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ORIGINAL PAPER

Achievement goal orientation: A predictor of student engagement in higher education

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Abstract

Achievement goal orientation has been studied within education for many years, but the practical implications are frequently focused on K-12 students and classrooms and less often applied to established concepts within higher education. Prior research has connected the construct to student achievement, along with stress and anxiety that accompany the learning of challenging new material. This study uses achievement goal orientation as a context for exploring student engagement in postsecondary education, joining constructs from educational psychology and higher education. Data were drawn from over 8500 first-year and senior college students across 15 higher education institutions participating in the National Survey of Student Engagement (NSSE). Using a series of ordinary least squares regression analyses, results indicate that students who employ a mastery-approach orientation are more likely to partake in a variety of engagement indicators, such as reflective and integrative learning, higher-order learning, quantitative reasoning, and student–faculty interaction. Performance-avoidance orientation generally showed a negative relationship with engagement indicators, while results for the performance-approach orientation were more mixed.

Keywords Higher education · Achievement goal orientation · Student engagement

Introduction

Achievement goal orientation, which is commonly explained as the motivation or reasons students have to accomplish a specific task or tasks (Hsieh, Sullivan, & Guerra, 2007), has been studied within education for decades. The research has connected achievement goal orientation to several different outcomes, both positive and negative (Hulleman et al., 2010), and practical suggestions for promoting or de-emphasizing certain orientations have resulted from this large body of work (Elliot & Hulleman, 2017). However, these implications are frequently situated from a K-12 classroom perspective, despite the fact that much of the preliminary research on the construct used convenience samples of college students (Elliot, 2006). Achievement goal orientation is less often applied to established concepts within higher education, such as student engagement (Kuh, 2001). A major goal of this study was to bridge this gap between educational psychology and higher education by exploring the relationships between achievement goal orientation and student engagement with a large multi-institution data set.

Achievement goals have previously been defined based on at least two dimensions of competence: definition and valence (Elliot, 2006; Elliot & Murayama, 2008). The definition component of competence is centered on the standard used to evaluate it (either an absolute/intrapersonal standard or a normative standard). The valence component of competence is centered on either a positive orientation toward approaching success or a negative orientation toward avoiding failure. Combining these two dimensions of competence results in four different achievement goal orientations: *mastery-approach*, where the goal is attaining task-based or intrapersonal competence; *performance-approach*, where the goal is attaining normative competence; *mastery-avoidance*, where the goal is avoiding task-based or intrapersonal

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incompetence; and *performance-avoidance*, where the goal is avoiding normative incompetence (Bruning, Schraw, & Norby, 2011; Elliot & Murayama, 2008; Hsieh et al., 2007; Phillips & Gully, 1997). A mastery (sometimes also referred to as "learning") orientation is linked to a person's willingness to develop skills necessary to complete a task, while performance orientation is based in a desire to be perceived positively by peers based on the accomplishment of a task (Phillips & Gully, 1997; VandeWalle, Cron, & Slocum, 2001). A considerable amount of the existing research is centered on this 2 × 2 model, although newer frameworks have been proposed as well (see Elliot, Murayama, & Pekrun, 2011 for details).

Educational implications of achievement goal orientation

Previous research using the 2 × 2 framework has established several different links between goal orientations and other academic behaviors and experiences. With performance-avoidance goal orientation, learners will shun certain tasks to prevent appearing incompetent; consequently, this does not facilitate a sense of learning or achievement (Bruning et al., 2011). Hsieh, Sullivan and Guerra (2007) found that students with lower GPAs were more likely to display performance-avoiding behaviors, and conversely, students with higher GPAs were more prone to mastery goal orientation. Performance goal-oriented individuals will often attempt to dodge tasks that they perceive as difficult, to not appear incompetent, and they often are afraid of making mistakes (Locke & Latham, 2006). Performance orientations have also been associated with shallow processing (Greene & Miller, 1996) and unwillingness to work with others (Midgley, Kaplan, & Middleton, 2001). On the other hand, performance-approach goal orientation can facilitate high achievement under particularly challenging conditions (Senko et al., 2013), and in some instances, it is also a positive predictor of well-being (Gillet et al., 2014). In comparison, mastery goals are largely recognized as the most desirable within educational settings, relating to positive outcomes such as efficacy, interest, effort, persistence, and positive affect (Pintrich, 2000; Senko & Miles, 2008; Wolters, 2004). Mastery goals can also buffer against negative post-failure emotions and behaviors (Smiley et al., 2016).

Achievement goal behaviors stand alone in predicting academic achievement and are also complicated by mediating or moderating relationships with other student behaviors (Karlen et al., 2019; Lee & Anderman, 2020; Putwain et al., 2018). Mastery- and performance-approach goal orientations were not significant predictors of elementary students' mathematics academic achievement (Putwain et al., 2018). However, Putwain et al. (2018) discovered mastery-approach, when mediated by behavioral engagement, was a predictor of achievement while performance-approach was not significant. Karlen et al. (2019) used a longitudinal approach in Switzerland to study the relationship between two elements of grit to academic achievement through achievement goals in high school students. Mastery goal orientation was positively correlated with intrinsic motivation; additionally, the more students were intrinsically motivated, the greater their academic achievement (Karlen et al., 2019). In studying undergraduate students' perfectionist behaviors, Lee and Anderman (2020) found students with mixed perfectionism and performance-approach orientation had higher levels of academic exhaustion. Students with high mastery-avoidance goal orientation reported lower levels of satisfaction with their efforts toward studying to achieve higher grades. Students who attempted to appear perfect academically but not put forth the effort were less likely to report exhaustion (Lee & Anderman, 2020). Huang's meta-analysis (2012) demonstrated that approach motivations were associated with higher academic achievement, and avoidance motivations were associated with lower academic achievement, albeit with small effect sizes and very few significant moderators. However, Diseth and Kobbeltvedt (2010) found that the relationship between goal orientation and achievement can be mediated by the use of learning strategies. Other research indicates a connection between mastery goals and academic achievement as well (Linnenbrink-Garcia, Tyson, & Patall, 2008).

It is important to note that achievement goal orientation is subject to change over time (Shim, Ryan, & Anderson, 2008; Tuominen-Soini, Salmela-Aro, & Niemivirta, 2011). For example, a person who leaned toward performance-approach orientation at one point in time does not necessarily mean they will always have this orientation. There is also some research concerning the ability to change achievement goal orientations through intervention, suggesting that in some cases, teachers or other authority figures can promote mastery goals over performance goals (see Elliot & Hulleman, 2017 for a review). Specifically, providing moderately challenging tasks that are inquiry-based, intrinsically interesting to students, focusing on improvement, and encouraging positive self-talk can promote mastery goals in education settings (Linnenbrink, 2005; Marjanović, Comoutos, & Papaioannou, 2019; Post & van der Molen, 2020). Furthermore, some research in sports and business contexts has also demonstrated that changes to goal orientations are possible through intervention (Schmidt & Ford, 2003; Smith, Smoll, & Cumming, 2007; Stevens & Gist, 1997).

While these findings are optimistic, the suggested implications of much of the achievement goal orientation research are discussed from a K-12 perspective (Bruning et al., 2011; Sideridis, 2005) or fields outside of education, such as sport or organizational psychology (Locke & Latham, 2006; Van Yperen, Blaga, & Postmes, 2014). Most measures are

validated with college student samples (Elliot & Murayama, 2008; Elliot et al., 2011), but there are less cohesive applications of the theory with this population that go beyond using them as a convenience sample. There have been few attempts to integrate achievement goal orientation with the prominent existing higher education theoretical frameworks (such as Astin, 1993 or Kuh, 2003). In a Harackiewicz et al. (2002) longitudinal study on college students, they found that mastery goals predicted a continued interest in major over time, while performance-approach goals predicted higher grades and GPA in alliance with how college rewards performance in the classroom. Similarly, Durik, Lovejoy, and Johnson (2009) found that performance-approach goals positively predicted cumulative college GPA, while performance-avoidance goals negatively predicted GPA and mastery goals had no relationship. Barron and Harackiewicz (2003) also suggested that a match between the students' perceived classroom climate and their achievement goals can impact the relationship between goals and outcomes. In a subsample of Honors College students, another study found relationships between perfectionism and performance goal orientation (Miller & Speirs Neumeister, 2017).

However, it is important to note that although all of these aforementioned findings on achievement goal orientation are statistically significant, the effect sizes are often quite small (Van Yperen et al., 2014). Compared to effect sizes for achievement goal orientation in fields such as sports or business, those in educational research tend to have less explanatory power (Lochbaum & Gottardy, 2015). Indeed, Huang (2012) found that in a meta-analysis, achievement goals alone cannot explain a considerable amount of variance in academic achievement; thus, researchers may want to stop using achievement goal orientation to predict academic achievement (e.g., grades) and instead pursue investigations of other relationships to the construct.

Student engagement in higher education

Student engagement, defined as student involvement in educationally purposeful activities (Kuh, 2001), is commonly acknowledged to have a favorable impact on several important outcomes in higher education, such as persistence, learning, satisfaction, and graduation (Astin, 1993; Chickering & Gamson, 1987; Kuh, 2003; Pascarella & Terenzini, 2005). Engagement encompasses a broad swath of experiences and perceptions (Kuh, 2001; McCormick, Kinzie, & Gonyea, 2013) and can be directly and indirectly linked to courses and academic behaviors. Student engagement has several interrelated aspects, found both inside and outside of the classroom (Kuh, 2001). Some of these aspects are more traditionally centered on classroom experiences, and many of these behaviors serve to develop both content knowledge and general cognitive processing skills, and they are all connected with various elements of achievement and success (Ormrod, 2011; Pascarella & Terenzini, 2005).

The National Survey of Student Engagement (NSSE), first launched in 2000 and then updated in 2013, was created to assess "activities and experiences that have been empirically linked to desired college outcomes" for students and uses student engagement as an umbrella term to capture numerous content areas including academic challenge, learning with peers, experiences with faculty, and campus environment (NSSE, 2018, p. 1). Within these content areas are 10 different "Engagement Indicators" (e.g., scales). The content area of academic challenge refers to the scales of higher-order learning, reflective and integrative learning, quantitative reasoning, and use of learning strategies; learning with peers refers to collaborative learning and discussions with diverse others; experiences with faculty refers to student–faculty interaction and effective teaching practices; campus environment refers to the quality of interactions and a supportive environment. Described in more detail below, these content areas and scales can be utilized as a conceptual framework for comprehending the various facets of student engagement employed in this study.

Perhaps the most central of the academic challenge behaviors within student cognitive development is higher-order learning. Centered on the well-known Bloom's taxonomy (Krathwohl, 2002), higher-order learning involves the proactive integration of new and existing knowledge and the association and extension of this information to pursue answers and solutions (Lewis & Smith, 1993; Weiss, 2003). Merging new information with existing knowledge or practical issues, and reflecting on one's own views while simultaneously taking into account the views of others, suggest deeper approaches to learning that extend past simply memorizing content and instead highlight the underlying meaning of information (Nelson Laird, Shoup, & Kuh, 2005).

Other academic skills and behaviors are also important for high levels of student engagement. Learning strategies are specific patterns or types of activities that learners intentionally use to gain knowledge (Clayton, Blumberg, Auld, 2010; Vermetten, Lodewijks, & Vermunt, 1999; Vermunt, 1996), related to what is also referred to as "self-regulated learning" (Pintrich, 2004). Learning strategies can range from taking notes during readings and class to summarizing and organizing new information to establishing an environment that is conducive to studying (Ormrod, 2011). While these strategies vary in their levels of effectiveness, they all can be beneficial if students are directed to use them in their learning process (McConnell et al., 2017). Another specialized construct, quantitative literacy/quantitative reasoning, involves the ability to use numerical, statistical, and graphical information in daily life as well as in the workplace (Steen, 2001; Wilkins, 2010). Quantitative reasoning

is a critical skill for a diversity of engaging and important situations in higher education (Rocconi et al., 2013).

Interactions with peers are also an essential aspect of student engagement (Cabrera et al., 2002). Collaborative learning occurs when two or more students participate together in a particular intellectual activity, often with the instructor serving in a facilitative role (as opposed to functioning as a knowledge source). Students work together for an expanded understanding of course material, to solve problems, to complete group projects, or for a variety of other rigorous learning activities (Goodsell, 1992; Smith et al., 2005). Furthermore, research demonstrates that experiences with diverse groups of peers during higher education can positively impact students' personal development (Astin, 1993). Interacting with diverse peers is associated with positive academic outcomes, along with cognitive development, reduced racial bias, civic engagement, and prosocial behaviors such as volunteering and leadership (Bowman, 2010, 2011, 2013; Denson, 2009; Denson & Chang, 2009; Gurin et al., 2002; Loes, Pascarella, & Umbach, 2012; Nelson Laird, 2005).

It is broadly recognized that student–faculty interactions generally have a positive influence on the cognitive growth and development of students in higher education and are also related to their satisfaction (Kuh & Hu, 2001; Pascarella & Terenzini, 2005) and retention (Lau, 2003). A plethora of seminal higher education research has demonstrated that student–faculty interaction is positively linked to students' learning (Astin, 1993; Cabrera et al., 1999; Kuh, Pace, & Vesper, 1997; Pike, 1991; Quaye & Harper, 2015; Volkwein & Carbone, 1994). Additionally, faculty who implement their courses with clarity, organization, and provide prompt and formative feedback have a constructive influence on student learning and development (Pascarella & Terenzini, 2005). Students' appraisals of several effective teaching practices are positively related to critical thinking, psychological well-being, leadership, openness to diversity, and academic motivation (Blaich & Wise, 2011). Furthermore, using teaching methods that incorporate transparency in instructional approaches and goal setting tends to provide students with a better understanding of expectations and course content (BrckaLorenz et al., 2012).

Finally, there are various elements of the overall climate that influence student engagement, including the quality of interactions with students, faculty, and other types of staff, as well as a more global perception of a supportive environment (Baird, 2005; Zepke, 2015). Interactions may affect a range of student outcomes such as academic achievement, social development, and critical thinking (Umbach & Wawrzynski, 2005; Whitt et al., 1999). A supportive campus environment involves cognitive, social, and physical domains for students (Flowers & Pascarella, 2003; Pascarella & Terenzini, 2005). Research has revealed connections between supportive environments and numerous favorable aspects of higher education, including retention, satisfaction, engagement, and student involvement (Kuh, 1993; Kuh & Hall, 1993; Quaye & Harper, 2015).

The current study

Given the vast research on the importance of both achievement goal orientation and student engagement in educational settings, but also considering the mixed results concerning positive and negative outcomes and the limited practical implications of small effect sizes, the goal of the current study was to extrapolate findings that may bridge research across educational psychology and higher education. This study addressed this goal using a multi-institution sample of college students across the United States. Specifically, we addressed the following questions:

- How does achievement goal orientation predict first-year and senior students' engagement in higher-order thinking, reflective and integrative learning, quantitative reasoning, learning strategies, collaborative learning, discussions with diverse others, student–faculty interaction, effective teaching practices, quality of interactions, and supportive environment?
- Are there significant relationships between achievement goal orientations and student engagement, even after controlling for other demographic and institutional characteristics known to influence student development and the overall university experience?
- What is the relative contribution of explained variance for the different types of achievement goal orientation?

Method

Data and sample

Data used in this study were drawn from the 2015 administration of the National Survey of Student Engagement (NSSE). Every spring, NSSE gathers information from first-year and senior students about the activities and programs they are engaged in while at their postsecondary institutions. NSSE items look at student experiences, time spent on various activities, and perceptions of institutional climate and support. Since its beginning, NSSE has always concentrated on first-year and senior students, as they are at two key points in their undergraduate educational journeys, with first-year students setting the foundation and seniors having the most college experience (NSSE, 2018). Data demonstrate that the experiences of these groups are different (NSSE, 2009), and it is best to keep them separate when examining engagement to take into account patterns of retention,

transfer, persistence, and enrollment (NSSE, 2011). Due to these differences, NSSE has a stringent requirement to keep these groups of students distinct in reporting and analysis, and this was applied to the grouping choices for the current study as well.

In 2015, data were collected from over 300,000 first-year and senior respondents from 541 four-year degree-granting colleges and universities. The NSSE respondents and participating institutions are generally representative of all United States undergraduate students at 4-year institutions, with a few exceptions (female, White, and full-time students are slightly overrepresented) (NSSE, 2015). Institutions participate in NSSE for a variety of reasons, including national and regional accreditation, curricular improvement for general education courses, departmental or program assessment, and institutional advancement efforts (e.g., retention rates, FYE programming, high-impact practices).

In addition to the main NSSE instrument, every year experimental questions are added for research and development purposes. In 2015, several item sets were administered to random subsets of participating institutions, and this study utilizes responses to an item set that contained additional demographics questions and an achievement goal orientation measure. Data were available from 8530 students across 15 different 4-year degree-granting universities of various types and sizes. There were seven public and eight private institutions. For enrollment size, there were 4 schools with under 2500 students, 2 schools in the 2500–4999 range, 3 in the 5000–9999 range, and 5 with over 10,000 students. For Carnegie classification, seven were Doctoral universities, five were Master's colleges and universities, and three were Baccalaureate colleges. First-year students comprised 46% of the respondents, while the remaining 54% were seniors. The sample was 40% males and 60% females, with a majority (88%) reporting full-time enrollment status. There were 47% of respondents reporting first-generation status (neither parent holds a bachelor's degree), and 80% were traditionally aged (under 25 years old). Regarding racial/ethnic diversity, the sample was 55% White, 12% Black/African American, 13% Hispanic or Latino, 7% Asian/Asian American, and the remaining respondents falling into other or multiple racial categories. For further information on the sample characteristics, see Table 1.

Table 1 Sample descriptive statistics

	Valid %
First-generation	47
Traditionally-aged (23 or younger)	80
Female	60
Race/ethnicity	
American Indian	< 1
Asian, Asian American	7
Black, African American	12
Latino, Hispanic	13
Native Hawaiian/Other Pacific Islander	< 1
Prefer not to respond	4
Unknown/Other race or ethnicity	2
Multiracial	7
White	55
Full-time enrollment	88
Transfer Student	30
College grades	
Mostly A's	45
Mostly B's	46
Mostly C's or lower	9
Major field	
Arts and Humanities	8
Biological Sciences	9
Physical Sciences, Math, and Comp Sci	6
Social Sciences	9
Business	19
Communications, Media and Public Rel	4
Education	6
Engineering	11
Health Professions	16
Social Service Professions	5
Other Majors	5
Undecided	1
Participating in honors college	16

Data collection procedures

Students were invited to respond to NSSE via an email request. All first-year and senior students at the participating institutions received this email, which included a link to the online survey instrument. The surveys were administered online during untimed sessions. NSSE data is collected annually during the spring semester, which can range from February to May depending on the institution's academic calendar. Students get a maximum of five contact emails. In 2015, the average institutional response rate was 29%.

Measures

The Achievement Goal Questionnaire-Revised (AGQ-R; Elliot & Murayama, 2008) was part of the experimental item set appended to the core NSSE survey. The AGQ-R measures achievement goal orientation with a 12-item scale to determine performance-approach, performance-avoidance, mastery-approach, and mastery-avoidance goal orientation. Participants reported their level of agreement with statements about their academic motivations and behaviors using a 5-point Likert-type scale (e.g., "I am striving to do better compared to other students" and "My goal is to learn as

much as possible"). Four subscale scores can be calculated, one for each of the orientations, with higher scores indicating higher levels of the particular goal orientation. Scores can range from 3 to 15 for each subscale (see Table 2 for Cronbach's αs, means, and standard deviations). Original development as well as explorations of revisions for this measure established the 2×2 structure predicted by achievement goal theory, supported by factor analysis and evidence for concurrent and predictive validity (Elliot & McGregor, 2001; Elliot & Murayama, 2008).

The dependent variables of interest for this study were 10 scales, which NSSE terms "Engagement Indicators," that were used to assess the engagement levels of students. These scales included higher-order learning, reflective and integrative learning, quantitative reasoning, learning strategies, collaborative learning, discussions with diverse others, student–faculty interactions, effective teaching practices, quality of interactions, and supportive environment (see Table 2 for Cronbach's αs, means, and standard deviations). As scales, the engagement indicators show acceptable levels of internal consistency (McMillan & Schumacher, 2001), and prior research indicates sufficient evidence for construct validity using exploratory and confirmatory factor analyses (Miller et al., 2016). Each engagement indicator scale was scored on a 60-point scale by transforming the response sets to 60-point intervals and then averaging the rescaled items. Therefore, a score of zero would mean a student responded using the lowest response option for every item in the scale, while a score of 60 would mean that a student responded using the highest response option for every item in the scale. Subsequently, higher scores on the scales indicate higher levels of that particular aspect of engagement. Example items from each scale can be found in "Appendix 1". For more detailed information on the scale construction process and individual items included in each engagement indicator scale, please see the NSSE website at https://nsse.indiana.edu/nsse/survey-instruments/engagement-indicators.html.

The core survey instrument also gathered demographic information from respondents, including sex, enrollment status, first-generation status, transfer status, race/ethnicity, age, major field, grades, percentage of online courses, and honors college participation. The survey data was then combined with additional institution-provided data, such as student scores for SAT/ACT, institution control (public vs. private), and institutional enrollment size. This demographic and institutional data served as control variables in the analyses. As a wide variety of higher education research notes important differences in the educational experiences of students based on these characteristics (see Mayhew et al., 2016 and Pascarella & Terenzini, 2005 for a review), it is critical to include them in the analyses. Existing research also recognizes the potential influence of sociodemographic characteristics for achievement goal orientation (Hulleman et al., 2010; Lochbaum, Zanatta, & Kazak, 2020; Witkow & Fuligni, 2007), offering further rationale for the inclusion of control variables in statistical models.

Results

A series of 20 Ordinary Least Squares (OLS) regression analyses were used to investigate the potential relationships between certain demographic and institutional characteristics, the types of achievement goal orientation, and

Table 2 Achievement goal questionnaire-revised and engagement indicator α coefficients and descriptive statistics

	# of Items	FY: Cronbach's α	FY: Mean	FY: SD	SR: Cronbach's α	SR: Mean	SR: SD
Performance-Approach	3	.87	11.47	2.92	.88	11.21	3.16
Performance-Avoidance	3	.88	11.20	3.26	.91	10.62	3.65
Mastery-Approach	3	.87	11.91	2.55	.86	12.00	2.57
Mastery-Avoidance	3	.83	10.45	3.34	.83	10.21	3.47
Reflective and Integrative Learning	7	.87	36.2	12.8	.88	39.2	13.1
Higher-Order Learning	4	.85	39.6	14.0	.86	41.5	14.2
Learning Strategies	3	.77	40.0	14.3	.78	40.6	14.9
Quantitative Reasoning	3	.85	28.4	16.8	.87	30.6	17.4
Collaborative Learning	4	.81	32.4	14.5	.80	32.7	14.7
Discussions with Diverse Others	4	.89	41.0	16.2	.90	41.9	16.3
Student–Faculty Interaction	4	.83	20.9	15.1	.85	23.7	16.5
Effective Teaching Practices	4	.85	40.2	13.5	.87	40.7	14.0
Quality of Interactions	5	.84	41.5	12.8	.81	42.5	12.2
Supportive Environment	8	.89	37.2	14.1	.89	33.1	14.6

FY first-year, *SR* senior

the engagement indicators (EIs). OLS regression analyses were selected due to the student-level and univariate focus of the research questions, the ordinal nature of the dependent variables, the number and type of control variables, and the appropriateness of this method for testing theory with real-world data collected outside of manipulated laboratory settings (Aldrich, 2019; Field, 2009; Huang, 2020; Rocconi, 2013; Tabachnick & Fidell, 2001). The demographic variables were included as the independent variables in the first step of the model (sex, transfer status, enrollment status, first-generation status, age, SAT/ACT, institutional control, institutional enrollment size, race/ethnicity, major field, estimated grades, percentage of online courses, and Honors College status—see "Appendix 2"). In the second step of the modeling process, the independent variables of the four achievement goal orientation scores were added to estimate the unique effect of mastery-avoidance, mastery-approach, performance-avoidance, and performance-approach orientation. Separate models were analyzed for each of the 10 EIs (as dependent variables) for both first-years and seniors (resulting in 20 models total). Normal probability plots and residual analyses suggested no severe divergence from assumptions of independence, normality, linearity, and homoscedasticity. Variance inflation factors indicated that multicollinearity among the predictor variables was not present in these analyses, as all VIFs were less than 4 (Field, 2009). Finally, since multiple comparisons were being made, the Bonferroni correction was used (.05/10), and only those predictors that were significant at the $p < .005$ level were considered.

These analyses show that the four types of achievement goal orientation have strong explanatory power in the models, relative to the other control variables. For many of the EIs, achievement goal orientations made large contributions to the explained variance (as noted in the ΔR^2 values for Tables 3, 4). The combined achievement goal orientations accounted for nearly half to three-quarters of the total explained variance for reflective and integrative learning, higher-order learning, learning strategies, quality of interactions, and supportive environment.

Further examination of the standardized regression coefficients (Tables 5, 6, 7, 8) indicates that overall, a

Table 3 Model summary statistics for OLS regression for first-year students

	F	df	Sig	Adjusted R^2	ΔR^2 (AGO subscales)
Reflective and Integrative Learning	9.113	35, 3192	< .001	.082	.044
Higher-Order Learning	10.733	35, 3125	< .001	.098	.063
Learning Strategies	15.455	35, 3146	< .001	.139	.075
Quantitative Reasoning	7.877	35, 3189	< .001	.070	.023
Collaborative Learning	6.674	35, 3137	< .001	.060	.029
Discussions with Diverse Others	6.055	35, 3189	< .001	.053	.017
Student–Faculty Interaction	8.492	35, 3152	< .001	.077	.016
Effective Teaching Practices	7.551	35, 3199	< .001	.067	.034
Quality of Interactions	8.015	35, 3105	< .001	.073	.032
Supportive Environment	6.285	35, 3184	< .001	.055	.037

AGO achievement goal orientation

Table 4 Model summary statistics for OLS regression for senior students

	F	df	Sig	Adjusted R^2	ΔR^2 (AGO subscales)
Reflective and Integrative Learning	18.003	35,2525	< .001	.191	.095
Higher-Order Learning	10.742	35,2470	< .001	.121	.088
Learning Strategies	18.704	35,2485	< .001	.200	.151
Quantitative Reasoning	13.631	35,2522	< .001	.149	.043
Collaborative Learning	11.414	35,2489	< .001	.128	.024
Discussions with Diverse Others	4.504	35,2511	< .001	.047	.029
Student–Faculty Interaction	13.548	35,2502	< .001	.149	.045
Effective Teaching Practices	8.832	35,2527	< .001	.098	.053
Quality of Interactions	6.100	35,2448	< .001	.068	.033
Supportive Environment	7.588	35,2516	< .001	.084	.046

AGO achievement goal orientation

Table 5 OLS regression models for first-year students: Standardized β coefficients

	Ref. and Int. Learning		Higher-Order Learning		Learning Strategies		Quantitative Reasoning		Collaborative Learning	
	Std. β	Sig	Std. β	Sig	Std. β	Sig	Std. β	Sig	Std. β	Sig
*Step 1: Control Variables*Step										
Male	0.049	0.010	0.035	0.065	−0.050	0.006	**0.132**	0.000	0.009	0.648
Transfer Status	−0.010	0.547	−0.012	0.490	0.010	0.573	0.006	0.726	0.011	0.532
Enrollment Status	−0.022	0.203	0.012	0.483	−0.022	0.190	0.002	0.921	0.027	0.134
First-generation Status	0.036	0.050	0.030	0.098	0.031	0.076	0.015	0.410	−0.041	0.028
Age	−0.018	0.296	0.009	0.619	0.041	0.017	0.013	0.468	−0.028	0.119
ACT/SAT Score	−0.050	0.025	**−0.068**	0.002	**−0.081**	0.000	−0.046	0.038	**−0.064**	0.005
Private Institution	**0.082**	0.002	**0.096**	0.000	**0.103**	0.000	0.036	0.171	0.041	0.124
Institution Size	0.043	0.121	0.024	0.386	0.064	0.020	0.054	0.054	0.042	0.137
Race: American Indian[a]	0.042	0.015	0.037	0.029	0.042	0.012	0.035	0.041	0.024	0.163
Race: Asian[a]	0.006	0.731	0.022	0.201	−0.019	0.274	0.046	0.009	0.007	0.688
Race: Black/African American[a]	0.012	0.552	0.000	0.997	0.025	0.206	0.017	0.410	0.007	0.755
Race: Hispanic/Latino[a]	0.003	0.887	0.028	0.169	−0.044	0.026	0.030	0.144	−0.026	0.209
Race: Pacific Islander[a]	−0.010	0.553	−0.019	0.278	−0.009	0.598	−0.007	0.663	0.000	0.981
Race: Prefer not to respond[a]	0.000	0.997	−0.011	0.537	−0.019	0.259	−0.011	0.519	−0.019	0.285
Race: Other race/ethnicity[a]	0.039	0.024	0.008	0.651	0.045	0.008	0.035	0.047	0.009	0.595
Race: Multi-racial[a]	0.021	0.243	0.009	0.628	0.012	0.497	0.009	0.600	−0.006	0.734
Major: Bio Sci.[b]	−0.042	0.100	0.005	0.841	0.056	0.025	**0.141**	0.000	0.072	0.006
Major: Phys. Sci.[b]	**−0.080**	0.001	−0.017	0.468	−0.039	0.088	**0.115**	0.000	0.012	0.625
Major: Social Science[b]	0.024	0.335	−0.009	0.716	0.010	0.687	**0.081**	0.001	−0.025	0.316
Major: Business[b]	−0.056	0.049	−0.026	0.366	−0.023	0.410	**0.163**	0.000	0.049	0.086
Major: Comm.[b]	0.005	0.800	−0.009	0.680	−0.001	0.967	0.053	0.013	−0.002	0.915
Major: Education[b]	−0.032	0.171	−0.019	0.410	0.002	0.920	0.042	0.068	0.022	0.343
Major: Engineering[b]	**−0.086**	0.001	0.011	0.680	0.012	0.646	**0.154**	0.000	**0.083**	0.002
Major: Health Prof.[b]	**−0.085**	0.004	−0.049	0.095	0.016	0.571	**0.095**	0.001	0.074	0.013
Major: Soc. Serv. Prof.[b]	−0.043	0.054	−0.041	0.070	0.012	0.581	0.049	0.028	−0.003	0.879
Major: Other[b]	−0.048	0.021	−0.011	0.605	0.005	0.817	**0.068**	0.001	0.022	0.309
Major: Undecided[b]	−0.036	0.059	−0.020	0.305	−0.032	0.085	0.030	0.120	−0.012	0.553
College grades-mostly B's[c]	−0.025	0.218	−0.052	0.010	−0.041	0.035	−0.007	0.743	−0.020	0.329
College grades-mostly C's[c]	**−0.077**	0.000	**−0.118**	0.000	**−0.118**	0.000	−0.049	0.015	**−0.096**	0.000
Percent of online courses	0.007	0.702	0.009	0.608	0.015	0.380	0.024	0.165	0.009	0.620
Honors college status	**0.075**	0.000	0.020	0.283	**0.050**	0.005	0.017	0.348	0.043	0.021
Step 2										
Mastery-avoidance	0.026	0.292	0.024	0.326	**0.069**	0.004	**0.088**	0.000	0.023	0.354
Mastery-approach	**0.210**	0.000	**0.234**	0.000	**0.262**	0.000	**0.087**	0.000	**0.118**	0.000
Performance-avoidance	−0.030	0.299	−0.043	0.141	−0.078	0.006	−0.040	0.171	−0.078	0.008
Performance-approach	0.014	0.631	0.051	0.077	0.029	0.300	0.042	0.142	**0.112**	0.000

Significant coefficients are bolded (Bonferroni cutoff: $p < .005$)

[a]Reference group: White

[b]Reference group: Arts and Humanities majors

[c]Reference group: College grades-mostly A's

mastery-approach orientation is a uniformly positive predictor of engagement. This orientation was a significant positive predictor for every single EI for both first-years and seniors. Additionally, this orientation showed relatively large standardized β coefficients, indicating that this orientation was also strong in magnitude. For both first-years and seniors, mastery-approach was the largest coefficient out of all the predictor variables for the models with reflective and integrative learning, higher-order learning, learning strategies, effective teaching practices, quality of

Table 6 OLS regression models for first-year students: Standardized β coefficients

	Discuss. w/ Diverse Others		Student–Fac. Interaction		Effective Teach. Pract		Quality of Interactions		Supportive Environment	
	Std. β	Sig	Std. β	Sig	Std. β	Sig	Std. β	Sig	Std. β	Sig
*Step 1: Control Variables*Step										
Male	0.004	0.837	**0.097**	0.000	0.031	0.097	**0.080**	0.000	−0.029	0.129
Transfer Status	0.033	0.059	0.011	0.525	0.009	0.601	0.003	0.882	0.020	0.264
Enrollment Status	−0.026	0.144	0.003	0.873	0.020	0.261	−0.017	0.343	0.025	0.156
First-generation Status	0.038	0.040	−0.004	0.829	0.049	0.008	0.010	0.580	0.026	0.154
Age	−0.010	0.582	−0.008	0.674	0.033	0.063	0.010	0.581	−0.001	0.959
ACT/SAT Score	**0.104**	0.000	**−0.153**	0.000	−0.031	0.169	0.050	0.027	−0.031	0.174
Private Institution	**0.113**	0.000	**0.082**	0.002	**0.096**	0.000	**0.120**	0.000	**0.076**	0.005
Institution Size	**0.133**	0.000	−0.043	0.128	0.004	0.890	0.026	0.361	0.035	0.212
Race: American Indian[a]	0.043	0.014	0.022	0.209	0.010	0.546	−0.003	0.884	**0.049**	0.005
Race: Asian[a]	−0.027	0.130	−0.003	0.873	−0.006	0.724	−0.046	0.010	−0.035	0.052
Race: Black/African American[a]	0.008	0.714	0.043	0.038	0.004	0.837	**−0.090**	0.000	−0.004	0.842
Race: Hispanic/Latino[a]	**−0.071**	0.001	−0.012	0.556	0.003	0.868	−0.049	0.019	−0.009	0.675
Race: Pacific Islander[a]	0.006	0.717	−0.004	0.804	0.017	0.331	0.005	0.765	0.013	0.459
Race: Prefer not to respond[a]	0.020	0.254	0.020	0.248	**−0.049**	0.005	**−0.065**	0.000	**−0.056**	0.001
Race: Other race/ethnicity[a]	0.049	0.006	0.010	0.550	0.006	0.736	−0.006	0.718	0.000	0.998
Race: Multi-racial[a]	0.035	0.049	−0.004	0.815	−0.007	0.696	−0.042	0.019	−0.027	0.134
Major: Bio Sci.[b]	0.031	0.243	−0.010	0.700	−0.027	0.306	0.004	0.887	0.010	0.710
Major: Phys. Sci.[b]	−0.019	0.427	**−0.081**	0.001	−0.006	0.808	0.000	0.990	0.001	0.951
Major: Social Science[b]	0.013	0.606	−0.047	0.054	−0.036	0.138	0.016	0.518	−0.014	0.578
Major: Business[b]	0.019	0.510	−0.031	0.273	−0.006	0.836	0.009	0.760	0.026	0.360
Major: Comm.[b]	0.036	0.095	−0.022	0.308	−0.019	0.365	0.022	0.316	−0.010	0.631
Major: Education[b]	−0.013	0.581	0.006	0.786	−0.010	0.668	0.041	0.084	−0.008	0.743
Major: Engineering[b]	−0.004	0.876	**−0.074**	0.005	−0.043	0.100	0.024	0.365	0.009	0.726
Major: Health Prof.[b]	−0.007	0.807	−0.039	0.188	−0.029	0.334	0.013	0.654	0.013	0.667
Major: Soc. Serv. Prof.[b]	0.001	0.957	−0.035	0.121	0.000	1.000	0.020	0.379	0.003	0.880
Major: Other[b]	−0.035	0.101	−0.011	0.617	0.002	0.927	0.020	0.353	0.008	0.720
Major: Undecided[b]	−0.007	0.740	−0.052	0.007	−0.021	0.287	0.005	0.805	−0.004	0.829
College grades-mostly B's[c]	−0.014	0.487	−0.038	0.060	−0.049	0.016	−0.025	0.221	−0.029	0.157
College grades-mostly C's[c]	−0.020	0.341	**−0.066**	0.001	**−0.127**	0.000	**−0.059**	0.004	**−0.075**	0.000
Percent of online courses	0.013	0.480	0.018	0.299	0.000	0.981	−0.008	0.635	0.012	0.505
Honors college status	0.049	0.007	**0.084**	0.000	0.012	0.508	0.019	0.295	0.005	0.795
Step 2										
Mastery-avoidance	0.013	0.614	**0.075**	0.002	0.060	0.016	0.038	0.132	0.055	0.028
Mastery-approach	**0.123**	0.000	**0.069**	0.005	**0.186**	0.000	**0.165**	0.000	**0.172**	0.000
Performance-avoidance	0.002	0.938	**−0.116**	0.000	−0.074	0.011	−0.033	0.260	−0.021	0.476
Performance-approach	0.009	0.758	**0.084**	0.004	0.002	0.940	0.024	0.423	0.009	0.769

Significant coefficients are bolded (Bonferroni cutoff: $p < .005$)

[a]Reference group: White

[b]Reference group: Arts and Humanities majors

[c]Reference group: College grades-mostly A's

interactions, and supportive environment as the outcome variables. Additionally, mastery-approach was the largest coefficient in the first-year model that predicted collaborative learning, as well as the senior model that predicted student–faculty interaction.

Another consistent pattern that emerged from an examination of the individual goal orientations was for performance-avoidance. When significant, this was detrimental to student engagement. For seniors, performance-avoidance orientation was a significant negative predictor for all EIs,

Table 7 OLS regression models for seniors: Standardized β coefficients

	Ref. and Int. Learning		Higher-Order Learning		Learning Strategies		Quantitative Reasoning		Collaborative Learning	
	Std. β	Sig	Std. β	Sig	Std. β	Sig	Std. β	Sig	Std. β	Sig
Step 1: Control Variables										
Male	−0.012	0.542	−0.044	0.033	**−0.057**	0.004	**0.119**	0.000	−0.031	0.134
Transfer Status	−0.020	0.305	−0.012	0.542	0.035	0.074	0.016	0.408	−0.018	0.382
Enrollment Status	0.025	0.200	−0.001	0.959	0.017	0.394	0.019	0.345	**0.081**	0.000
First-generation Status	0.034	0.070	0.024	0.233	0.014	0.472	−0.023	0.227	−0.026	0.185
Age	−0.047	0.024	−0.034	0.118	0.033	0.117	−0.012	0.587	**−0.112**	0.000
ACT/SAT Score	0.040	0.093	−0.049	0.050	−0.035	0.146	0.026	0.295	**−0.088**	0.000
Private Institution	0.079	0.006	0.077	0.011	0.042	0.148	0.002	0.936	−0.009	0.774
Institution Size	0.033	0.265	0.019	0.539	−0.005	0.868	−0.048	0.117	−0.005	0.872
Race: American Indian[a]	−0.004	0.839	0.033	0.079	−0.009	0.602	0.018	0.329	−0.025	0.180
Race: Asian[a]	0.020	0.287	**0.058**	0.003	0.032	0.084	0.036	0.055	0.031	0.106
Race: Black/African American[a]	0.028	0.169	0.028	0.197	0.049	0.019	0.030	0.164	0.047	0.032
Race: Hispanic/Latino[a]	0.050	0.014	0.056	0.010	0.054	0.009	**0.065**	0.002	−0.007	0.737
Race: Pacific Islander[a]	−0.006	0.729	0.005	0.803	−0.011	0.555	0.007	0.712	−0.017	0.369
Race: Prefer not to respond[a]	−0.022	0.220	−0.028	0.144	0.005	0.771	0.001	0.957	−0.018	0.342
Race: Other race/ethnicity[a]	0.013	0.488	−0.002	0.905	0.006	0.719	0.015	0.421	0.022	0.251
Race: Multi-racial[a]	0.039	0.036	0.010	0.595	−0.001	0.977	0.023	0.229	−0.030	0.126
Major: Bio Sci.[b]	**−0.124**	0.000	−0.035	0.146	**0.084**	0.000	**0.241**	0.000	**0.074**	0.002
Major: Phys. Sci.[b]	**−0.131**	0.000	−0.007	0.745	0.035	0.095	**0.173**	0.000	**0.075**	0.001
Major: Social Science[b]	0.005	0.833	0.007	0.772	0.064	0.006	**0.192**	0.000	−0.008	0.749
Major: Business[b]	**−0.135**	0.000	−0.048	0.076	0.023	0.370	**0.292**	0.000	**0.079**	0.003
Major: Comm.[b]	0.002	0.927	−0.009	0.683	0.011	0.581	0.059	0.006	0.018	0.419
Major: Education[b]	−0.028	0.206	−0.034	0.142	−0.011	0.624	0.047	0.041	**0.097**	0.000
Major: Engineering[b]	**−0.235**	0.000	−0.014	0.592	0.012	0.636	**0.310**	0.000	**0.276**	0.000
Major: Health Prof.[b]	**−0.098**	0.000	−0.045	0.093	0.032	0.213	**0.206**	0.000	**0.135**	0.000
Major: Soc. Serv. Prof.[b]	−0.030	0.150	0.004	0.850	0.002	0.939	**0.104**	0.000	−0.023	0.282
Major: Other[b]	−0.047	0.027	−0.023	0.310	0.006	0.769	**0.100**	0.000	0.040	0.075
Major: Undecided[b]	0.031	0.090	0.033	0.084	0.028	0.128	**0.064**	0.001	0.024	0.199
College grades-mostly B's[c]	−0.014	0.487	−0.053	0.015	−0.023	0.261	0.024	0.268	−0.004	0.865
College grades-mostly C's[c]	−0.037	0.061	−0.045	0.032	**−0.058**	0.004	−0.009	0.671	−0.035	0.097
Percent of online courses	−0.004	0.833	0.026	0.199	−0.006	0.751	0.017	0.379	**−0.116**	0.000
Honors college status	0.003	0.866	−0.017	0.410	−0.014	0.478	0.014	0.462	−0.012	0.541
Step 2										
Mastery-avoidance	**0.067**	0.009	**0.098**	0.000	**0.143**	0.000	**0.112**	0.000	0.025	0.346
Mastery-approach	**0.315**	0.000	**0.275**	0.000	**0.321**	0.000	**0.149**	0.000	**0.115**	0.000
Performance-avoidance	−0.086	0.006	**−0.106**	0.001	**−0.168**	0.000	**−0.115**	0.000	−0.030	0.358
Performance-approach	−0.018	0.548	0.014	0.666	**0.100**	0.001	0.062	0.049	0.069	0.031

Significant coefficients are bolded (Bonferroni cutoff: $p < .005$)

[a]Reference group: White

[b]Reference group: Arts and Humanities majors

[c]Reference group: College grades-mostly A's

but three (reflective and integrative learning, collaborative learning, and effective teaching practices). The coefficients were relatively large in magnitude for learning strategies, quantitative reasoning, and diverse discussions. For the models using first-year students, performance-avoidance was a relatively strong negative predictor for student–faculty interaction.

The findings for performance-approach orientation were mixed. For a few of the models, this type of orientation was a positive but relatively weaker predictor of

Table 8 OLS regression models for seniors: Standardized β coefficients

	Discuss. w/ Diverse Others		Student–Fac. Interaction		Effective Teach. Pract		Quality of Interactions		Supportive Environment	
	Std. β	Sig	Std. β	Sig	Std. β	Sig	Std. β	Sig	Std. β	Sig
Step 1: Control Variables										
Male	−0.042	0.049	0.053	0.009	0.033	0.109	**0.063**	0.003	−0.017	0.402
Transfer Status	−0.024	0.255	**−0.057**	0.004	0.005	0.816	−0.021	0.320	**−0.094**	0.000
Enrollment Status	0.047	0.026	0.026	0.205	0.013	0.536	0.054	0.011	0.044	0.033
First-generation Status	0.036	0.081	0.012	0.546	0.001	0.950	0.020	0.342	0.015	0.444
Age	0.009	0.679	**−0.085**	0.000	−0.037	0.093	0.001	0.979	−0.029	0.184
ACT/SAT Score	**0.091**	0.000	**−0.070**	0.004	−0.041	0.100	−0.032	0.215	−0.020	0.441
Private Institution	0.066	0.036	0.014	0.626	0.065	0.033	0.051	0.103	0.067	0.029
Institution Size	0.084	0.009	**−0.136**	0.000	−0.001	0.967	−0.039	0.235	0.056	0.077
Race: American Indian[a]	−0.001	0.954	0.030	0.104	0.003	0.892	0.014	0.470	0.025	0.194
Race: Asian[a]	**0.058**	0.004	0.038	0.044	0.019	0.315	0.031	0.126	0.025	0.199
Race: Black/African American[a]	0.042	0.065	**0.074**	0.001	0.017	0.447	−0.016	0.475	**0.070**	0.002
Race: Hispanic/Latino[a]	0.024	0.282	0.016	0.446	0.031	0.158	0.022	0.337	**0.075**	0.001
Race: Pacific Islander[a]	0.011	0.585	−0.025	0.179	0.002	0.912	0.002	0.921	−0.001	0.962
Race: Prefer not to respond[a]	0.034	0.092	−0.013	0.491	**−0.068**	0.000	**−0.059**	0.003	**−0.061**	0.002
Race: Other race/ethnicity[a]	0.044	0.026	−0.009	0.643	0.015	0.430	−0.051	0.009	−0.021	0.274
Race: Multi-racial[a]	0.042	0.039	−0.010	0.585	0.020	0.304	−0.008	0.707	0.009	0.650
Major: Bio Sci.[b]	−0.025	0.325	**−0.069**	0.004	−0.052	0.035	0.000	0.995	−0.002	0.922
Major: Phys. Sci.[b]	−0.027	0.247	**−0.068**	0.002	−0.043	0.058	−0.021	0.355	0.010	0.656
Major: Social Science[b]	−0.007	0.771	**−0.068**	0.005	−0.011	0.669	−0.042	0.103	0.026	0.298
Major: Business[b]	−0.035	0.211	**−0.091**	0.001	**−0.075**	0.005	−0.004	0.880	0.026	0.345
Major: Comm.[b]	−0.007	0.755	−0.020	0.352	0.004	0.866	0.029	0.198	0.045	0.042
Major: Education[b]	−0.020	0.415	−0.003	0.908	−0.018	0.450	0.009	0.704	−0.011	0.644
Major: Engineering[b]	−0.067	0.013	**−0.112**	0.000	**−0.133**	0.000	−0.062	0.023	−0.022	0.400
Major: Health Prof.[b]	**−0.089**	0.001	−0.064	0.015	**−0.079**	0.004	0.005	0.864	0.013	0.626
Major: Soc. Serv. Prof.[b]	−0.005	0.808	**−0.072**	0.001	−0.022	0.316	−0.022	0.330	−0.029	0.189
Major: Other[b]	−0.039	0.093	−0.037	0.097	−0.038	0.090	0.036	0.123	0.027	0.233
Major: Undecided[b]	0.028	0.154	**0.057**	0.002	0.008	0.663	−0.026	0.195	0.010	0.601
College grades-mostly B's[c]	0.058	0.010	**−0.073**	0.001	−0.055	0.013	−0.055	0.016	−0.022	0.319
College grades-mostly C's[c]	0.001	0.959	**−0.076**	0.000	**−0.060**	0.005	**−0.066**	0.003	**−0.070**	0.001
Percent of online courses	−0.019	0.363	**−0.059**	0.003	−0.020	0.326	0.035	0.097	−0.003	0.890
Honors college status	0.013	0.546	0.053	0.007	−0.027	0.189	0.005	0.823	−0.012	0.554
Step 2										
Mastery-avoidance	0.069	0.012	0.056	0.032	**0.075**	0.005	0.067	0.016	0.075	0.006
Mastery-approach	**0.122**	0.000	**0.190**	0.000	**0.210**	0.000	**0.151**	0.000	**0.189**	0.000
Performance-avoidance	**−0.118**	0.001	**−0.105**	0.001	−0.077	0.021	**−0.108**	0.002	−0.076	0.023
Performance-approach	0.086	0.010	0.056	0.073	0.018	0.573	0.055	0.100	0.030	0.355

Significant coefficients are bolded (Bonferroni cutoff: $p < .005$)

[a]Reference group: White

[b]Reference group: Arts and Humanities majors

[c]Reference group: College grades-mostly A's

engagement, while for other models, it was not significant. For seniors, performance-approach orientation was a moderate significant positive predictor of engagement in learning strategies. Similarly, this was also the case for first-year students when it comes to student–faculty interaction. The only exception to this pattern was for first-year students and collaborative learning. In this model, performance-approach was a relatively strong positive predictor, with the second-highest coefficient in the model.

Findings for mastery-avoidance were also mixed. For first-year students, it was positively related to some, but not all, of the engagement indicators (learning strategies, quantitative reasoning, and student–faculty interaction), with relatively weak to moderate coefficients. For seniors, it was a significant positive predictor for about half of the engagement indicators (higher-order learning, learning strategies, quantitative reasoning, and effective teaching practices), suggesting that mastery-avoidance orientation can positively predict student engagement in a variety of areas. However, it is also worth noting that the coefficients for mastery-avoidance orientation were much weaker in magnitude than those for mastery-approach orientation.

Discussion

In terms of patterns of results, one of the most notable findings involves the large contributions of explained variance for the achievement goal orientations. For many of the engagement indicators, the four different achievement goal orientations contributed nearly half to three-quarters of the total explained variance, suggesting that goal orientation is playing a substantial role in the various engagement behaviors. This further supports Huang's (2012) assertion that restricting studies of achievement goal orientation to only focus on academic achievement as the outcome is problematic and exploring relationships with other constructs will be more fruitful. These relatively large amounts of explained variance are important in our understanding of how individual motivators and characteristics contribute to student engagement, as engagement often varies much more between students at an institution rather than between institutions themselves (NSSE, 2014). Being able to explain how engagement is functioning also informs our attempts to increase engagement for students through positive programs, curriculum, and interventions.

Mastery-approach orientation was consistently and strongly related to student engagement for both first-years and seniors across all of the different indicators of engagement. This finding is consistent with previous research demonstrating students who set specific learning goals to master content are more likely to yield positive outcomes, such as topic interest and higher GPAs than peers (Harackiewicz et al., 2002; Hsieh et al., 2007; Locke & Latham, 2006). Furthermore, the stronger relative effect sizes are consistent with research from fields outside of education, with a meta-analysis from Lochbaum, Zanatta, and Kazak (2020) demonstrating that mastery-approach goals in sports psychology have effect sizes that are larger in magnitude. The strength of mastery-approach goals in the current study also supports the notion that rather than focusing on grades, students who focus on learning the content of the courses will have more positive educational experiences overall (Pintrich, 2000). Mastery-approach orientation seems to be an important component of student engagement. However, it is necessary to note that although the terminology of statistical regression techniques uses "predictor" and "outcome" variables, it is still a correlational analysis, and we cannot conclude that mastery-approach orientation is the "cause" of the increased engagement. More research, preferably longitudinal in nature, might better address this particular nuance of interpretation. It is likely that achievement goal orientation and student engagement have a bidirectional relationship, each functioning to increase (or decrease) the other as the student progresses through the education system. Still, if the objective is to increase student engagement, it is prudent for professors, advisors, and other university staff with whom students interact to encourage mastery-approach goals and downplay grades as much as is possible. If a student is engaged, then good grades tend to follow as a positive side effect.

While mastery-approach orientation was a uniformly positive predictor of engagement, performance-avoidance orientation had either the opposite result or no significant relationship at all. In an attempt to "not look dumb," students may be avoiding course material (e.g., reviewing and summarizing notes), certain courses which are deemed "too hard" (e.g., math-heavy classes), or even talking to faculty (so as not to say the "wrong" thing and expose their lack of knowledge) (Bruning et al., 2011). This is comparable to other research that suggests students with performance-avoidance behaviors were less committed to goal obtainment than peers with other orientations (Harackiewicz et al., 2002; Sideridis, 2005). This connection to student engagement makes sense from the perspective that if one is using avoidance as a strategy that guides behavioral choices then it is difficult to be engaged. Again, the directionality of this relationship needs further exploration—does a performance-avoidance orientation cause low levels of engagement or vice versa? Regarding this finding, a recommendation for education professionals might be to convey a compassionate and empathetic attitude when it comes to interacting with students, especially those who might be intimidated or feel out of place in a higher education setting (such as first-generation students or students of color). Furthermore, it is important to establish a welcoming classroom atmosphere, creating a community of learners and emphasizing discourse rather than harsh judgment (Quaye & Harper, 2015).

For the performance-approach orientation, the patterns were less uniform, and in several cases, it was not significantly related to engagement, but in a few others was a weak

to moderate positive predictor. This finding is consistent with the mixed perspectives in the literature on whether or not performance-approach goals are beneficial. Some research purports that performance orientations are less desirable because they do not predict interest (Harackiewicz et al., 2000), are related to shallow processing (Greene & Miller, 1996), and contribute to avoiding challenges and an unwillingness to work with others (Midgley et al., 2001). However, there is also an argument from some who claim that performance-approach goal orientation can be adaptive if it is combined with a mastery goal orientation (Pintrich, 2000), can facilitate high achievement under highly challenging conditions (Senko et al., 2013), and can positively predict well-being (Gillet et al., 2014; Sideridis, 2005). Performance-approach goals are not necessarily detrimental in other contexts either, such as sports and physical activity (Lochbaum et al., 2020). Thus, the findings from this study that in some cases, performance-approach is positively related to engagement, but in other cases is not significantly related at all, suggest that while not necessarily detrimental to learning and engagement, developing performance-approach goals should not be emphasized.

The findings on relationships between mastery-avoidance goal orientation and engagement were also more mixed. As with performance-approach goal orientation, in some cases, this orientation was a significant positive predictor of engagement, and in other instances, there was not a significant relationship. There are fewer consistent findings within the literature regarding mastery-avoidance, and therefore does not have a uniform consensus on whether or not it is constructive and should be encouraged. Borrowing a term from popular culture, mastery-avoidance can potentially be conceptualized as a sort of academic FOMO—fear of missing out. For students with higher levels of this goal orientation, wanting to avoid "missing out" on learning content may promote certain engagement-related behaviors. While these engagement-related behaviors are ultimately related to positive outcomes such as academic achievement (Kuh, 2003; Pascarella & Terenzini, 2005), if they are rooted in a place of fear and anxiety, there might be residual stress that students experience. Given that the relationships for mastery-avoidance orientation were only weak to moderate, the real winner for engagement is still mastery-approach. Because past research also associates mastery-avoidance orientations with elevated cognitive anxiety, negative affect, and fear of failure (Sideridis, 2008), it is probably best for institutions and instructors to focus their efforts on encouraging mastery-approach, rather than mastery-avoidance, goals for their students.

In the context of what is already known about the benefits of student engagement for the higher education experience, there are further implications when adding in the overall findings on achievement goal orientation. Instructors might adapt the interventions for promoting mastery goals that have been successful in K-12 settings (Elliot & Hulleman, 2017; Linnenbrink, 2005; Marjanović et al., 2019; O'Keefe, Ben-Eliyahu, & Linnenbrink-Garcia, 2013; Post & van der Molen, 2020), making sure to encourage positive self-talk and include tasks for students that are moderately challenging, inquiry-based, and allow students to choose topics for open-ended assignments that are of personal interest to stimulate their intrinsic motivation. Knowing that encouragement of mastery goals goes hand-in-hand with student engagement, administrators might consider policies that downplay grades in favor of ways that students can demonstrate interest and mastery of content. This knowledge might also be extended to programming with student affairs staff, academic advisors, or first-year orientation activities. Reminding students that grades are not the only component of their academic experiences may be another important element of encouraging student engagement at the college level.

Limitations

Although there are various strengths of this study, some limitations should be mentioned. Given the data collection process, the sample may not represent all students at bachelor's-granting colleges and universities, and therefore, caution should be used when making generalizations. Institutions elect to administer NSSE for multiple reasons that usually involve institutional improvement, which may impact the overall context of the college experience. Moreover, this study used self-reported data, which may not always be entirely objective. On the other hand, most studies utilizing self-reports in higher education indicate that self-reports and actual measures of constructs like abilities are positively associated (Anaya, 1999; Hayek et al., 2002; Pike, 1995), and social desirability bias does not have a large impact on student responses for surveys of basic cognitive and academic behaviors (Miller, 2012). The lower response rate could also be a possible reason for bias in the sample, although prior research indicates that studies with lower response rates can still sustain acceptable response representativeness (Fosnacht et al., 2017; Lambert & Miller, 2014). As previously noted, considering the research design, this study did not test for causal relationships between achievement goal orientation and student engagement. The findings can only corroborate whether or not these constructs are related. Given these methodological and conceptual caveats, the findings should be interpreted with caution.

Conclusions

Yet, even in light of the potential limitations, this study has many valuable implications. Overall, this study provides evidence to support the relationship between achievement goal orientation and student engagement, with patterns suggesting that mastery-approach orientation is a positive predictor of engagement, while performance-avoidance tends to be a negative predictor. Performance-approach and mastery-avoidance orientations were less consistent in their prediction of engagement, but the scattered significant findings were positive in direction. Additionally, several of the models had strong explanatory power, which contrasts with Huang's (2012) findings on the disappointing relationship with academic achievement. The connection between achievement goal orientation and student engagement was much stronger in this study.

Future research could expand on these findings in an assortment of ways. For example, there may be important differences in achievement goal orientations based on demographic or cultural characteristics. Additionally, longitudinal research might more sufficiently determine more conclusive results regarding the aforementioned "cause-and-effect" issues. Further studies might also dive deeper into the specific demographic characteristics and educational experiences related to certain orientations, taking a "multiple approaches" perspective of achievement goals (Hulleman et al., 2010; Lochbaum et al., 2020) to better understanding their development and functionality. This study included several demographic characteristics as control variables in the models, but the interpretation of their relationships with goal orientation was beyond the scope of this research and should be addressed more fully in the future. It may also be interesting to look at how goal orientation predicts other aspects of the higher education experience, such as participation rates in high-impact practices (e.g., internships, service-learning, study abroad, etc.) or if there are changes in orientation over time. Institutions looking to increase mastery-approach orientation within their students might develop curricular and programming interventions to promote these goals and test their effectiveness in future studies as well. It may be possible to adapt K-12 interventions to a higher education setting, exploring how these may or may not contribute to goal orientation development.

Appendix 1

See Table 9.

Table 9 Example Engagement Indicator Scale Items

Higher-Order Learning
Coursework emphasized: Evaluating a point of view, decision, or information source
Coursework emphasized: Forming a new idea or understanding from various pieces of information
Reflective and Integrative Learning
How often: Connected your learning to societal problems or issues
How often: Examined the strengths and weaknesses of your own views on a topic or issue
Learning Strategies
How often: Reviewed your notes after class
How often: Summarized what you learned in class or from course materials
Quantitative Reasoning
How often: Reached conclusions based on your own analysis of numerical information (numbers, graphs, statistics, etc.)
How often: Used numerical information to examine a real-world problem or issue (unemployment, climate change, public health, etc.)
Collaborative Learning
How often: Explained course material to one or more students
How often: Worked with other students on course projects or assignments
Discussions with Diverse Others
How often had discussions with: People from a race or ethnicity other than your own
How often had discussions with: People from an economic background other than your own
Student–Faculty Interaction
How often: Worked with a faculty member on activities other than coursework (committees, student groups, etc.)
How often: Discussed your academic performance with a faculty member
Effective Teaching Practices
Instructors have: Clearly explained course goals and requirements
Instructors have: Provided feedback on a draft or work in progress
Quality of Interactions
With: Academic advisors
With: Student services staff
Supportive Environment
Institution emphasizes: Providing opportunities to be involved socially
Institution emphasizes: Helping you manage your non-academic responsibilities (work, family, etc.)

For full list of items, see https://nsse.indiana.edu/nsse/survey-instruments/engagement-indicators.html

Appendix 2

See Table 10.

Table 10 Description of independent variables

Variable	Description
Sex[a]	0 = Female; 1 = Male
Transfer Status[a]	0 = Started at current institution; 1 = transfer student
Enrollment status[a]	0 = Part-time; 1 = Full-time
First-generation status[a]	0 = At least one parent earned a bachelors degree; 1 = Neither parent earned a bachelors degree
Age	Continuous variable for age
SAT/ACT score	Continuous variable for combined ACT and SAT scores (ACT converted to SAT)
Control[a]	0 = Public; 1 = Private
Enrollment size	Continuous variable for the total number of undergraduate enrollment
Race or ethnicity[a]	American Indian; Asian, Asian American; Black, African American; Latino, Hispanic; Native Hawaiian or Other Pacific Islander; Prefer not to respond; Unknown/Other race or ethnicity; Multiracial; White[b]
Major field[a]	Biological Sciences, Agriculture, and Natural Resources; Physical Sciences, Mathematics, and Computer Science; Social Sciences; Business; Communications, Media and Public Relations; Education; Engineering; Health Professions; Social Service Professions; Other Majors; Undecided; Arts and Humanities[b]
Earned college grades[a]	Mostly As[b]; Mostly Bs; Mostly Cs
Percentage of courses taken online	Continuous variable for the percentage of courses taken online
Honors program or honors college participation[a]	0 = No; 1 = Yes

[a]Coded as a dichotomous variable (0 = not in group; 1 = in group)

[b]Reference group

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Declarations

Conflict of interest All authors declare that they have no conflict of interest.

Ethical approval All procedures performed in studies involving human participants were in accordance with the ethical standards of the Institutional and/or National Research Committee and with the 1964 Helsinki Declaration and its later amendments or comparable ethical standards. The data collection and analysis adhere to all human subject guidelines, as specified by the Institutional Review Board at the authors' institution, as well as with the Institutional Review Boards of all institutions participating in the study.

Informed consent Informed consent was obtained from all individual participants included in the study.

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