

**RELATIONSHIP BETWEEN ENGLISH PROFICIENCY TEST SCORES AND
ACADEMIC SUCCESS AT THE UNIVERSITY OF HAWAI‘I AT MĀNOA**

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ABSTRACT

This study compared the relationship between English language proficiency (ELP) test scores and academic success at the University of Hawai‘i at Mānoa (UHM) and evaluated whether academic outcomes differed for students who entered on the basis of different tests. Locally, this represents one step in evaluating the validity of using the Duolingo English Test (DET) in admissions decisions. More broadly, it fills a gap in the literature by examining outcomes in a new context (a large, public, less selective university in the US), including a newer test (DET), and covering a wider range of ELP scores than is typically represented in such research. In addition to GPA as an indicator of student success, this study considered proportions of students on academic probation or withdrawing in relation to test submitted, and also made comparisons to international students who were exempt from submitting an ELP score for admission. Further, it compared students admitted unconditionally with higher ELP scores, to those with lower ELP scores admitted contingent upon further English language instruction. Findings are relevant to discussing valid use of DET alongside IELTS and TOEFL in admissions at UHM, while incorporating academic outcomes indicators beyond score correlations with GPA.

Keywords: English language proficiency test, university admissions, Duolingo English Test, range restriction, academic success, academic outcomes measures

INTRODUCTION

The present study is one step in evaluating the criterion-related and predictive validity of using the Duolingo English Test (DET) in admissions decisions for international students at the University of Hawai‘i at Mānoa (UHM). DET is a relatively new English Language Proficiency (ELP) test, which became more widely accepted as part of university admissions decisions during the COVID-19 pandemic (Isbell & Kremmel, 2020). This project examined institutional data to explore relationships between ELP test scores and academic success, as represented by first year GPA. Moreover, it evaluated whether there are disparate outcomes in GPA, or in instances of withdrawing or receiving academic probation or warning, for students who entered on the basis of DET compared to those who submitted a different ELP test score or were exempt from submitting an ELP score. The following research questions guided the project:

1. What is the relationship between UHM students’ English language proficiency test scores and academic success?
2. Do academic outcomes differ for students who entered on the basis of different English language proficiency tests or without such a score?

Informed by and in partial replication of Isaacs et al. (2023), this study explored how DET compares to more established tests, International English Language Testing System Academic Test (IELTS) or Test of English as a Foreign Language iBT (TOEFL), in terms of association with initial student success, but in a different context. Isaacs et al. (2023) reviewed DET scores and first year grades at a “very selective” (College Board, n.d.) Russell Group institution in the United Kingdom with over 50,000 students (40% international) (Isaacs et al., 2023) and a 22% undergraduate acceptance rate. The present study considered ELP tests operating at a “less selective” (College Board, n.d.) public university in the United States with 19,000 students (7% international) (University of Hawai‘i at Mānoa, n.d.) and a 73% acceptance rate. Findings contribute to the validity discussion of using DET in admissions at UHM specifically and at English-medium universities generally by examining a new setting, and add to the broader literature on ELP tests and academic success by: exploring a wider range of ELP scores than typically represented; including students who were exempt from ELP testing; and

incorporating withdrawal, probation, or warning as academic outcomes indicators in addition to GPA.

BACKGROUND

Before using a test to inform decisions, test developers, takers, and decision-makers ask whether the test is reliable and fair, and whether using the given test takers' scores for certain decisions is valid and just. Validity is not an inherent property of a test, but appertains to specific test takers and uses (Chapelle, 2012). In order to argue that a given use of a test score is valid, it is important to establish that a test takers' score relates to how successfully they are able to use language in the real-world Target Language Use (TLU) domain (Bachman, 2005; Kane, 2013). To explore whether scores reflect ability to use English for completing college-level work, reviewers may evaluate whether scores correlate well with other measures of academic English proficiency (criterion-related validity), and whether they can be extrapolated to predict academic success (predictive validity) (Stoynoff & Chapelle, 2005). This project contributes to the validity discussion on using DET for university admissions, informed by the literature on the predictive validity of high stakes ELP tests for academic success, and on current evidence for DET validity.

Predictive Validity of High Stakes English Proficiency Tests for Academic Success

Requiring college applicants to take ELP tests is based on the premise that scores provide a predictive measure of future success in an English language institution. For criterion-related validity, researchers calculate the correlation between test scores and a second representative criterion. If the correlation is large and positive, this suggests a student's score provides predictive evidence for how they may perform on the other criterion (Stoynoff & Chapelle, 2005). In this framework, what criteria are used to represent academic success?

Researchers have suggested GPA, degree completion, time to graduation, student satisfaction, or professional qualifications as criteria for evaluating academic success. Others propose considering a student's intellectual and inter- and intrapersonal behavior (Zimmermann et al., 2018). There are limitations to using GPA alone, since it does not account for differences in course and grading difficulty between subjects, instructors, levels, or institutions. Still, GPA remains the most commonly used proxy for student success (York et al., 2015).

Beyond framing academic success only as attaining a high GPA, it may be more immediately critical to focus on the opposite end of the scale and scrutinize factors associated with earning a very low GPA. That is, whether a student earns a 3.1 compared to a 3.9 GPA may not matter as much to that individual or the institution in the near or long term, as whether and how many students earn grades below a level that prevents them from persisting to graduation. The present study considered academic success in terms of the threshold GPAs required to maintain good academic standing, which in turn support students in persisting and ultimately completing their degree.

There are limitations to assuming linguistic ability alone predicts GPA and associated academic outcomes. Language proficiency has been shown to correlate more with first-semester or first-year GPA than overall cumulative GPA (Kuncel & Hezlett, 2007). This is logical, since students gain more language exposure over time, making their pre-matriculation proficiency less relevant. The evidence is mixed on predicting GPA from widely used ELP test scores (Daller & Phelan, 2013; Daller & Yixin, 2017), including IELTS (Dang & Dang, 2021; Dooley & Oliver, 2002; Hu & Trenkic, 2021; Schoepp, 2018; Shakibaei & Memari, 2019) and TOEFL (Bridgeman et al., 2016; Chapelle et al., 2008; Cho & Bridgeman, 2012; Ginther & Yan, 2018; Harsch et al., 2017; Zimmermann et al., 2018). Language is necessary to succeed academically, but myriad other factors affect academic performance, including motivation, age, background, intelligence, and major field of study (Dooley & Oliver, 2002). This is also true of native speakers of the language of instruction, who do not all earn perfect GPAs simply by virtue of L1 proficiency. The implication is that researchers do not expect to find especially strong correlations between ELP or other admission test scores and GPA, and this alone is not a criterion for whether using these scores is valid in admissions decisions. Such tests are used to demonstrate whether a student meets a necessary level of proficiency to support their success, rather than to make precisely predictive quantitative estimates of individuals' grades over many years in differing circumstances in and out of the classroom.

Accordingly, meta-analyses consistently report statistically significant but weak to moderate positive correlations between ELP test scores and GPA (Abunawas, 2014; Brown, 2017; Gagen, 2019). A 2017 dissertation evaluated TOEFL iBT and first-year GPA at the University of Hawai'i, and found a small statistically significant correlation (Brown, 2017). The

most recent peer-reviewed meta-analysis of both TOEFL and IELTS reports only a weak positive correlation between test scores and GPA ($r = .23, p < .001$) (Ihlenfeldt & Rios, 2022). This latter study found no difference between the two exams, and no significant moderating variables. Still, reviewers report that TOEFL for example does indeed reflect academic English proficiency (Chapelle et al., 2008), and so it measures what it purports to measure, per Messick (1989). In turn, “even a small correlation might indicate a meaningful relationship between TOEFL iBT...and GPA” (Cho & Bridgeman, 2012).

In all of these studies, researchers recommend including calculations on meaningful subsamples of participants, such as level and major field of study, country of origin, and subscores on different test sections (Bridgeman et al., 2016; Ginther & Yan, 2018). For example, in 2011, Purdue University initially calculated the predictive validity of TOEFL iBT total scores and first-year GPA as 0, using only overall scores and aggregating all students in a single calculation (Ginther & Yan, 2018). Yet when Ginther and Yan (2018) disaggregated students by subgroups, corrected for range restriction, and investigated subscores for listening, speaking, reading, and writing, the researchers found that the score profile of a single Chinese subgroup was largely responsible for dampening the university’s initial correlation calculation. Subsequent changes in Purdue admissions policy excluded this subgroup, and negative correlations then disappeared.

Analyses must also consider the effect of range restriction in test scores and in GPA. In the above study, Purdue’s cut score of 80 restricted the range of TOEFL iBT scores to the top 52% of the range of possible scores. Overall, “Data on GPA are only available for the admitted students; therefore, the relationship tends to be underestimated” (Ginther & Yan, 2018). That is, correlation coefficients may be low when comparing admissions test scores to GPA, because the students who are admitted and then earn a GPA by definition exceeded a high cut score on the test. Because validity coefficients are based on sample variance, “having little variance in scores will ultimately lead to a weaker correlation” (Cho & Bridgeman, 2012). As seen in the present study, graduate student GPAs may also exacerbate this effect of restricted range, as graduate programs typically require students to maintain a high GPA.

Evidence for DET Validity

As a newer test, empirical support for DET is still emerging, and there is a general need for more research, especially after the 2019 DET revision. DET was only recently developed, and even more recently accepted by more institutions. In many cases, acceptance was driven by the COVID-19 pandemic when universities sought new options for test administration, including at-home (Isbell & Kremmel, 2020; Wagner, 2020). At that time, there was “very little empirical evidence supporting [DET] use for university admission purposes,” including few independent, peer-reviewed studies on the reliability and validity of the current version of the test (Wagner, 2020). Today, more such studies have been published (Isaacs et al., 2023; Isbell et al., 2023), but more are needed to contribute to the validity argument of using DET alongside other accepted ELP tests for university international admissions decisions.

Starting with reliability as a precondition for validity, an early study reported a .79 test-retest reliability coefficient for DET, when participants took the test again after two weeks (Ye, 2014). The author wrote that this value is especially high for a test-retest protocol with different items, compared to identical forms. A year later, DET reported high internal consistency, with a split half reliability coefficient of .96, and test-retest reliability coefficient of .84 for repeat tests taken within 30 days (Settles, 2016). It must be noted that these studies were both commissioned by Duolingo, and Settles is one of DET’s developers.

If reliability is established, then reviewers can turn to whether DET correlates well with other established measures of English proficiency (criterion-related validity). For example, this could include comparing students’ DET scores with IELTS or TOEFL. As with the reliability evidence above, most existing studies on this come from internal Duolingo Research Reports (DRR) rather than peer reviewed journals. Early DRR studies found a relatively low correlation between DET and TOEFL scores of .41 (Ishikawa et al., 2016). Later studies reported $r = .67$ (Ye, 2014) and .70-.71 (Brenzel & Settles, 2017). Another Duolingo study found a significant correlation ($r = .83$) between DET and IELTS scores, and from this correlation inferred typical US university admission cutoff scores and CEFR levels for DET (Bézy & Settles, 2015).

The revised DET released in 2019 now includes writing and speaking tasks. After this revision, Settles et al. (2020) asked participants to take DET and also submit their IELTS or TOEFL score. In a peer-reviewed study, they found an improved test/retest reliability of .85, and

correlation coefficients of $r = .77$ with TOEFL iBT and $.85$ with IELTS. Similarly, the TOEFL and IELTS have a $.73$ correlation to each other, so DET's relationship to IELTS and to TOEFL is comparable to the relationship between IELTS and TOEFL (Brenzel & Settles, 2017; Settles et al., 2020).

Isaacs et al. (2023) is the first published study correlating DET scores and GPA. The researchers analyzed the correlation between first year GPA and DET scores for 1,389 graduate and 492 undergraduate students entering University College London in Fall 2020. Overall, they found a small positive correlation between DET scores and first year GPA for graduate students (adjusted $r = .195$), but a small negative correlation for undergraduate students (adjusted $r = -.112$). Importantly, the same pattern held for students entering on the basis of IELTS and TOEFL, supporting criterion-related validity of DET compared to these two widely accepted tests. These findings lend mixed support for DET but also for IELTS and TOEFL predictive validity, in terms of how well the test scores relate to future academic outcomes as measured by GPA.

Frequent critiques of DET, especially in its earlier version, note that DET items do not appear to reflect realistic, authentic language use in academic contexts (Isbell & Kremmel, 2020; Wagner, 2020; Yao, 2023). This could challenge the content validity of using DET scores as measures of academic English usage. Regarding extrapolation to the TLU, Isbell et al. (2023) asked university stakeholders to rate DET test takers' speech samples in terms of comprehensibility and acceptability for English language use in an academic context. They found a strong correlation between speakers' DET scores (both overall and subscores) and the stakeholders' acceptability and comprehensibility ratings ($r \geq .74-.89$). This high accordance between DET score and speech acceptability ratings from university faculty, staff, and students begins to build support for considering DET as reflecting expectations for English language use in an academic setting, at least in the speaking skill.

The present study seeks to add to the validity discussion on DET use in college admissions decisions for students with English as an additional language. How strongly do students' DET scores correlate with success at UHM in terms of GPA? From the other angle, do students who enter with DET experience negative academic outcomes (such as dropping out or receiving a warning or probation) at a higher rate? Further, how do these students' outcomes

compare to their peers who submitted other widely accepted ELP tests, or who were exempt from submitting an ELP score?

METHODS

International Student Admissions and ELP Test Scores at UHM

Data were received from the UHM Undergraduate Admissions Office and Graduate Division for 988 international students entering UHM between Fall 2020 and Spring 2023, the full period when DET was accepted for both graduate (GR) and undergraduate (UG) admissions. 399 of these students submitted ELP test scores to meet admissions criteria for English proficiency (Table 1). Fall 2021 was the first semester that entering students submitted DET scores (two graduate, seven undergraduate). This makes sense, since most students would have applied for Fall 2020 admission or taken an ELP test for Spring 2021 applications by the time UHM began accepting DET during the COVID-19 pandemic. In this three-year period, the number of students submitting DET scores peaked for Fall 2022 entry.

Table 1
ELP tests used by international students admitted and entering UHM, Fall 2020-Spring2023

Entry	DET			IELTS			TOEFL			Total all ELP			No ELP test**		
	GR	UG	total	G R	U G	total	G R	U G	total	G R	U G	total	G R	U G	total
Fall 2020	0	0	0	25	0	25	33	7	40	58	7	65	74	72	146
Spring 2021	0	0	0	4	0	4	16	3	19	20	3	23	13	27	40
Fall 2021	2	7	9	22	6	28	61	12	73	85	25	110	76	96	172
Spring 2022	2	4	6	7	1	8	18	1	19	27	6	33	34	22	56
Fall 2022	18	30*	48	26	9	35	44	12	56	88	51	139	58	74	132
Spring 2023	2	2	4	8	2*	10	11	4	15	21	8	29	20	19	39
Total	24	43	67	92	18	110	183	39	222	299	100	399	275	310	585

* In the UG data, two Fall 2022 DET scores and two Spring 2023 IELTS scores were self-reported only. The Undergraduate Admissions office reports that it is possible for staff to verify a student's score and fail to enter the official score in the database, and that this may have been exacerbated during COVID-19 staff challenges.

** Excludes four GR students who entered in Summer with no ELP score (three in Summer 2021, one in 2022)

This dataset includes 585 students with no recorded ELP test score (excluding four graduate students who entered in Summer terms). Although students born outside of the U.S. must submit a measure of language proficiency, this evidence can include being a native speaker of English, living in an English-speaking country, or completing education in an English language institution (Office of Admissions, n.d.). The latter could include any of a wide range of educational experience, including completing the last three years of high school in the US, transferring 60 college credits from another US institution, or earning an associate degree at one of the seven University of Hawai'i community colleges before entering UHM. Accordingly, either graduate or undergraduate students may be exempt from providing an ELP score.

Outside of these known reasons for lacking an ELP score, UHM staff cautioned that admissions staff may fail to enter some scores in the database after verifying them, and that this

may have been exacerbated during the unusually challenging workloads and circumstances during the pandemic. This may have created unknown gaps in score data, and also explains four undergraduate students who have ELP scores in a self-reported score field only that were not also entered in the official score field. These four scores (two DET in Fall 2022, two IELTS in Spring 2023 entry) are included in this study's analyses, as students who misrepresented their test scores would likely be denied admission.

Students required to submit an ELP test must meet or exceed a cut score to enter the university (Table 2), but UHM offers both unconditional admission and conditional admission.

Table 2

Required minimum English proficiency test scores for admission to UHM, Fall 2022, Graduate (GR) and Undergraduate (UG)

Test	Conditional		Unconditional	
	GR	UG	GR	UG
DET	95	90	125	125
IELTS Academic	6.0	5.0	7.0	7.0
TOEFL iBT	61	61	100	100

Applicants admitted conditionally report to the English Language Institute (ELI) for further language instruction (or exemption after placement testing). For unconditional admission, both graduate and undergraduate students must achieve at least 7.0 on IELTS Academic or 100 on TOEFL iBT. In order to be considered for a graduate assistantship, graduate students must further meet a minimum 25 subscore on Listening and on Speaking in TOEFL iBT. Individual graduate programs may set higher cut scores.

Starting in Fall 2020, students scoring 125 or higher on DET were offered unconditional admission, with conditional admission via the ELI for DET scores of 95 (graduate) or 90 (undergraduate) or higher. Effective Spring 2023, the Graduate Division no longer accepts DET, and now only accepts TOEFL (including iBT Home Edition) and IELTS Academic (including Online) (Graduate Division, n.d.-b). Undergraduate Admissions continues to accept DET for Fall

2024 entry, as well as the ACT (American College Testing), Cambridge English Test, English Language Proficiency Test (ELPT), GRE, IELTS, PTE-A, SAT, and TOEFL (iBT, PBT, or Essentials) (Office of Admissions, n.d.). Despite the many ELP test options for undergraduates, the overwhelming majority of students who submitted any of these scores submitted DET, IELTS, or TOEFL (94% of those with a test score on file who entered in Fall 2021, Spring 2022, or Fall 2022). Other ELP tests were excluded from further analysis because only three undergraduate records held an EIKEN score, six reported SAT only, and three reported ACT only, with no scores reported for Cambridge English Test, ELPT, or PTE-A.

This sample is subject to selection bias because it includes only students who were admitted to and entered the university. These participants by definition exceeded an ELP test cut score and also met other high academic requirements. As noted in the literature review, existing studies on ELP and other admission test scores and GPA regularly observe that this restriction of range may dampen correlation coefficients (Ginther & Yan, 2018; Ihlenfeldt & Rios, 2022; Ishikawa et al., 2016). For example, for admissions to University College London (UCL), as for participants in Isaacs et al. (2023), students must exceed one of five cut score levels depending on course of study (University College London, n.d.). The least restrictive of these levels requires a minimum score of 92 on TOEFL (44th percentile for graduate, 52nd percentile for undergraduate test takers (ETS, 2023)), or 115 on DET (68th percentile of test takers) (Cardwell et al., 2023). This means that the analyses in Isaacs et al. (2023) included only at most the highest half of the range of TOEFL test scores, and the highest 32% of the range of DET scores (unfortunately, IELTS does not publish similarly detailed information on score distributions, so it is unknown how IELTS scores relate to percentiles).

By comparison, UHM allows for conditional admission via ELI for students with scores as low as 61 on TOEFL; 6.0 graduate / 5.0 undergraduate on IELTS; and 95 graduate / 90 undergraduate on DET (see Table 2). In percentile terms, with these lower, conditional-admission cut scores, UHM only outright excludes students with the lowest 5% of graduate and 10% of undergraduate TOEFL scores (ETS, 2023), and only the lowest 20% of the distribution of DET test takers (Cardwell et al., 2023). The less-restricted range of ELP test scores in this student population may lead to stronger correlations, since it potentially includes students who score across 90-95% of the distribution of TOEFL test scores and those who earn scores

spanning 80% of the DET test score distribution. While Duolingo provides global mean and standard deviation information which could allow calculations to correct for range restriction, such a range correction is not necessary for this study because the range is not as restricted to begin with.

Study Cohorts and Demographics

In Fall 2022, 988 degree-seeking international students were enrolled at UHM (573 graduate, 415 undergraduate), including continuing students (International Student Services, n.d.). The most-represented home countries were Japan, China, South Korea, Canada, and Taiwan. These were also among the countries most represented in the Fall 2022 ELP score data (Table 3), with the unsurprising exception of Canada, which only had four students with ELP scores (perhaps hailing from Québec, from which ELP test scores are required).

Table 3

Top five home countries among UHM international students

Country	International students enrolled Fall 2022 (including continuing)			ELP tests taken by newly entering students from these countries, Fall 2020-Spring 2023			
	GR	UG	Total	DET	IELTS	TOEFL	Total
Japan	61	115	176	8	15	30	53
China	112	31	143	3	19	31	53
South Korea	69	33	102	2	5	25	32
Canada	40	57	97	2	0	2	4
Taiwan	29	10	39	4	5	7	16

While China, Korea, and Japan are the most represented countries among students submitting any ELP test score, for each ELP test individually, the most common countries vary. For DET test takers, after Japan, the second-most prevalent home country is the Philippines ($n =$

5). For IELTS, Bangladesh ($n = 13$) and Thailand ($n = 6$) are third and fourth, above Korea. For TOEFL, Germany ($n = 11$), Iran ($n = 10$), and Nepal ($n = 9$) precede Taiwan. Available data do not include information suggesting first language or other languages spoken, other than country of birth and citizenship.

This study focused on students who entered in Fall 2021, Spring 2022, and Fall 2022, as each of these cohorts reported DET scores and has had the opportunity to complete at least two semesters of study through Spring 2023. This enabled the researcher to identify students who withdrew or were placed on academic probation or warning, and permitted calculation of first year GPA across two terms. Analysis centered on the $n = 282$ (200 graduate, 82 undergraduate) who submitted ELP scores, with selected comparisons to the 364 (172 graduate, 192 undergraduate) with no ELP test score recorded. The 282 students with ELP test scores included 200 graduate (119 female, 80 male, 1 not reported, mean age = 29.02 years, $SD = 7.09$) and 82 undergraduate (54 female, 28 male, mean age = 19.48 years, $SD = 2.28$).

Additional analyses focused on the cohort entering in Fall 2022, as this was the first semester since March 2020 when mostly in-person instruction resumed at the university. Students in this cohort returned to a more typical semester in terms of instructional methods and experiences, compared to students entering during the peak of COVID-19 when most classes and services were online and campus was extensively disrupted. Of the 139 students with ELP scores entering in Fall 2022 (88 graduate, 51 undergraduate), 131 enrolled in both the Fall 2022 and Spring 2023 semester, enabling comparison of first year GPA. This study's final Fall 2022 cohort of 131 participants included 85 graduate students (51 female, 33 male, 1 not reported, mean age = 28.3 years, $SD = 6.80$) and 46 undergraduate (31 female, 15 male, mean age = 19.1 years, $SD = 1.89$).

Available Data Fields

The UHM Undergraduate Admissions Office and Graduate Division provided the following data for international students entering between Fall 2020 and Spring 2023. Not all of these were used in the final reported results, but are documented here:

1. *Demographics*: gender, age, country of birth, citizenship
2. *Academics*: term of entry, level (graduate or undergraduate), major field of study, degree program (i.e., BA, BS, PhD), and previous GPA submitted for admissions purposes
3. *Test scores*: overall scores and date taken for the most recent test date. Section scores were requested, but not available in most cases. Admissions staff reported that section scores are never recorded for undergraduate applicants. ELP tests included DET, IELTS, and TOEFL, as well as Cambridge English Test, EIKEN, ELPT, or PTE-A (although as described above, only DET, IELTS, and TOEFL appeared frequently enough in the data to be compared). The dataset also included scores from general admissions tests such as GRE, SAT, and ACT, but these were not directly compared to the ELP tests as they do not purport to measure the same construct.
4. *Grades*: for each semester, total credits attempted and earned GPA (out of 4.0). The dataset also included grades for required freshmen English composition courses (ENG 100 or ESL 100), and the number of courses undertaken that are designated as Writing Intensive (a UHM designation applicable for undergraduate courses only).
5. *Other*: graduate student data included Graduate Assistant Exemption status (Y or N) and English Language Institute (ELI) exemption code. This code indicates whether admissions officers determined the student should report to the ELI for further English language study, or were exempted due to living in an English-speaking country, holding a degree from an English medium institution, or exceeding UHM's higher ELP test cut scores for unconditional admission (see Table 2).

Variables Included in Statistical Analyses

This study investigated the relationship between DET, TOEFL, and IELTS scores and first year academic outcomes, and evaluated whether meaningful differences exist between those who submitted scores from different tests or were exempt. Analyses further considered possible differences by academic level or field of study. Accordingly, key continuous variables were GPA by semester and first full year, and ELP test scores for DET, IELTS, and TOEFL. First year GPA was calculated from credits attempted and grade points earned for each enrolled semester.

Key nominal variables for comparing subgroups included ELP test taken, academic level (graduate or undergraduate), and field of study. Following Isaacs et al. (2023), field of study was coded into three groups based on European Research Council classifications: life sciences, physical sciences and engineering, and social sciences and humanities (European Research Council, 2021). Students were also classified on their cohort based on entry term (Fall 2021, Spring 2022, or Fall 2022), and whether they were admitted unconditionally with an ELP score exempting them from further English language instruction, or conditionally through the ELI.

As part of the second research question regarding differential academic outcomes for students who entered with different ELP tests or none, in addition to comparing mean GPA, students were flagged if they withdrew or received an academic action (warning or probation) after their first or second semester. At UHM, graduate students are placed on probation when their GPA falls below 3.0 after earning eight credits (Graduate Division, n.d.-a). Undergraduate students receive an academic warning if they earn less than a 2.0 GPA in their first semester, and probation if their cumulative GPA is under 2.0 thereafter (Mānoa Advising Center, n.d.). This dichotomous flag provided another nominal variable, to compare proportions of students on academic action (warning, probation, or withdrawal) by ELP test taken. This is a coarser outcomes measure, but has more serious consequences than fractions of GPA points. It also in part addresses the ceiling effect in graduate student grades: because graduate students are required to maintain a 3.0 or higher GPA, graduate GPAs tend to cluster around 4.0, reducing the meaningfulness of correlation calculations on their face with this restricted range of GPAs.

Analyses

This study used an alpha of $p < .05$ for statistical significance, for comparison with the level utilized by other ELP test score ~ GPA correlation studies including Isaacs et al. (2023). All analyses were performed using R Statistical Software v4.3.1 (R Core Team, 2023).

First, correlations (Pearson's r) with 95% confidence intervals were calculated between ELP test scores and first year GPA, to examine the relationship between UHM students' English language proficiency test scores and academic success. Correlation assumes that the variables are continuous (which is true of both test scores and GPA), and that the two have a linear relationship. Scatter plots were created to check the linear relationship assumption. Correlations were then calculated for subgroups, to identify any differences in the associations. Subgroups included academic level (graduate or undergraduate), field of study (life sciences, physical sciences and engineering, or social sciences and humanities), and whether the student was admitted unconditionally or conditioned on further English language coursework via the ELI. Analyses combining all three cohorts (entering Fall 2021, Spring 2022, and Fall 2022) were compared with analyses for the Fall 2022 cohort only, to cross-check for effects that may have accrued during the COVID-impacted semesters.

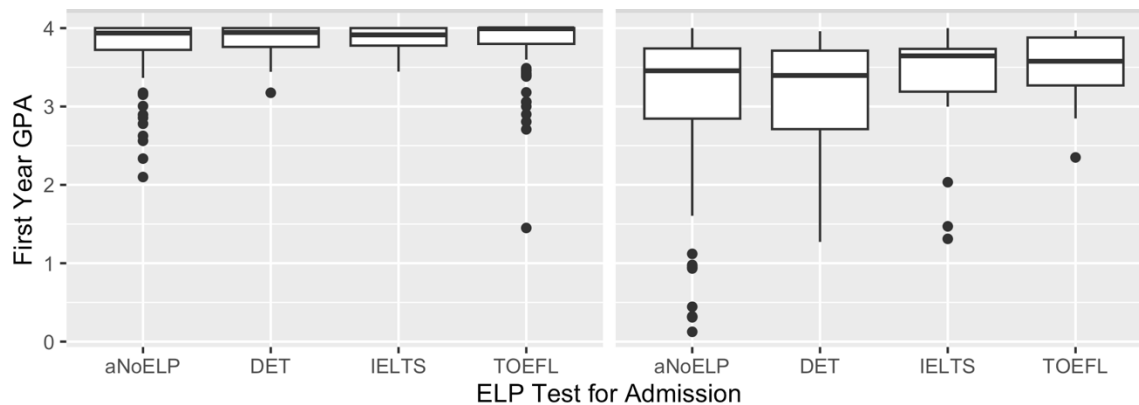
The second research question asked whether academic outcomes differ for international students who entered on the basis of different English language proficiency tests, or were exempt from submitting an ELP score, based on significant experience living in an English-speaking country or studying in an English medium institution. One-way ANOVA with post-hoc contrasts tests were used to check whether mean first year GPA differs significantly based on which of the three ELP tests (or no ELP score) students submitted (a four-level categorical variable). Next, chi square and difference of proportion tests were created to compare proportions of students who withdrew, or were placed on academic warning or probation, as a more serious indicator of whether there are meaningful differences in academic outcomes for those who had no ELP score or submitted DET, IELTS, TOEFL for admission during the same timeframe. Although ELP test scores alone were not expected to be especially powerful for predicting academic success, it would be instructive if any test bore a stronger relationship than others, or if those who entered on the basis of one ELP test had notably differently outcomes than other subgroups.

RESULTS

Initial data exploration revealed an accumulation of graduate GPAs near 4.0, reflecting the requirement for graduate students to maintain a minimum cumulative GPA of 3.0 (Figure 1).

Figure 1

Box and whiskers plot of mean first year GPA by ELP test submitted (or no ELP score), cohorts entering Fall 2021, Spring 2022, and Fall 2022, graduate and undergraduate disaggregated



In these cohorts, only graduate students entering with no ELP or TOEFL earned a first year GPA under 3.0. This plot also showed that for undergraduate students, first year GPA varied more for those entering with no ELP score or with a DET score on file, seen in the long whiskers and wider box spreads compared to IELTS and TOEFL. The no ELP score group had outliers with the lowest GPAs, under 1.0. These descriptive statistics informed subsequent decisions to conduct analyses separated by level (graduate and undergraduate), and provided context for evaluating correlations.

Correlations Between ELP Test Scores and First Year GPA: by Level

Overall and when grouped by academic level, ELP scores correlated moderately with first year GPA for the cohort entering in Fall 2022 (Table 4). All of the correlations showed a positive association ($r = .30-.45$), with the exception of graduate students who submitted DET scores ($r = -.40$). The correlations were statistically significant for IELTS scores for graduate students ($p = .019$), DET scores for undergraduate students ($p = .021$), and when both graduate and undergraduate students were combined for DET ($p = .024$) and for TOEFL ($p = .001$).

Table 4*Correlation between ELP test scores and first year GPA by level: Fall 2022 cohort*

Level	ELP test	n	M	SD	min	max	r	95% CI		p	R ²
								LL	UL		
All	DET	45	118	14.6	90	150	.34	.05	.57	.024*	.11
		GPA	3.49	0.54	1.91	4.00					
	IELTS	34	6.96	0.73	5.5	8.5	.32	-.01	.59	.057	.10
		GPA	3.69	0.56	1.31	4.00					
	TOEFL	52	92.2	19.4	30	117	.42	.17	.62	.001**	.18
		GPA	3.70	0.48	1.45	4.00					
GR	DET	17	121	12.8	95	140	-.40	-.74	.10	.112	.16
		GPA	3.84	0.23	3.18	4.00					
	IELTS	25	6.96	0.57	6.0	8.0	.45	.08	.71	.019*	.20
		GPA	3.88	0.13	3.65	4.00					
	TOEFL	43	96.6	15.2	64	117	.30	.00	.54	.052	.09
		GPA	3.73	0.49	1.45	4.00					
UG	DET	28	116	15.5	90	150	.44	.07	.70	.021*	.19
		GPA	3.29	0.57	1.91	3.96					
	IELTS	9	6.94	1.13	5.5	8.5	.43	-.32	.85	.243	.19
		GPA	3.16	0.90	1.31	3.97					
	TOEFL	9	74.5	24.6	30	107	.45	-.21	.83	.168	.20
		GPA	3.58	0.44	2.85	3.97					

Results were similar when calculating correlations for all three cohorts of students combined entering in Fall 2021, Spring 2022, and Fall 2022 (Table 5), with no remarkable differences compared to looking at the Fall 2022 cohort alone. With the combined cohorts, the negative correlation (non-statistically significant) for DET and graduate student GPA was weaker (from -.40 in all cohorts compared to -.05 for Fall 2022), and the non-statistically significant correlation for IELTS for all student levels combined was dampened from .32 to .10. The correlation for TOEFL and graduate student GPA became statistically significant ($r = .27, p = .004$). For undergraduate students, the correlation between DET and GPA was no longer statistically significant, while TOEFL became significantly correlated ($r = .42, p = .040$).

Table 5

Correlation between ELP test scores and first year GPA by level: Cohorts entering Fall 2021, Spring 2022, and Fall 2022

Level	ELP test	n	M	SD	min	max	r	95% CI		p	R ²
								LL	UL		
All	DET	58	118	14.9	90	150	.29	.03	.51	.027*	.08
		GPA	3.42	0.63	1.27	4.00					
	IELTS	67	6.87	0.79	5.0	8.5	.10	-.14	.33	.413	.01
		GPA	3.73	0.50	1.31	4.00					
	TOEFL	134	93.4	15.9	30	117	.40	.25	.53	<.001***	.16
		GPA	3.77	0.39	1.45	4.00					
GR	DET	21	122	14.2	95	140	-.05	-.48	.39	.814	.00
		GPA	3.84	0.23	3.18	4.00					
	IELTS	52	6.89	0.66	5.0	8.5	.36	.10	.57	.008**	.13
		GPA	3.87	0.14	3.44	4.00					
	TOEFL	112	95.8	13.7	61	117	.27	0.09	.43	.004**	.07
		GPA	3.82	0.36	1.45	4.00					
UG	DET	37	115	15.0	90	150	.29	-.04	.56	.082	.08
		GPA	3.19	0.67	1.27	3.96					
	IELTS	15	6.8	1.16	5	8.5	.02	-.50	.52	.956	.00
		GPA	3.23	0.89	1.31	4.00					
	TOEFL	22	82.1	20.7	30	109	.42	.02	.71	.040*	.18
		GPA	3.51	0.42	2.35	3.97					

Figures 2 and 3 provide scatterplots for GPA and ELP test scores for the Fall 2022 cohort and for the three cohorts combined. Scatterplots with separate fit lines by level, showing the differences that emerge when disaggregating graduate and undergraduate, are included in Figures 4 and 5.

Figure 2

*ELP test scores and first year GPA, all levels (graduate and undergraduate combined):
Fall 2022 cohort*

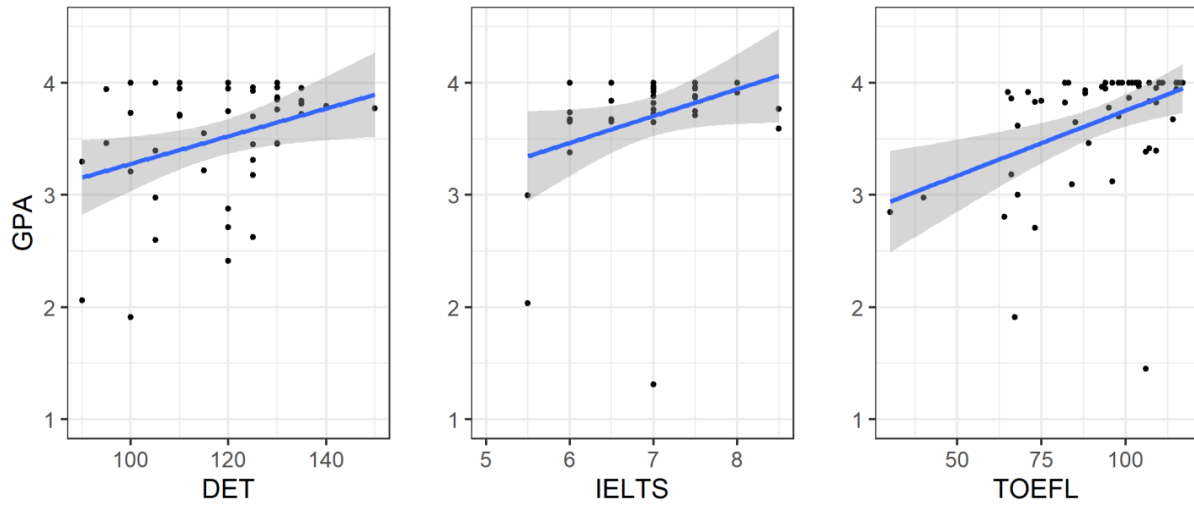


Figure 3

*ELP test scores and first year GPA, all levels (graduate and undergraduate combined):
Combined cohorts entering Fall 2021, Spring 2022, and Fall 2022*

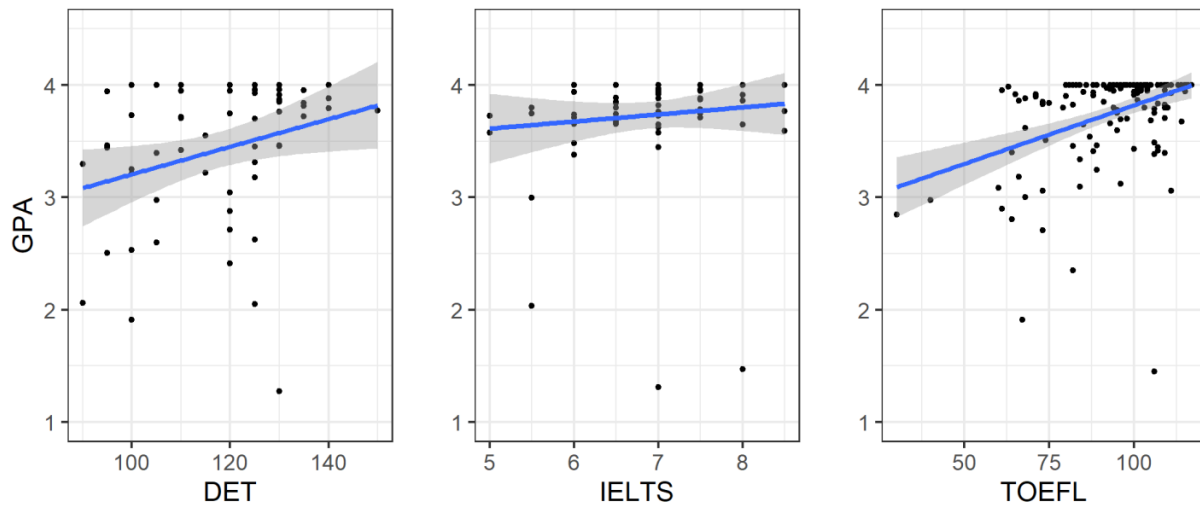


Figure 4

ELP test scores and first year GPA, by level (graduate and undergraduate separated): Fall 2022 cohort

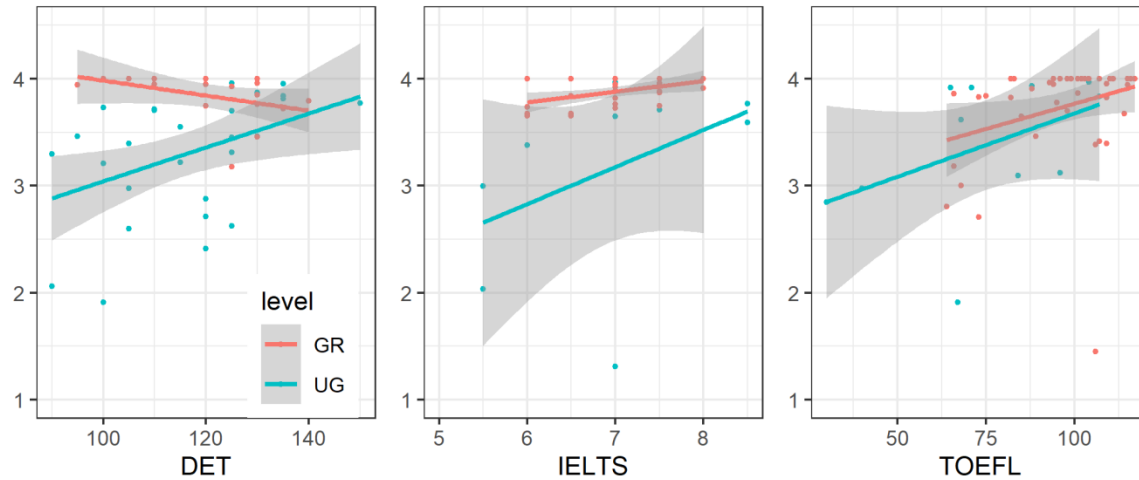
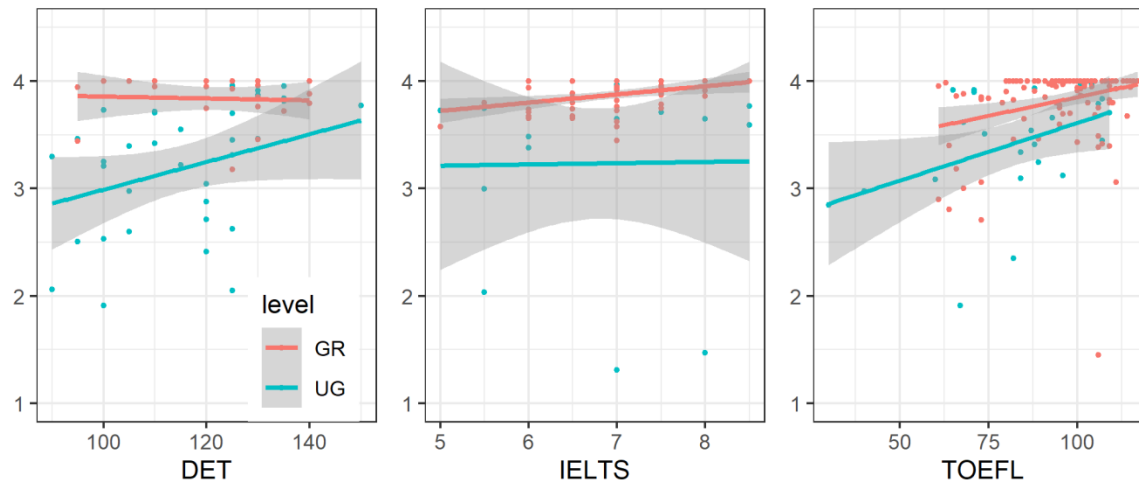


Figure 5

ELP test scores and first year GPA, by level (graduate and undergraduate separated): Combined cohorts entering Fall 2021, Spring 2022, and Fall 2022



Correlations between ELP Test Scores and First Year GPA: by Field of Study

Next, correlations were calculated for first year GPA and ELP test score for subgroups by field of study (life sciences, physical sciences and engineering, or social sciences and humanities). However, sample sizes became too small in many of the subgroups to draw meaningful conclusions. For the combined cohorts entering Fall 2021, Spring 2022, and Fall 2022, correlations between GPA and ELP test score only met the alpha for statistical significance

for social sciences and humanities students who submitted TOEFL ($r = .49, p < .001, n = 70$). Fall 2022 cohort correlations met the alpha for social sciences and humanities students submitting TOEFL ($r = .45, p = .017, n = 26$) or IELTS ($r = .83, p < .001, n = 12$). Correlation tables are reported for reference in Appendix A, but caution in interpretation is necessary due to the small subgroups.

Correlations between ELP Test Scores and GPA: Unconditional vs. Conditional Admission

As described above, at UHM, students may be admitted conditionally with DET scores of 95 for graduate or 90 for undergraduates, IELTS scores of 6.0 for graduate or 5.0 undergraduate, or 61 on TOEFL, while unconditional admission requires reaching 125 DET, 7.0 IELTS, or 100 TOEFL (see Table 2). For students admitted unconditionally (with higher ELP test scores), there were no statistically significant correlations between ELP test score and GPA (Table 6; Figures 6-8). For those admitted conditionally, with ELP scores reflecting a lower range of English proficiency that might make the linguistic demands of study in English more difficult, stronger and statistically significant correlations emerged (Table 7; Figures 9-11). This is notable, that for students admitted conditionally, their relative position among this lower entering ELP score range (for example, TOEFL 61-99) correlated more with their first year GPA outcomes, compared to unconditionally admitted students who exceeded higher ELP cut scores (for example, TOEFL 100-120) and for whom relative position above the already high cut score related less to their first year GPA.

The following tables and figures are for all three cohorts combined (students entering in Fall 2021, Spring 2022, and Fall 2022). See Appendix B for the Fall 2022 cohort alone.

Table 6

Students admitted unconditionally: Correlation between ELP test score and first year GPA, cohorts entering Fall 2021, Spring 2022, and Fall 2022

ELP		95% CI									
Level	test	n	M	SD	min	max	r	LL	UL	p	R ²
All	DET	27	131	6.31	125	150	.25	-.14	.58	.203	.06
		GPA	3.57	0.64	1.27	4.00					
	IELTS	42	7.33	0.49	7.0	8.5	-.09	-.39	.22	.554	.01
		GPA	3.76	0.56	1.31	4.00					
	TOEFL	61	106	4.42	100	117	-.06	-.30	.19	.645	.00
		GPA	3.84	0.37	1.45	4.00					
GR	DET	12	132	5.77	125	140	.25	-.38	.72	.436	.06
		GPA	3.79	0.25	3.18	4.00					
	IELTS	33	7.26	0.42	7.0	8.5	.21	-.14	.52	.236	.04
		GPA	3.9	0.14	3.44	4.00					
	TOEFL	55	106	4.58	100	117	-.04	-.30	.22	.742	.00
		GPA	3.84	0.39	1.45	4.00					
UG	DET	15	130	6.81	125	150	.24	-.31	.67	.391	.06
		GPA	3.4	0.80	1.27	3.96					
	IELTS	9	7.61	0.65	7.0	8.5	.04	-.64	.69	.919	.00
		GPA	3.23	1.06	1.31	4.00					
	TOEFL	6	106	2.80	101	109	-.66	-.96	.33	.154	.44
		GPA	3.78	0.20	3.44	3.97					

Figure 6

Students admitted unconditionally, graduate and undergraduate combined: ELP test score and first year GPA, cohorts entering Fall 2021, Spring 2022, and Fall 2022

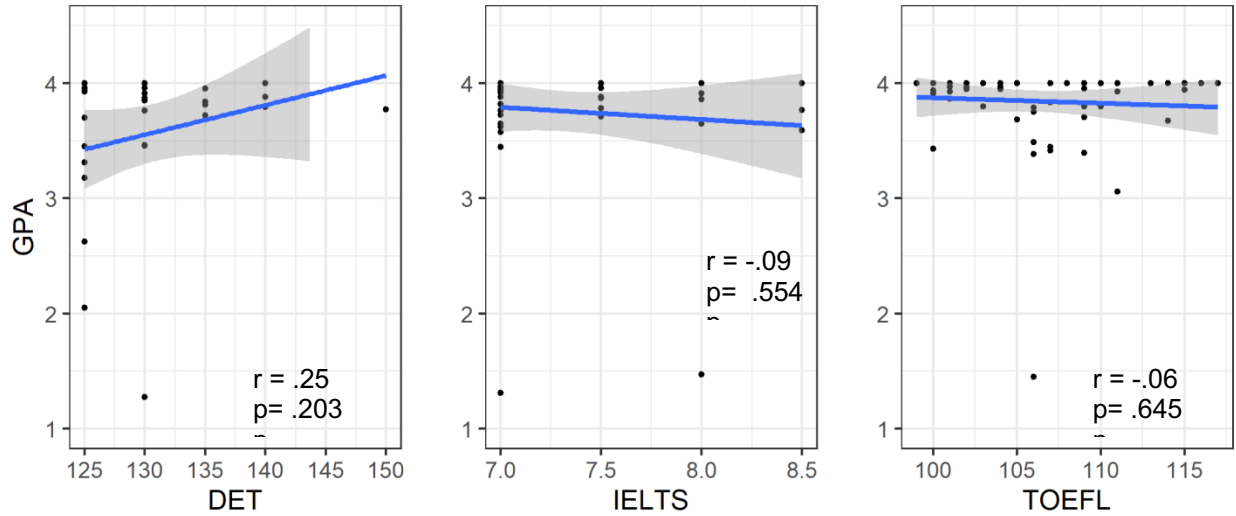


Figure 7

Students admitted unconditionally, graduate only: ELP test score and first year GPA, cohorts entering Fall 2021, Spring 2022, and Fall 2022

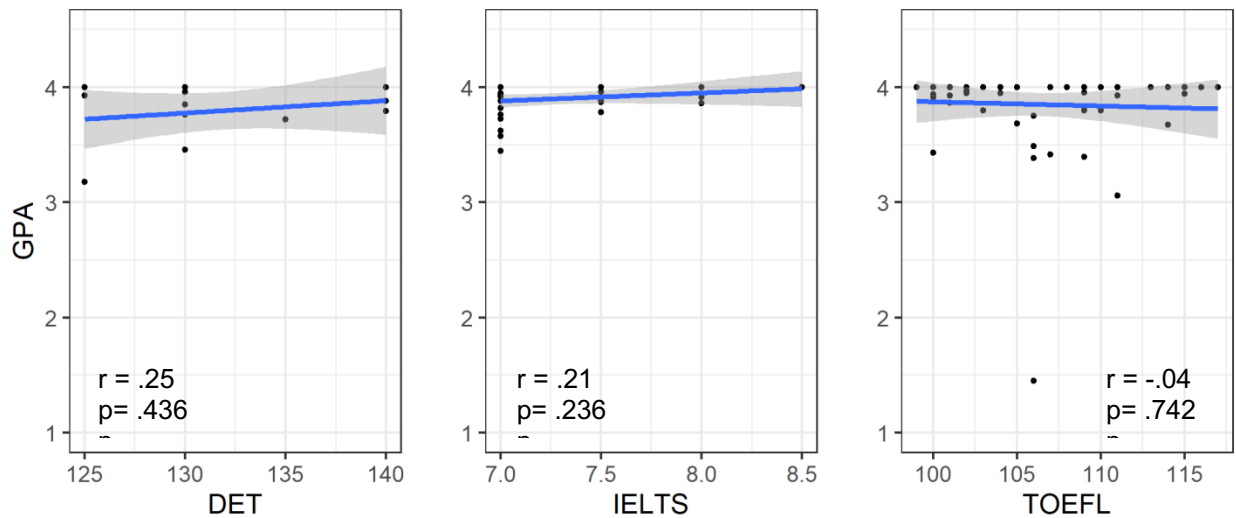


Figure 8

Students admitted unconditionally, undergraduate only: ELP test score and first year GPA, cohorts entering Fall 2021, Spring 2022, and Fall 2022

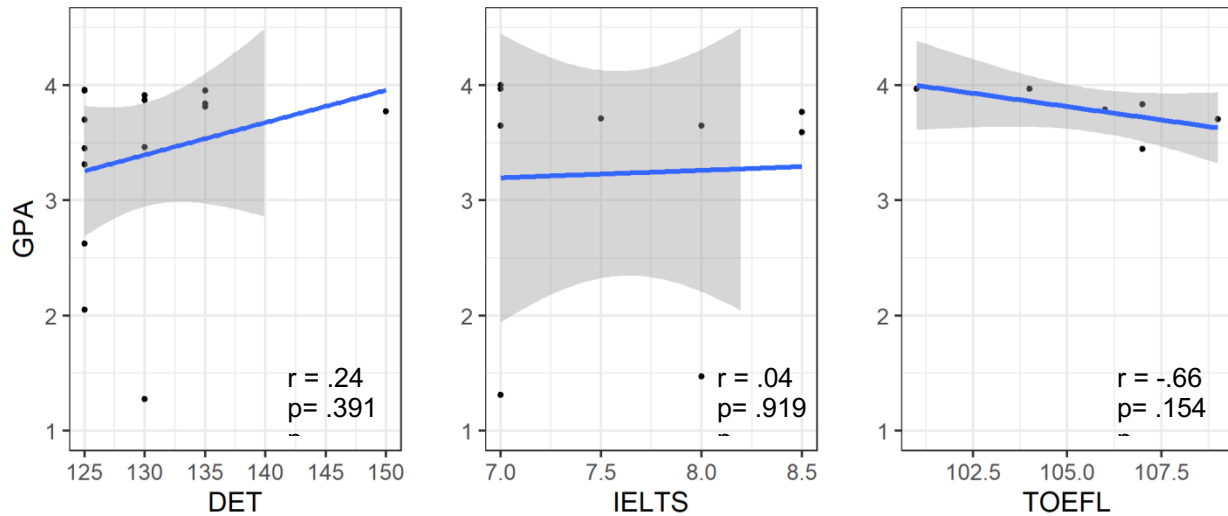


Table 7

Students admitted conditionally via ELI: Correlation between ELP test score and first year GPA, cohorts entering Fall 2021, Spring 2022, and Fall 2022

Level	ELP test	n	M	SD	min	max	r	95% CI		p	R ²
								LL	UL		
All	DET	31	106	9.91	90	120	.16	-.20	.49	.377	.03
	GPA		3.29	0.6	1.91	4					
	IELTS	25	6.04	0.48	5	6.5	.39	.01	.67	.044*	.15
	GPA		3.68	0.41	2.03	4					
GR	TOEFL	73	83.4	13.2	30	99	.50	.31	.66	<.001***	.25
	GPA		3.71	0.39	2.35	4					
	DET	9	108	10.3	95	120	.29	-.46	.80	.443	.09
	GPA		3.89	0.19	3.44	4					
UG	IELTS	19	6.18	0.42	5	6.5	.30	-.16	.64	.193	.09
	GPA		3.82	0.14	3.58	4					
	TOEFL	57	85.3	11.6	61	99	.55	.34	.71	<.001***	.30
	GPA		3.79	0.33	2.71	4					
UG	DET	22	105	9.87	90	120	.08	-.35	.49	.710	.01
	GPA		3.05	0.53	1.91	3.73					
	IELTS	6	5.58	0.38	5	6	-.04	-.82	.80	.945	.00
	GPA		3.23	0.65	2.03	3.74					
UG	TOEFL	16	76.9	16.4	30	96	.23	-.26	.63	.348	.06
	GPA		3.4	0.44	2.35	3.93					

Figure 9

Students admitted conditionally via ELI, graduate and undergraduate combined: ELP test score and first year GPA, cohorts entering Fall 2021, Spring 2022, and Fall 2022

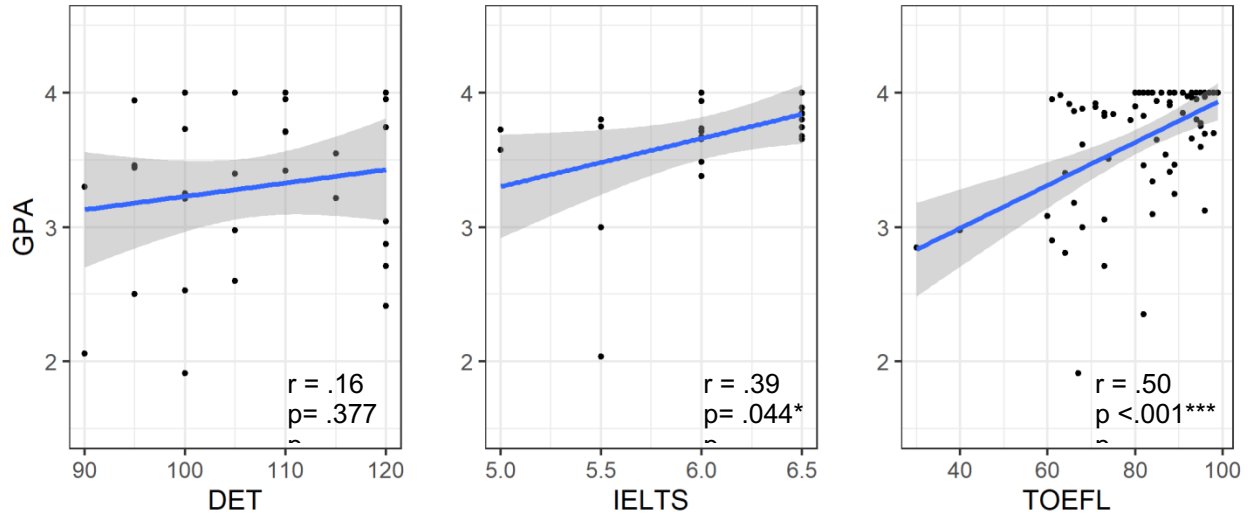


Figure 10

Students admitted conditionally via ELI, graduate only: ELP test score and first year GPA, cohorts entering Fall 2021, Spring 2022, and Fall 2022

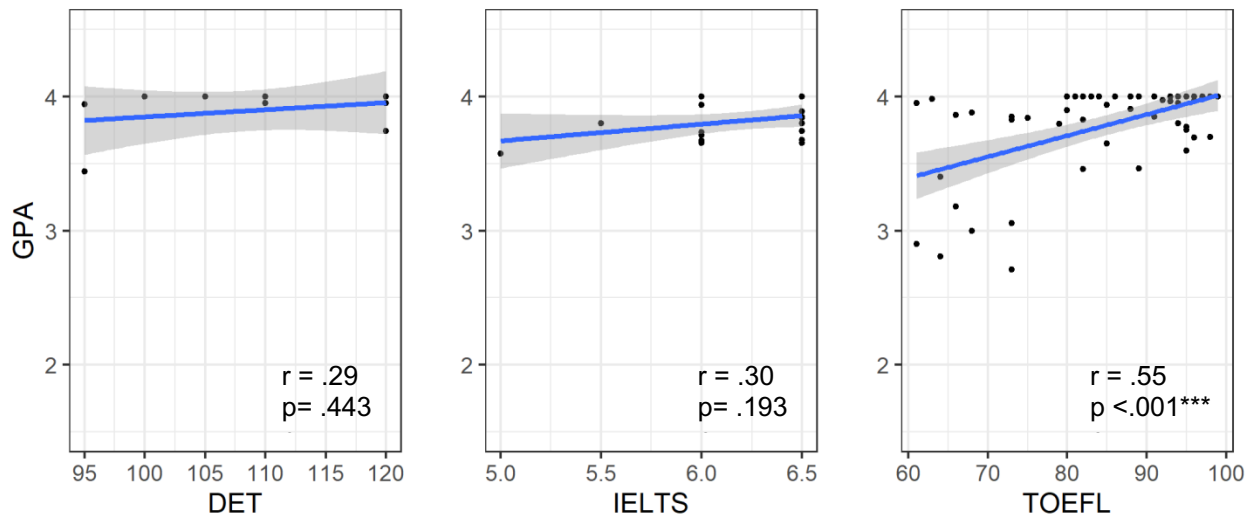
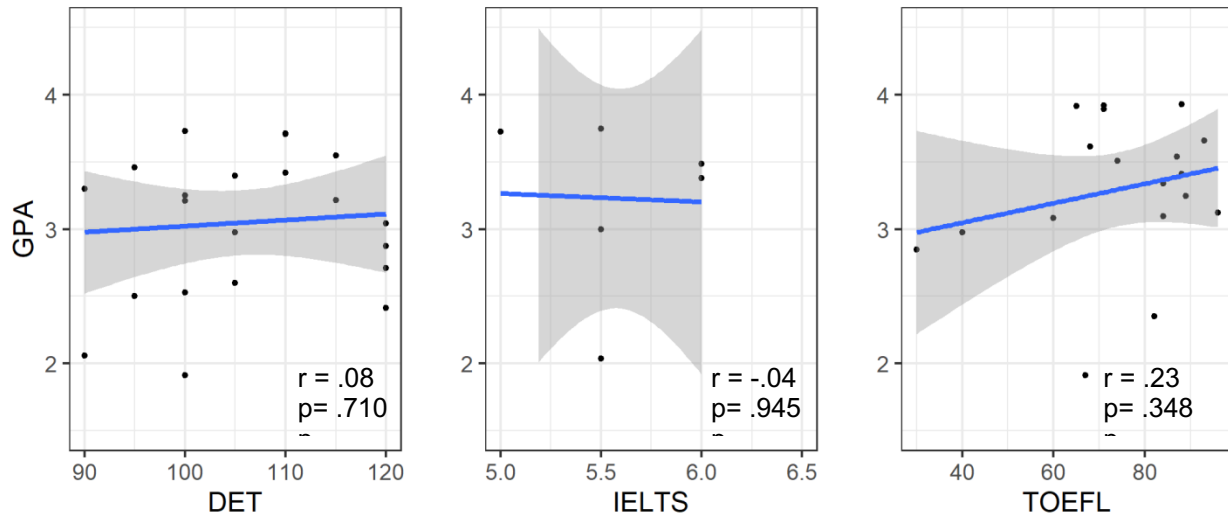


Figure 11

Students admitted conditionally via ELI, undergraduate only: ELP test score and first year GPA, cohorts entering Fall 2021, Spring 2022, and Fall 2022



Academic Outcomes: Mean GPA For Those Entering with Different ELP Tests

After exploring each test's correlations with first year GPA for different subgroups, this study turned to whether students entering on the basis of different ELP tests displayed significantly different academic outcomes. In this phase of the research, international students who did not submit an ELP test score were included as a fourth comparison group (no ELP). This latter group consists of students who fulfilled the ELP requirement in another way, such as by living or studying for an extended previous period in an English-speaking country.

A one-way ANOVA was conducted to compare the mean first year GPAs of students grouped by ELP test taken (a four-level categorical variable: no ELP, DET, IELTS, or TOEFL). For the Fall 2022 cohort alone, no statistically significant difference was found in mean GPAs between the groups, when considering all students combined or when separated by level (graduate or undergraduate) (Appendix C).

With all three cohorts combined (students entering in Fall 2021, Spring 2022, and Fall 2022 considered together), and with both levels combined (graduate and undergraduate), one-way ANOVA revealed a significant difference in mean GPA between at least two of the groups ($R^2 = .05$, $F(3, 572) = 9.65$, $p < .001$) (Table 8). However, importantly, when one-way ANOVA was applied to students separated by level (graduate and undergraduate disaggregated), any statistically significant differences in mean GPA by ELP disappeared.

Table 8

One-way ANOVA of mean first year GPA by ELP test taken, combined cohorts entering Fall 2021, Spring 2022, and Fall 2022, by level (graduate (GR) and undergraduate (UG))

Level of study	ELP test	n	First year GPA			95% CI		F	p	DF	R ²
			M	SD	SE	LL	UL				
Both levels (GR & UG)	no ELP	31				3.4	3.5	9.65	<.001***	572	0.05
		7	3.48	0.69	0.04	1	6				
	DET	58	3.42	0.63	0.08	6	8				
		13				3.6	3.8				
	IELTS	67	3.73	0.50	0.06	0	5				
		13				3.7	3.8				
	TOEFL	4	3.77	0.39	0.03	0	3				
GR only	no ELP	14				3.7	3.8	0.76	.516	329	0.01
		8	3.79	0.34	0.03	4	5				
	DET	21	3.84	0.23	0.05	4	3				
		11				3.8	3.9				
	IELTS	52	3.87	0.14	0.02	3	1				
		11				3.7	3.8				
	TOEFL	2	3.82	0.36	0.03	5	8				
UG only	no ELP	16				3.0	3.3	1.07	.362	239	0.01
		9	3.21	0.79	0.06	9	3				
	DET	37	3.19	0.67	0.11	7	0				
		15				2.7	3.6				
	IELTS	15	3.23	0.89	0.23	8	8				
		15				3.3	3.6				
	TOEFL	22	3.51	0.42	0.09	3	8				

Post hoc contrasts tests (with Tukey HSD adjustment for comparing a family of four estimates) were then conducted on the combined cohorts (entering Fall 2021, Spring 2022, and Fall 2022) and with graduate and undergraduate levels combined (Table 9). This post hoc test revealed that – again, only when both levels of students were aggregated – students entering either with no ELP score or with DET earned a statistically significantly lower mean GPA compared to those entering with either IELTS or TOEFL.

Table 9

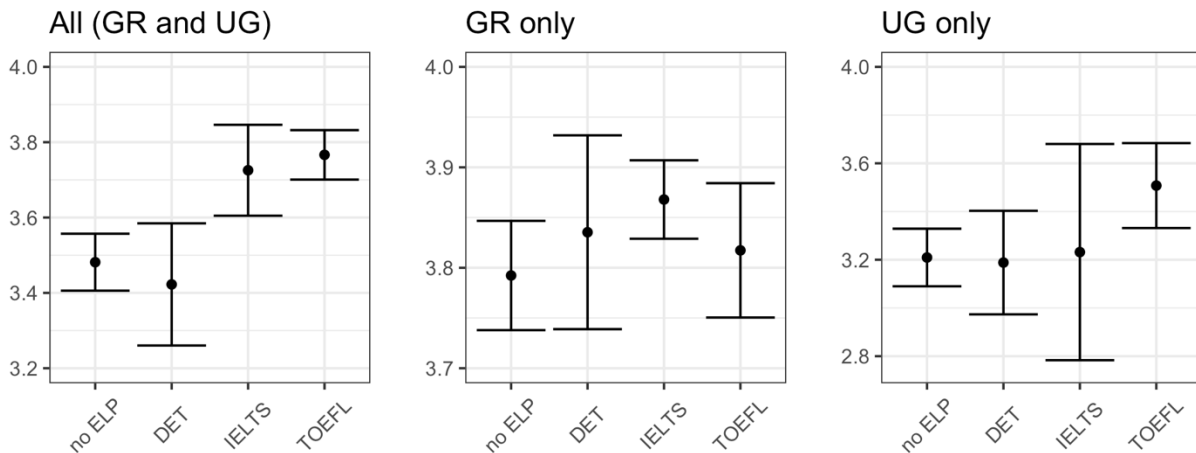
Post hoc contrasts test (Tukey method for comparing a family of four estimates), first year GPA by ELP test taken, combined cohorts entering Fall 2021, Spring 2022, and Fall 2022, all levels combined (graduate and undergraduate)

Contrast	estimate	SE	df	p	t ratio
no ELP - DET	0.06	0.09	572	.903	0.69
no ELP - IELTS	-0.24	0.08	572	.015*	-3.01
				<.001**	
no ELP - TOEFL	-0.29	0.06	572	*	-4.59
DET - IELTS	-0.30	0.11	572	.027*	-3.51
DET - TOEFL	-0.34	0.09	572	.002**	-4.55
IELTS - TOEFL	-0.04	0.09	572	.969	-0.57

These results are graphically displayed in Figure 12. The first plot aggregates both student levels (graduate and undergraduate combined), showing that the 95% CI for the mean GPA of students with no ELP and with DET test scores did not overlap the mean GPA of IELTS or TOEFL test takers. Again, it is essential to note that these statistically significant differences only appeared with graduate and undergraduate students aggregated. When separated by level, any statistical significance disappeared, with the 95% CI of mean GPA for each group overlapping the other groups' mean GPA (final two plots in Figure 12).

Figure 12

Mean first year GPA with 95% confidence intervals by ELP test submitted, combined cohorts entering Fall 2021, Spring 2022, and Fall 2022, by level (graduate (GR) and undergraduate (UG))



Academic Outcomes: Probation or Withdrawal for Those Entering with Different ELP Tests

Moving to an academic outcomes measure with more serious consequences for students, a chi square test of equal proportions was used to determine whether the proportion of international students with an academic action – academic warning, probation, or withdrawn – was comparable by ELP test submitted (no ELP, DET, IELTS, or TOEFL). Pearson’s chi square difference of proportions test found that the proportion of students with an academic action did not differ by groups who submitted no ELP score or each of the different ELP tests. This holds for the Fall 2022 cohort alone, as well as for the three cohorts combined, and whether separately evaluating graduate and undergraduate or combining both levels (Table 10). Two-sample tests for equality of proportions of students on academic action by test taken also returned no statistically significant differences (Table 11).

Table 10

Pearson’s chi square difference of proportions tests for proportions of students on academic action (probation, warning, or withdrawal) by ELP test taken or no ELP test submitted

Level		<u>ELP test score submitted</u>				X ²	df	p
		No ELP	DET	IELTS	TOEFL			
<i>Fall 2022 cohort alone</i>								
All	Total	130	48	35	55	6.262	3	.100
	# academic action	22	4	1	6			
	Proportion acad. action	.17	.08	.03	.11			
GR	Total	56	18	26	44	6.884	3	.076
	# academic action	10	1	0	4			
	Proportion acad. action	.18	.06	.00	.09			
UG	Total	74	30	9	11	.869	3	.833
	# academic action	12	3	1	2			
	Proportion acad. action	.16	.10	.11	.18			
<i>Combined cohorts entering Fall 2021, Spring 2022, and Fall 2022</i>								
All	Total	352	63	70	145	4.659	3	.199
	# academic action	49	8	4	14			
	Proportion acad. action	.14	.13	.06	.10			
GR	Total	160	22	55	121	2.660	3	.447
	# academic action	16	1	2	11			
	Proportion acad. action	.10	.05	.04	.09			
UG	Total	192	41	15	24	.462	3	.927
	# academic action	33	7	2	3			
	Proportion acad. action	.17	.17	.13	.13			

Table 11

Matrix of p-values for two-sample tests for equality of proportions of students on academic warning, probation, or withdrawing, by ELP test submitted, for the Fall 2022 cohort alone, or the combined cohorts entering Fall 2021, Spring 2022, and Fall 2022

Fall 2022 cohort alone				Combined cohorts entering Fall 2021, Spring 2022, and Fall 2022			
				No ELP	DET	IELTS	No ELP
DET	.230			DET	.952		
IELTS	.063	.570		IELTS	.090	.271	
TOEFL	.413	.915	.324	TOEFL	.250	.682	.475

The primary finding here is that there was no statistically significant difference in the proportions of students on academic action based on which ELP test they submitted for admission. Still, it is worth noting patterns of interest in the raw proportions. First, overall, graduate students experienced academic probation or dropped out in lower raw proportions than undergraduates. Among students who submitted any ELP test score, the academic action or withdrawal rate ranged from .00-.09 of graduate students by ELP test taken, and .10-.18 of undergraduates with such test scores. Perhaps it is not surprising that graduate students with more advanced education, more stringent admissions requirements, more maturity, and potentially more well-defined academic plans persisted more successfully.

Potentially problematic, the raw proportion of students who experienced academic warning or probation or withdrew was higher in general among those who were exempt from submitting an ELP test score compared to those who were required to do so. For example, in the Fall 2022 cohort (the first semester with mostly in-person on-campus operations since COVID-19 began), 17% of international students entering without an ELP test score had an academic action or withdrew, compared to 3-11% of those required to submit such a score. Again, while these differences did not reach the level of statistical significance, it is worth flagging this rate of students experiencing critical negative academic outcomes after having been exempted from providing an ELP score to evidence their preparation for academic study in English.

DISCUSSION

Existing literature, theory, and logic tell us that many other factors influence first year academic success beyond English language proficiency alone. Thus, small to moderate correlations with small R^2 are not a surprise. Such mixed results in terms of statistical significance and strength of relationships are common in correlation studies of GPA and ELP test scores (Bridgeman et al., 2016; Dang & Dang, 2021; Ginther & Yan, 2018; Hu & Trenkic, 2021; Ihlenfeldt & Rios, 2022). Compounding this, graduate programs often require that students maintain a higher minimum GPA (at UHM, 3.0), leading to a GPA ceiling effect.

However, the correlations in the present study were stronger compared to other studies of ELP test scores and GPA, including those reported in Ihlenfeldt and Rios's (2022) meta-analysis and the even weaker correlations reported by Isaacs et al. (2023). This is in part thanks to the wider range of ELP test scores in this sample, because UHM offers a conditional admission option for students with lower ELP test scores. UHM admissions decisions include students who scored across 90-95% of the TOEFL score distribution, and 80% of the DET score distribution. By comparison, Isaacs et al. (2023) included students with scores across only about 50% of the range of TOEFL scores, and 32% of the range of DET scores. That the present study found stronger correlations between ELP score and GPA reflects some mitigation of the restriction of range seen in most other correlation studies of entrance exams and first year GPA.

Further, when students in the present dataset were separated into those admitted conditionally with lower ELP test scores (DET 90-124, IELTS 5.0-6.5, TOEFL 61-99), and those admitted unconditionally with higher ELP cut scores (DET 125, IELTS 7.0, TOEFL 100), statistically significant correlations were found for conditionally admitted students with lower ELP test scores, but no statistically significant correlations emerged for unconditionally admitted students with higher scores. For conditionally admitted students with a lower range of entering English ability, we might expect them to struggle more with the linguistic demands of study overall. Indeed for those students, it appears that their relative starting position along the range of lower English proficiency scores may have mattered more in terms of their eventual grades, than specific score above the higher cut score mattered for unconditionally admitted students. This could be evidence that the unconditional admit cut scores are well set, as students who exceeded

them achieved less varied eventual GPAs and were presumably comparably well prepared regardless of relative score placement over the cut.

Of greater interest than specific separate correlation results is whether different ELP tests perform differently when used to decide that a student is linguistically prepared for college study in English. In the correlations, the unexpectedly strong negative correlation for graduate students' DET scores and first year GPA in the Fall 2022 cohort ($r = -.40$) bears further attention, although this is moderated in the three cohorts combined ($r = -.05$ for students entering in Fall 2021, Spring 2022, and Fall 2022) and does not reach statistical significance in either group ($p = .112$ and $p = .814$, respectively). An important caveat when considering graduate student grade correlations is the ceiling effect stemming from the Graduate Division requirement to maintain a 3.0 GPA (see Figure 1). Virtually all graduate first year GPAs in this dataset were over 3.0, and cluster near 4.0. In this subsample, the restricted range of graduate GPA moderated correlation strength, significance, and perhaps direction.

A one-way ANOVA comparing mean GPA of international students who were exempt from submitting ELP scores (no ELP) or each of the different ELP tests at first suggested there was a statistically significant difference between at least two of these groups, with graduate and undergraduate levels combined, and with the three entry semesters combined. However, it is necessary to emphasize that these mean GPA differences only appeared when graduate and undergraduate students were aggregated together in a combined analysis. When graduate and undergraduate students were disaggregated, the 95% confidence intervals for each ELP test group largely overlapped. Importantly, graduate and undergraduate students did not submit the different tests in the same proportions (see Table 1): across the Fall 2021, Spring 2022, and Fall 2022 cohorts, DET was submitted by only 22 graduate students but 41 undergraduates; IELTS was submitted by 55 graduates but only 16 undergraduates; and TOEFL was overwhelmingly preferred by graduate students, with 123 scores compared to 25 undergraduate TOEFL scores. This different representation from student levels within each test group, and the fact that graduate GPAs cluster near 4.0 while undergraduates spread to 2.0, demand caution in making conclusions based on calculations that aggregate graduate and undergraduate students. In summary, statistically, we cannot reject the possibility that mean GPA among the ELP test

groups (or no ELP test) may be the same, and that there is no difference in a students' probable GPA outcome solely on the basis of which ELP test they submitted.

More critical for students' academic outcomes than fractions of GPA points is the risk of dropping out or earning a low enough GPA to warrant academic action (probation or warning). Difference of proportions tests found no statistically significant difference in the proportion of students withdrawing or on probation or warning between those who submitted the three different ELP tests (or no ELP test). In this analysis, as in the ANOVA previously reported, there was no apparent significant difference in risk of these serious negative academic outcomes based on belonging to the group of students who submitted any of these different ELP tests or no ELP test, for either graduate or undergraduate students. However, an unexpected finding here was that students exempt from submitting an ELP test score had a higher proportion of academic probation, warning, or withdrawal than expected, with raw rates higher than for students who submitted an ELP test score as evidence of linguistic preparation.

Returning again to Figure 1, the spread of individual students' GPAs extended lowest among those with no ELP score. While no DET or IETLS graduate student test takers earned a GPA under 3.0, outliers below the whisker extended below 3.0 for those with no ELP score (though also for TOEFL). Among undergraduates, the outliers extended the lowest for students with no ELP score, including the only GPAs in the sample below 1.0. These findings suggest an important opportunity to review ELP test exemption, and to break this group of students into smaller meaningful subgroups for further analyses of potential patterns.

LIMITATIONS

As is common, a larger sample size would benefit this study. In terms of subgroups in this dataset, statistically significant correlations with GPA were found most often in relationship to TOEFL test scores. This group had the largest sample size, as TOEFL was the most submitted ELP test. By contrast, no meaningful conclusions could be drawn about differences by field of study in this population, as the subgroups by field of study yielded sample sizes too small for interpretable statistical evaluation, and were ultimately moved to Appendix A of this report. In addition, no single country of origin represented a large enough proportion of students at UHM

in this study to warrant considerations by country or suggest effects by L1. Incorporating data from additional semesters, especially if the number of applicants submitting DET increased, would support more confident recommendations based on findings and may support further subgroup comparisons.

Fall 2022 was the first “post-COVID” semester, when UHM began returning to majority in-person teaching and on-campus operations and student services. This is another reason it will be instructive to evaluate data from additional future semesters, to consider whether and how patterns changed after pandemic restrictions eased, both in terms of ELP testing and in terms of student experience at UHM. It would also enable making important comparisons with awareness of recent revisions in DET structure and items. Future data on UHM graduate students will be limited because the Graduate Division discontinued accepting DET as an ELP test in Spring 2023. Unless Graduate Division policy changes, continued analyses should still be made for undergraduate students alone.

Initially, this study intended to model previously earned GPA in combination with ELP test score as potential predictors of future GPA. However, there is no detail about previous GPA recorded in this institutional database regarding the country or region of the prior institution, how the previous GPA was calculated, or the level of study represented (i.e., whether high school, associate degree, or prior undergraduate or master’s degree grades). These factors make it challenging to assign meaning to any individual student’s previous GPA or in comparison to others. Although this limitation cannot presently be addressed, exploring potential predictive power of previous GPA in association with ELP test score is an area for future study.

CONCLUSION

Although overall these analyses returned no glaring statistically significant differences in these ELP tests’ functioning at UHM, there are subgroups where DET looks at least on the surface different than IELTS and TOEFL, in spread of undergraduate GPA and in a (statistically non-significant) negative correlation with graduate GPA. Still, crucially, statistically significant differences in mean GPA of DET test takers or those with no ELP compared to IELTS and

TOEFL only appeared if graduate and undergraduate students were combined; no significant differences were found when graduate and undergraduate level students were disaggregated.

Notably, the present analyses indicated that international students exempt from submitting an ELP test score for UHM admission also earned lower mean GPAs than IELTS and TOEFL takers (with graduate and undergraduate students combined), and experienced academic probation or warning or withdrew in higher raw rates than any of the ELP groups. Similarly, previous research in Australia found ELP tests to be more reliable in establishing a student's readiness to complete university study in English compared to other exemption criteria (Oliver et al., 2012). This suggests an opportunity to reevaluate UHM's ELP exemption criteria by further breaking the ELP test exempt students into subgroups based on why they were exempted, and examining their outcomes.

While differences among these tests in terms of predictive validity cannot be definitively ruled out, the present results suggest there are no immediate red flags against accepting DET alongside IELTS and TOEFL. Perhaps most critically for student outcomes, no significant difference was found in proportions of international students withdrawing or on academic action or probation after their first two semesters when grouped by ELP test submitted (or compared to those who submitted no ELP test). Among Graduate students who submitted DET for admission, none earned a first year GPA under the 3.0 threshold for probation. Especially in light of ongoing revisions to improve the DET, and the inarguable savings in price, time, and easier access to DET for potential test takers, these findings support recommending that the Graduate Division reconsider accepting DET.

Locally, this study contributes to ongoing discussions of using different ELP scores in admissions decisions for international students at UHM. More broadly, it fills a gap in the existing literature by examining outcomes in a new context (a large, public, less selective state university in the US) and including a newer test, the DET, building directly on Isaacs et al.'s (2023) study in a highly-selective UK institution. If valid for admissions decisions, continued use of DET could support justice, in providing more access to ELP testing options more broadly to more potential students. DET is cheaper than most other accepted tests, takes far less time to complete, and can be taken anywhere and at any time (Settles et al., 2020). For students in socioeconomic or geopolitical situations that make it difficult to access the more expensive

IELTS and TOEFL, DET provides an option. UHM, along with other English-medium institutions, may wish to re-evaluate DET cut scores in light of more student outcomes data, newer linking studies, and in combination with other evidence of prospective students' academic readiness. Universities do not seek to do harm by admitting those not prepared for success, but neither do admissions committees want to unjustly hinder access for those who are prepared. Good ELP tests are useful tools for identifying students who are ready to study, but these potential students must first be able to access the test.

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APPENDIX A

Table A1

Correlation between ELP test scores and first year GPA by field of study, graduate and UG combined, combined cohorts entering Fall 2021, Spring 2022, and Fall 2022, and Fall 2022 cohort only, by field of study

Field	ELP		95% CI								
	test	n	M	SD	min	max	r	LL	UL	p	R ²
<i>Combined cohorts entering Fall 2021, Spring 2022, and Fall 2022</i>											
Life Sciences (LS)	DET	11	125	15.4	95	150	.58	-.03	.88	.060	.34
		GPA	3.38	0.61	2.41	4					
	IELTS	14	6.79	0.85	5.5	8.5	.37	-.20	.75	.193	.14
		GPA	3.71	0.50	2.03	4					
TOEFL	23	91.9	9.98	63	107	.05	-.37	.45	.824	.00	
	GPA	3.82	0.28	3.1	4						
Physical Sciences and Engineering (PE)	DET	15	123	13.9	95	140	.08	-.45	.57	.790	.01
		GPA	3.52	0.68	1.27	4					
	IELTS	24	6.84	0.75	5	8.5	.00	-.40	.39	.984	.00
		GPA	3.76	0.54	1.31	4					
TOEFL	41	97.4	13.4	61	117	.07	-.24	.36	.668	.00	
	GPA	3.8	0.24	3	4						
Social Sciences and Humanities (SH)	DET	32	113	13.7	90	140	.30	-.06	.59	.098	.09
		GPA	3.39	0.63	1.91	4					
	IELTS	29	6.93	0.82	5	8.5	.06	-.31	.41	.747	.00
		GPA	3.71	0.49	1.47	4					
TOEFL	70	91.6	18.4	30	116	.49	.29	.65	<.001***	.24	
	GPA	3.73	0.48	1.45	4						
<i>Fall 2022 cohort only</i>											
LS	DET	8	127	13.1	110	150	.30	-.51	.83	.465	.09
		GPA	3.46	0.59	2.41	4.00					
	IELTS	7	6.79	0.99	5.5	8.5	.62	-.25	.94	.140	.38
		GPA	3.54	0.68	2.03	3.97					
TOEFL	11	91.1	7.06	82	102	.32	-.35	.77	.342	.10	
	GPA	3.83	0.29	3.10	4.00						
PE	DET	13	125	12.3	95	140	.48	-.09	.82	.095	.23
		GPA	3.7	0.27	3.18	4.00					
	IELTS	15	7	0.63	6	8.5	-.05	-.53	.46	.853	.00
		GPA	3.73	0.68	1.31	4.00					
TOEFL	15	99.3	16.3	65	117	.26	-.28	.67	.340	.07	
	GPA	3.73	0.30	3.00	4.00						
SH	DET	24	111	13	90	130	.26	-.16	.60	.224	.07
		GPA	3.39	0.61	1.91	4.00					
	IELTS	12	7	0.74	5.5	8	.83	.52	.95	<.001***	.70
		GPA	3.72	0.29	3.00	4.00					
TOEFL	26	88.6	23.2	30	116	.45	.09	.70	.017*	.20	
	GPA	3.63	0.61	1.45	4.00						

Table A2

*Correlation between ELP test scores and first year GPA by field of study:
Cohorts entering Fall 2021, Spring 2022, and Fall 2022*

Field	ELP test	n	M	SD	min	max	r	95% CI		p	R ²
								LL	UL		
<i>Graduate only</i>											
LS	DET	2	125	21.2	110	140	not enough observations				
		GPA	4	0	4	4					
	IELTS	10	6.60	0.57	6	7.5	.08	-.58	.68	.816	.01
		GPA	3.85	0.13	3.66	4					
TOEFL	17	91.6	10.5	63	105	-.02	-.50	.46	.935	.00	
	GPA	3.92	0.16	3.46	4						
PE	DET	9	126	12.9	95	140	.45	-.30	.86	.222	.20
		GPA	3.73	0.27	3.18	4					
	IELTS	22	6.76	0.69	5	8	.40	-.01	.70	.056	.16
		GPA	3.88	0.14	3.58	4					
TOEFL	38	97.7	12.6	61	117	.11	-.21	.41	.494	.01	
	GPA	3.8	0.25	3	4						
SH	DET	10	118	14.6	95	140	-.49	-.86	.20	.152	.24
		GPA	3.89	0.17	3.45	4					
	IELTS	20	7.17	0.60	6	8.5	.44	.01	.73	.047*	.19
		GPA	3.87	0.16	3.44	4					
TOEFL	57	95.7	15.1	61	116	.37	.12	.57	.004**	.14	
	GPA	3.8	0.46	1.45	4						
<i>Undergraduate only</i>											
LS	DET	9	124	15.5	95	150	.74	.14	.94	.024*	.54
		GPA	3.25	0.59	2.41	3.95					
	IELTS	4	7.25	1.32	5.5	8.5	.82	-.67	1.00	.181	.67
		GPA	3.35	0.89	2.03	3.97					
TOEFL	6	92.7	9.14	84	107	.33	-.66	.90	.528	.11	
	GPA	3.54	0.35	3.1	3.97						
PE	DET	6	119	15.6	95	135	-.19	-.87	.73	.716	.04
		GPA	3.21	0.98	1.27	3.96					
	IELTS	2	7.75	1.06	7	8.5	not enough observations				
		GPA	2.45	1.61	1.31	3.59					
TOEFL	3	93.7	24.8	65	109	-.82	--	--	.391	.67	
	GPA	3.82	0.11	3.7	3.91						
SH	DET	22	111	13.1	90	130	.33	-.11	.66	.139	.11
		GPA	3.16	0.63	1.91	3.95					
	IELTS	9	6.39	1.02	5	8	-.43	-.85	.33	.248	.18
		GPA	3.35	0.76	1.47	4					
TOEFL	13	75.6	21.5	30*	106	.40	-.14	.76	.141	.16	

GPA 3.42 0.47 2.35 3.97

*One student with TOEFL score of 30 earned a 2.85 GPA in the first two semesters

Table A3

*Correlation between ELP test scores and first year GPA by field of study:
Fall 2022 cohort only*

Field	ELP test	n	M	SD	min	max	r	95% CI		p	R ²
								LL	UL		
<i>Graduate only</i>											
LS	DET	1	110	--	110	110	not enough observations				
		GPA	4	--	--	--					
	IELTS	4	6.62	0.63	6	7.5	.81	-.68	1.00	.190	.66
		GPA	3.76	0.14	3.66	3.96					
TOEFL	9	92.2	7.31	82	102	.08	-.62	.71	.835	.01	
	GPA	3.91	0.17	3.46	4.00						
PE	DET	8	129	6.23	120	140	.21	-.58	.80	.615	.04
		GPA	3.77	0.26	3.18	4.00					
	IELTS	13	6.89	0.53	6	8	.21	-.36	.66	.481	.04
		GPA	3.92	0.11	3.65	4.00					
	TOEFL	13	101	14.5	68	117	.41	-.16	.77	.147	.17
		GPA	3.71	0.32	3.00	4.00					
SH	DET	8	114	13.3	95	130	-.67	-.93	.07	.069	.45
		GPA	3.88	0.19	3.45	4.00					
	IELTS	8	7.22	0.57	6	8	.68	.02	.92	.045*	.46
		GPA	3.86	0.12	3.67	4.00					
	TOEFL	21	95.5	17.7	64	116	.33	-.12	.66	.149	.11
		GPA	3.67	0.64	1.45	4.00					
<i>Undergraduate only</i>											
LS	DET	7	129	12.1	115	150	.63	-.24	.94	.132	.39
		GPA	3.38	0.59	2.41	3.95					
	IELTS	3	7	1.50	5.5	8.5	.81			.394	.66
		GPA	3.26	1.06	2.03	3.97					
TOEFL	2	86	2.83	84	88	not enough observations					
	GPA	3.51	0.59	3.10	3.93						
PE	DET	5	117	16.4	95	135	.55	-.64	.96	.333	.31
		GPA	3.59	0.29	3.31	3.96					
	IELTS	2	7.75	1.06	7	8.5	not enough observations				
		GPA	2.45	1.61	1.31	3.59					
	TOEFL	2	86	29.7	65	107	not enough observations				
		GPA	3.87	0.06	3.83	3.91					
SH	DET	16	109	13.1	90	130	.35	-.18	.72	.190	.12
		GPA	3.15	0.60	1.91	3.87					
	IELTS	4	6.5	0.91	5.5	7.5	.95	-.09	1.00	.047*	.91
		GPA	3.43	0.32	3.00	3.71					
	TOEFL	5	68	26.8	30	104	.42	-.49	.89	.350	.18
		GPA	3.49	0.50	2.85	3.97					

APPENDIX B

Correlations between ELP test scores and first year GPA, Fall 2022 cohort

Level	ELP test	n	M	SD	min	max	r	95% CI		p	R ²
								LL	UL		
<i>Students admitted Unconditionally</i>											
All	DET	20	131	6.34	125	150	.35	-.11	.69	.132	.12
		GPA	3.67	0.34	2.62	4.00					
	IELTS	23	7.33	0.49	7.0	8.5	.07	-.36	.47	.763	.00
		GPA	3.77	0.55	1.31	4.00					
	TOEFL	25	108	4.67	101	117	.06	-.34	.43	.789	.00
		GPA	3.79	0.53	1.45	4.00					
GR	DET	9	131	4.64	125	140	.23	-.51	.78	.543	.06
		GPA	3.74	0.27	3.18	4.00					
	IELTS	17	7.24	0.36	7.0	8.0	.15	-.36	.59	.562	.02
		GPA	3.92	0.09	3.72	4.00					
	TOEFL	23	108	4.79	101	117	.07	-.35	.46	.754	.00
		GPA	3.78	0.55	1.45	4.00					
UG	DET	11	131	7.69	125	150	.40	-.26	.81	.221	.16
		GPA	3.61	0.39	2.62	3.96					
	IELTS	6	7.58	0.74	7.0	8.5	.33	-.65	.90	.517	.11
		GPA	3.33	1.00	1.31	3.97					
	TOEFL	2	106	2.12	104	107	not enough observations				
		GPA	3.9	0.10	3.83	3.97					
<i>Students admitted Conditionally through the ELI</i>											
All	DET	25	107	10	90	120	.12	-.28	.50	.548	0.01
		GPA	3.35	0.625	1.91	4					
	IELTS	11	6.09	0.38	5.5	6.5	.58	.05	.86	.036*	0.34
		GPA	3.51	0.57	2.03	4					
	TOEFL	27	80.1	15.3	30	98	.52	.19	.75	.004**	0.27
		GPA	3.63	0.427	2.71	4					
GR	DET	8	110	9.64	95	120	-.38	-.86	.44	.353	0.14
		GPA	3.95	0.0865	3.74	4					
	IELTS	8	6.25	0.27	6	6.5	.22	-.47	.75	.540	0.05
		GPA	3.78	0.15	3.65	4					
	TOEFL	20	83.1	11.7	64	98	.63	.26	.84	.003**	0.40
		GPA	3.67	0.416	2.71	4					
UG	DET	17	106	10.1	90	120	.00	-.48	.48	.994	0.00
		GPA	3.08	0.569	1.91	3.73					
	IELTS	3	5.67	0.29	5.5	6	.72	--	--	.489	0.52
		GPA	2.8	0.69	2.03	3.38					
	TOEFL	7	71.7	21.6	30	96	0.28	-.47	.80	.468	0.08
		GPA	3.49	0.462	2.85	3.93					

APPENDIX C

One-way ANOVA of mean first year GPA by ELP test taken, Fall 2022 cohort only, aggregated and separated by level (graduate (GR) and undergraduate (UG))

Level of study	ELP test	n	First year GPA			95% CI		F	p	DF	R ²
			M	SD	SE	LL	UL				
Both levels <i>(GR & UG combined)</i>	no ELP	116	3.46	0.71	0.07	3.33	3.59	2.54	.057	243	0.03
	DET	45	3.49	0.54	0.08	3.34	3.65				
	IELTS	34	3.69	0.56	0.10	3.50	3.87				
	TOEFL	52	3.7	0.48	0.07	3.57	3.83				
GR only	no ELP	50	3.77	0.39	0.06	3.66	3.88	0.92	.435	131	0.02
	DET	17	3.84	0.23	0.05	3.73	3.94				
	IELTS	25	3.88	0.13	0.03	3.83	3.93				
	TOEFL	43	3.73	0.49	0.07	3.58	3.88				
UG only	no ELP	66	3.23	0.80	0.10	3.03	3.42	0.70	.555	108	0.02
	DET	28	3.29	0.57	0.11	3.08	3.50				
	IELTS	9	3.16	0.90	0.30	2.57	3.75				
	TOEFL	9	3.58	0.44	0.15	3.29	3.87				