetime number of TBIs and severity of most recent TBI as predictors. The model was not significant $F(26,2) = .901$, $p = .42$, $R^2 = .07$, and neither lifetime number of TBIs nor severity of most recent TBI predicted growth mindset scores.

Discussion

The purpose of this study was to investigate whether individuals, specifically college students, with a history of TBI score differently on predictors of academic achievement

compared to their peers without a history of TBI. We compared the group means of each of these two populations on the following three scales: New General Self-Efficacy Scale (Chen et al., 2001), Self-Compassion Scale—Short Form (Raes et al., 2011), and Growth Mindset Scale (Dweck, 1999) and found that participants with a history of TBI scored equivalently to or higher than participants without a history of TBI on these scales.

Group Comparisons

Results revealed no statistically significant differences between those with and without a TBI history on measures of self-efficacy and self-compassion, when we compared across all participants. As a group, participants with a TBI history demonstrated higher growth mindset than participants without TBI. However, the group mean score for participants with a TBI history (M = 3.87) is consistent with the mean range (M = 3.57 - 3.96) that Dweck et al. (1995) reported in their validation studies across six different participant groups. See Table 4 for more details. Interestingly, participants without a TBI history have a group mean score (M = 2.72) that is lower than Dweck's mean range values. It was beyond the scope of this study to ask participants to explain the reasoning behind their self-reported perceptions. However, possible reasons that the group with TBI history demonstrates a higher growth mindset could relate to common TBI sequalae that impact some individuals. For example, a person with anosognosia, the inability to have insight into one's deficits, may be less critical of their intelligence and its capacity for change relative to an uninjured peer. It is also possible that the lived experience of neurorecovery that some individuals with TBI experience may contribute at the group level to an expanded perception of growth and change. Additionally, participants with TBI history may have received

cognitive-communication or other therapeutic interventions that may have had positive impacts on growth mindset.

To address the asymmetry between our sample sizes of participants with and without TBI history (n = 72; n = 29) and the range of participant ages, we conducted a separate analysis that compared the group means of the 12 participants of Ackley (2022) who had a verified history of TBI with 12 participants from our data set without a TBI history who were matched on age and gender. All participants in these analyses were students. The comparison between these two groups showed that participants with a confirmed TBI history from Ackley (2022) demonstrated significantly higher means on both self-efficacy and growth mindset relative to their peers without a TBI history. These results are consistent with the findings of our full group analyses, namely that participants with TBI history do not demonstrate lower scores on predictors of academic achievement. Both analyses found statistically significant higher growth mindset scores among those with TBI. The matched group comparisons revealed statistically significant higher self-efficacy. Groups had equivalent self-compassion scores in both analyses. Taken together, our full group and matched group analyses show a consistent pattern of participants with TBI scoring equally or higher than participants without TBI on predictors of academic achievement.

At the time of this study, limited research existed that examined the relationship between self-efficacy and outcomes among individuals with TBI; none of the studies used NGSE to measure this construct (Sheenen et al., 2017; Cicerone & Azulay, 2007; Trontel et al., 2013). However, all of the aforementioned studies suggested that high self-efficacy is related to better coping and resilience, both of which predict better personal and academic outcomes. Our results

suggest that although there are individual differences in self-efficacy among individuals with TBI history, as a group, their self-efficacy ratings are equivalent to peers without a history of TBI. Indeed, when we compared a subset of demographically matched participants, those with TBI reported higher self-efficacy relative to participants who had not experienced TBI. Thus, although self-efficacy relates to higher coping and resilience for individuals with TBI, we did not find evidence that this is an area of deficit in this population.

Similarly, Desdentado et al. (2021) found that individuals with TBI who reported higher self-compassion on the SCS-SF tended to have lower anxiety and depression symptoms which was consistent with previous research findings. Thus, the authors implied that self-compassion may be one of the factors that influences rehab and treatment outcomes for individuals with TBI. Once again, individual scores on the SCS-SF in our data varied, but mean scores for participants with TBI were equivalent in both of our comparisons to participants without TBI, suggesting that low self-compassion is not a typical characteristic of individuals with TBI.

Although researchers have investigated growth mindset's relevance to educational contexts (Aronsen et al., 2002; Rammstedt et al., 2022), no studies explicitly examined this construct among the TBI population. Rabinowitz and Arnett (2018) highlighted that although positive psychology traits, like resilience, adaptive coping style, positive affect, hope, and optimism predict better psychosocial outcomes among individuals with TBI, individuals with TBI are less likely to exhibit these traits than their uninjured peers. The authors speculated that these lower levels of positive traits could result from the cognitive and emotional TBI sequalae. Therefore, one might assume that if individuals with TBI are less likely to demonstrate these traits, then they may also be less likely to demonstrate a growth mindset when compared to

uninjured peers. Our results, however, do not support this assumption as both comparisons revealed higher growth mindset among participants with a history of TBI.

Relations between Variables

We did not find statistically significant differences on self-efficacy and self-compassion between genders, but as a group males demonstrated numerically higher growth mindset scores. Additionally, study results indicated no relation between age and self-efficacy, self-compassion, and growth mindset measures across all participants with and without a TBI history. We also examined if a relation exists between the three outcome measures and found a statistically significant negative relation exists between self-efficacy and self-compassion across all participants. In other words, as self-efficacy increases, self-compassion decreases and vice versa across both groups. However, growth mindset was not related to the other outcome measures. The negative relation between self-efficacy and self-compassion observed in this study conflicts with extant literature, including a recent meta-analysis of sixty studies that explored the relation between self-compassion and self-efficacy and found a positive association between the two constructs (r = .35) (Liao et al, 2021). The authors stated that these findings support the idea that self-compassion could help individuals protect their sense of self-efficacy when confronting failure. It may be possible that our specific sample of primarily college students with and without TBI history accounts for the discrepancy in relations between variables.

Given that participants with a reported TBI history demonstrated higher growth mindset scores, we investigated if either or both lifetime number of TBIs or severity of most recent TBI predicted growth mindset scores. If the TBI experience caused higher growth mindset, then it may be the case that those with more TBI experience either due to having experienced a higher

number of TBIs or due to having experienced a more severe TBI would have higher growth mindset. However, we found that TBI experience did not significantly predict growth mindset among participants with a TBI history, which suggests that although TBI experience may cause increased growth mindset among individuals, this change does not seem to increase with more TBI experience.

Limitations and Future Directions

One of the most significant limitations of this study is its small sample size, which decreases the power of the statistical analyses, and thus makes it less likely that the results are representative of the larger college student population, both with and without TBI history. The sample size of individuals with self-reported TBI included 17 people, and those with documented TBI included 12 people from Ackley (2022), whereas there were 72 participants without a TBI history. Thus, there were approximately 60% fewer participants with a TBI history included in the analyses than without a TBI history. The mean scores of smaller sample sizes are more vulnerable to extreme scores, which could be one reason why the group with TBI history had higher scores on self-efficacy and growth mindset than their uninjured peers. One factor that contributed to both a smaller overall sample size and fewer participants with TBI was the short recruitment period window: the survey was available for 5.5 weeks.

Furthermore, the nature of this study's recruitment methods could have led to sampling bias, such as convenience sampling and voluntary response bias. Most recruitment occurred via email listservs, primarily among the speech and hearing sciences department, academic student support center, and athletics department at a single university. Physical flyers were also distributed throughout designated campus bulletin areas. While participation was not restricted to

only college students, this method of recruitment heavily relies on the convenience sampling of college students in a particular geographical area. Additionally, perhaps TBI participants who are more likely to volunteer for the survey demonstrate executive function skills that correlate with higher scores on predictors of academic achievement relative to individuals with a history to TBI who declined participation.

It is possible that various TBI characteristics could also have impacted the generalizability of the study's outcomes. For example, some individuals with TBI demonstrate difficulty interpreting abstract language and understand language more literally. Thus, it is possible that some participants with TBI may misinterpret the nuance of the scales' statements. Additionally, the phrasing of the Growth Mindset Scale (Dweck et al., 1995) is related to change in intelligence without distinguishing if change is positive or negative (i.e., gain versus loss of cognitive function). Individuals with TBI may have experienced cognitive deficits as a result of the injury, which might influence their interpretation of the items. Thus, disagreeing with items such as "Your intelligence is something about you that you can't change very much." may reflect the participant's endorsement of negative as opposed to positive cognitive change. Therefore, the higher scores among our participants with TBI history may not reflect a positive growth mindset.

Individuals who sustain TBIs can also demonstrate anosognosia which is characterized by a lack of insight into one's deficits. This lack of insight could impede an individual's ability to accurately assess their current abilities and functioning when responding to the self-assessment questions used here. Another confounding variable is the possibility of a therapy effect; neither our study nor Ackley (2022) collected information about if and how much cognitive-communication and/or psychological therapy participants with TBI may have received

prior to participation. This omission prevents researchers from determining if there is a possible relationship between amount of therapy and subjective self-ratings of self-efficacy, self-compassion, and growth mindset. The higher growth mindset and self-efficacy scores among the participants with TBI may stem from therapeutic treatment they received following their injuries. However, this possibility cannot be assessed using the current data. Also, only two of the participants who reported TBI history also stated that they were experiencing TBI sequalae at the time of participation in this survey. It is possible that scores could differ if more participants with TBI were experiencing symptoms at the time of participation.

Lastly, although the three scales utilized in this study are widely used, they have not been validated for use with the TBI population. Additionally, researchers such as Rammstedt et al. (2022) have questioned the lack of psychometric evidence regarding the growth mindset scale. These authors also stated that while evidence supports growth mindset as a predictor of academic motivation, evidence is mixed regarding its ability to predict academic achievement (despite Dweck's claim to the contrary).

It would be interesting to determine if results differed if aspects of the study were modified. First, broader recruitment could increase sample size and reduce sampling bias (e.g., across departments, different university campuses, community colleges or trade schools, and at institutions that support individuals recovering from TBI, such as return-to-school and return-to-work programs). Additionally, a longer recruitment period could increase sample size. Lastly, a more longitudinal study could assess these constructs—self-efficacy, self-compassion, and growth mindset—of TBI participants over time to determine if scores may differ depending on how recently an individual's TBI occurred and compare these group means to peers without TBI.

If researchers were to implement this adjustment, it would also be important to account for whether or not those individuals with TBI are concurrently or have received therapy, to account for a possible therapy effect.

Clinical Implications

Results of this study indicate that as a group, individuals with a history of TBI do not perceive themselves to have less self-efficacy, self-compassion, or growth mindset than their peers without TBI. This observation was also present when restricting our comparison to age- and gender-matched college student peers with and without TBI history. On the contrary, they endorse higher self-efficacy and growth mindset beliefs relative to college student peers who have no TBI history. In other words, the clinical assumption that these are areas of deficit for individuals with TBI relative to their peers was not substantiated. Therefore, evidence does not support using these scales as a meaningful outcome measure of cognitive-linguistic treatment without first confirming these are areas of difficulty for the particular individual. If confirmed, these concepts could be functionally significant for particular individuals. For example, if an individual with TBI is experiencing heightened anxiety and depression as part of their TBI sequalae, Desdentado et al. (2021) cited evidence that this correlates to demonstrating less self-compassion, which could negatively impact rehab and treatment outcomes. Therefore, whether during an initial evaluation with a new patient or during the course of treatment, behavioral observations may lead a clinician to determine that the psychoemotional health of the patient is a contributing factor to the patient's ability to progress in therapy and/or implement compensatory strategies in real life scenarios outside the therapy room. In summary, although the extant literature suggests that these positive psychology constructs are relevant both to the college

student population and TBI population, as clinicians we should not assume that individuals with TBI will necessarily display a deficit relative to their uninjured peers or that this needs to be a way of measuring progress in cognitive-linguistic treatment when supporting college students with TBI in their academic-related functional therapy goals.

Conclusion

As a group, individuals with TBI did not demonstrate significant differences from those without TBI on measures of self-efficacy and self-compassion. They also demonstrated higher growth mindset. Therefore, evidence does not support the assumption that these are areas of deficit for all or most individuals with TBI history relative to uninjured peers. This finding suggests that the New General Self-Efficacy Scale (Chen et al., 2001), Self-Compassion Scale—Short Form (Raes et al., 2011), and Growth Mindset Scale (Dweck, 1999) are not meaningful ways of measuring progress during cognitive-linguistic treatment in college students who have sustained TBIs unless clinicians confirm its relevance for the particular individual in question. However, given the individual variability demonstrated by TBI participants in this study and that of Ackley (2022), these concepts remain relevant as clinicians create individualized therapy plans and reflect on the myriad of factors that can hinder or support a patient's therapeutic journey and functional outcomes.

University of Arizona
Consent to Participate in Research

Study Title: Comparing performance on predictors of academic achievement among young adults with and without Traumatic Brain Injury (TBI)

Principal Investigator: Danielle Girard

Academic Advisor: Leah L. Kapa, PhD

You are being asked to participate in a research study. Your participation in this research study is voluntary and you do not have to participate. This document contains important information about this study and what to expect if you decide to participate. Please consider the information carefully. Feel free to ask questions before making your decision whether to participate.

Purpose of Study: Do university students without a history of Traumatic Brain Injury (TBI) and college students with a history of TBI differ in their sense of self-efficacy, self-compassion, and growth mindset? University students who have experienced TBI are at increased risk of academic difficulties and potential predictors of academic outcomes are self-efficacy, self-compassion, and growth mindset. This study aims to investigate if individuals with a documented history of TBI differ from peers with no TBI history on outcomes of the existing self-efficacy, self-compassion, and growth mindset questionnaires.

Study Requirements:

- To participate in this survey, participants must be:
  - 18 years or older
  - English speaking (native or non-native speaker with additional languages acceptable)
  - Individuals with and without a history of TBI are welcome to participate.

Time Commitment:

- Completion of this survey is expected to take between 10 – 15 minutes.

Summary of Risks and Benefits:

- There are no expected risks to you because of participating in this study.
- You will not benefit directly from participating in this study.
- Student participants may receive course extra credit in exchange for their participation if they are recruited through classes. This is at the discretion of individual instructors.

Confidentiality of information:

- The information that you provide in the survey will be anonymous. Your name, email address, date of birth, and other identifying information will not be collected or linked to your answers.

What if I change my mind and choose not to participate?

- Participants can stop participating in the study at any time by exiting out of the survey. Information collected prior to exiting may still be retained for the study.

Your de-identified data may be used for future research.

For questions, concerns, or complaints about the study you may contact Danielle Girard, Speech, Language, Hearing Sciences, M.S. Graduate Student, at dhgirard@arizona.edu or 520-626-0831.

For questions about your rights as a participant in this study or to discuss other study-related concerns or complaints with someone who is not part of the research team, you may contact the Human Subjects Protection Program Director at 520-626-8630 or online at https://research.arizona.edu/compliance/human-subjects-protection-program.

By clicking “Continue” at the bottom of this page in order to start the survey, you are consenting to participate in this research study.

Demographic Questions of Survey

Question / Prompt	Format of Question Prompt in Qualtrics
1. What is your age?	Free Text Box
2. What is your student status?	Single-select option: • Undergraduate full-time (≥ 12 units) • Undergraduate part-time (< 12 units) • Graduate full-time (≥ 9 units) • Graduate part-time (< 9 units) • Non-degree seeking/continuing education • Not a student
3. With what gender(s) do you identify?	Free Text Box
4. With which race/ethnicity do you identify? (Select all that apply):	Multi-select option: • African American or Black • American Indian or Alaska Native • Asian American or Asian • Hispanic or Latinx • Middle Eastern or North African • Pacific Islander or Native Hawaiian • White or Caucasian • I prefer to self-identify as _____ • Prefer to not answer
5. Do you have a history of Traumatic Brain Injury (TBI) of any severity, including concussion? *[N.B. If the participant selects "no," "unsure", or prefer not to answer the survey will not ask them the following three questions; if they select "yes" it will ask the following three questions.]*	Single-select drop down box: - Yes - No - Unsure - Prefer to not answer
5a. How many TBIs/concussions have you sustained?	Free Text Box
5b. How long ago was your most recent TBI/concussion?	Free Text Box

5c. What was the severity of your most recent TBI?	Single-select drop down box: - Mild/Concussion - Moderate - Severe - Unsure / don't know
5d. What was the most severe TBI you have ever experienced?	Single-select drop down box: - Mild/Concussion - Moderate - Severe - Unsure / don't know
5e. Are you currently experiencing symptoms from a TBI/concussion?	Single-select drop down box: - Yes - No - Unsure
5f. Please describe the symptoms you are experiencing:	Free Text Box

Predictive Scales of Academic Achievement

New General Self-Efficacy Scale

Self-Compassion Scale–Short Form

Growth Mindset Scale (3-item version)

New General Self-Efficacy Scale

	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
I will be able to achieve most of the goals I have set for myself.	O	O	O	O	O
When facing difficult tasks, I am certain that I will accomplish them.	O	O	O	O	O
In general, I think I can obtain outcomes that are important to me.	O	O	O	O	O
I believe I can succeed at most any endeavor to which I set my mind.	O	O	O	O	O
I will be able to successfully overcome many challenges.	O	O	O	O	O
I am confident that I can perform effectively on many different tasks.	O	O	O	O	O
Compared to other people, I can do most tasks very well.	O	O	O	O	O
Even when things are tough, I can perform quite well.	O	O	O	O	O

Self-Compassion Scale–Short Form (SCS–SF)

	Almost never	Rarely	Sometimes	Frequently	Almost always
When I fail at something important to me I become consumed by feelings of inadequacy.	O	O	O	O	O
I try to be understanding and patient towards those aspects of my personality I don't like.	O	O	O	O	O
When something painful happens I try to take a balanced view of the situation.	O	O	O	O	O
When I'm feeling down, I tend to feel like most other people are probably happier than I am.	O	O	O	O	O
I try to see my failings as part of the human condition.	O	O	O	O	O
When I'm going through a very hard time, I give myself the caring and tenderness I need.	O	O	O	O	O
When something upsets me I try to keep my emotions in balance.	O	O	O	O	O
When I fail at something that's important to me, I tend to feel alone in my failure.	O	O	O	O	O
When I'm feeling down I tend to obsess and fixate on everything that's wrong.	O	O	O	O	O
When I feel inadequate in some way, I try to remind myself that feelings of inadequacy are shared by most people.	O	O	O	O	O
I'm disapproving and judgmental about my own flaws and inadequacies.	O	O	O	O	O
I'm intolerant and impatient towards those aspects of my personality I don't like.	O	O	O	O	O

Growth Mindset Scale (3-item)

	Strongly agree	Agree	Mostly agree	Mostly disagree	Disagree	Strongly disagree
You have a certain amount of intelligence, and you can’t really do much to change it.	O	O	O	O	O	O
Your intelligence is something about you that you can't change very much.	O	O	O	O	O	O
You can learn new things, but you can't really change your basic intelligence.	O	O	O	O	O	O

Email Text

Hello!

You are invited to **participate** in a **10-15 minute online survey** that asks you to **anonymously rate your sense of self-efficacy, self-compassion, and growth mindset.**

This survey collects data for my Master's Thesis project. A brief description is provided below regarding the aim of the study. Your participation is appreciated!

This study aims to investigate if individuals without a documented history of Traumatic Brain Injury (TBI) differ from peers with TBI history on outcomes of existing self-efficacy, self-compassion, and growth mindset questionnaires.

Participants must be 18 years or older and English-speaking (native or non-native speaker with additional languages acceptable). Individuals with and without a history of TBI are welcome to participate.

Questions about participation can be directed to dhgirard@arizona.edu or 520.626.3104.

Click here to participate in the survey.

Best,

Danielle Girard, B.A. (she/her)

M.S. Candidate | Speech, Language, & Hearing Sciences

University of Arizona

dhgirard@arizona.edu

An Institutional Review Board responsible for human subjects research at The University of Arizona reviewed this research project and found it to be acceptable, according to applicable state and federal regulations and University policies designed to protect the rights and welfare of participants in research.

THE UNIVERSITY OF ARIZONA

VOLUNTEERS NEEDED

To participate in online research study!

Complete the survey!

STUDY REQUIREMENTS

Participants must be:

- **18 years or older**
- **English speaking**
  (native or non-native speaker with additional languages acceptable)
- **Individuals with and without** a history of Traumatic Brain Injury (TBI) / concussion are welcome to participate

WHAT TO EXPECT FROM SURVEY

- Completely **anonymous**
- Takes between **10-15 minutes** to complete
- Will ask participants to **rate statements** about their **sense of self-efficacy, self-compassion,** and **growth mindset**

WHY PARTICIPATE

- Contribute to science and research!
- This study aims to investigate if university students without a history of TBI differ from peers with TBI history on outcomes of existing self-efficacy, self-compassion, and growth mindset questionnaires.

Questions about the study?
Contact
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An Institutional Review Board responsible for human subjects research at The University of Arizona reviewed this research project and found it to be acceptable, according to applicable state and federal regulations and University policies designed to protect the rights and welfare of participants in research.

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