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Minding the Terrazzo Gap between Athletes and Nonathletes: Representativeness, Integration, and Academic Performance at the U.S. Air Force Academy

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Abstract

The tension between focusing on collegiate athletic or academic performance has persisted for decades. A recent study finds that recruited athletes in college athletic programs underperform academically, earning lower grades than predicted. It postulates that increased representativeness and integration efforts will enhance the academic value of college athletes' experience. The U.S. Air Force Academy system presents a natural experiment of whether such efforts can affect student-athlete academic performance. In this setting, we find that student-athletes perform comparably to nonathletes after controlling for predicted academic performance.

Keywords

sports economics, academic performance, student-athletes, representativeness, athletic integration

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Introduction

The academic performance of college athletes relative to their nonathlete counterparts remains a considerable topic of interest in the United States. Although postsecondary academic institutions exist primarily for educational purposes, college athletics remain a major factor influencing community morale (Douvis, 2008), endowment levels (Rhoads & Gerking, 2000), and local economies (Thompson, 2005). Additionally, athletics success has been linked to increases in university applications and enrollments (Murphy & Trandel, 1994). For example, when an institution experiences a significant increase in wins on the football field, applications increase by nearly 18% (Chung, 2013). Enrollments also increase due to football and basketball success (Pope & Pope, 2009).

The College Sports Project's (CSP) recent finding that recruited athletes systemically underperform relative to their nonathletic counterparts suggests the academic mission has become subordinate to the athletic one. Pursuing athletic achievement at the expense of academic achievement defeats the primary purpose of the educational institution. The Project therefore endorses representativeness and integration as remedies that will enhance the educational value of the intercollegiate (IC) athlete's experience (Malekoff, 2004). In a setting that has naturally embedded representativeness and integration into its system for decades, the U.S. Air Force Academy (USAFA) provides a mechanism for testing these remedies. Our results suggest athletes perform at a level consistent with their nonathlete counterparts after controlling for predicted academic performance.

Literature Review

College athletics has become big business. Revenues for varsity sports reached nearly $10 billion in 2011 (U.S. Department of Education, 2013). Athletics provide an entertainment and business impact (Cigliano, 2006) and create opportunities for recognition of student-athletes, as well as increased institutional visibility, which enhances the position of the university to attract alumni donations and increase student enrollments (Murphy & Trandel, 1994; Rhoads & Gerking, 2000). However, direct value can be difficult to assign to athletic programs, as many times the benefits are indirect (i.e., an improving student body).

Character Development—Athletics and the Mind/Body Link

In a sample of 595 students from a number of Division I, II, III and National Association for Intercollegiate Athletics colleges and universities, Rudd and Stoll (2004) find that college athletics aids in building social character. They find that team sport athletes score higher in social character development than nonathletes when students participate in athletic competition. Also, athletic activities promote improved grade

point averages (GPAs), encourage better attendance at school, reduce drop-out rates, and increase graduation rates (National Federation of High Schools Association [NFHS], 2003). The NFHS states that involvement in extracurricular athletic activities encourages citizenship while instilling pride in community and teaching teamwork and self-discipline.

Cigliano (2006) finds that student-athletes identified recognition, patience, self-discipline, maturity, teamwork, perseverance, self-confidence, and leadership as some of the qualities derived from participation in an athletic program. A survey of 492 university undergraduates investigated the differences between student-athletes and nonathletes and found that athletes have levels of self-esteem and approval motivation that are significantly higher than nonathletes (Bailey, Moulton, & Moulton, 1999). Thus, the authors conclude that athletes have a more positive self-reflection and are less inclined to seek approval than nonathletes.

The concept of Basking in Reflected Glory (BIRG) occurs when people find a common bond that develops from associating with a sport or team. BIRG can manifest in individuals feeling an increased sense of achievement and euphoria when their school team wins (Cialdini et al., 1976; Douvis, 2008). Cialdini et al. (1976) also find that college students are more likely to use the pronoun "we" and to wear school clothing after team victories as opposed to losses. Cialdini and colleagues suggest that BIRG can create a tremendous sense of community, gratitude, and pride.

Thus, if student-athletes are at a comparative academic disadvantage with their nonathlete peers, the boost in self-esteem, mental enhancement from physical activity, and the sense of camaraderie from BIRG may be contributing factors in leveling the playing field in overall academic performance for athletes versus nonathletes.

Academic Performance

Cigliano (2006) assesses the conflict between education and athletics, concluding that good communication between athletic and academic departments can minimize potential issues that occur in the absence of such communication. An analysis of 97 National Collegiate Athletic Association Division IA basketball and football programs found that success within a sports program does not translate into higher graduation rates, which suggests there is not a bias for schools to engage in IC athletics (Mangold, Bean, & Adams, 2003).

Opportunity

Athletic directors have expressed the sentiment that athletics provides an educational opportunity for a segment of students who otherwise might not be able to attend college (Cigliano, 2006). Since most student-athletes will not advance to professional sports, the elimination or reduction of athletic programs at universities and colleges could negatively affect student-athletes and their career goals. Further, Cigliano finds that coaches view athletics as a means to help students stay in school.

Coaches believe the structure and regimentation of athletic programs foster educational opportunities for student-athletes. By continually monitoring class attendance and grades, coaches create a structured environment, which supports the objective of attaining academic success.

In summary, the literature suggests college athletics programs can be beneficial in promoting student-athlete character development, academic success, and opportunities. These findings compel this study of the USAFA, recognizing its course sequence homogeneity, lack of self-selection for course sections, uniformity of curriculum, and student body similarity to other colleges. This setting provides an excellent natural experiment for testing the impact of representativeness and integration for college athletes.

Representativeness, Integration, and the USAFA Model

It is commonly understood that a cultural divide between competitive athletes and nonathletes exists at many universities and colleges. The central quad area at the USAFA is called the Terrazzo, leading to the frequently used phrase "Terrazzo Gap" to characterize the perceived chasm between IC athletes and non-ICs in terms of treatment, expectations, priorities, and performance. But as a military institution, the USAFA also strives for a measure of standardization and equality to bolster requisite morale and discipline among its students or cadets. As a result, the institution undertakes deliberate efforts to bridge the natural divide between ICs and non-ICs that can occur.

The CSP defines two initiatives, representativeness and integration, as central to the goal of enhancing learning outcomes for student-athletes. Representativeness is a measure of how similar the academic, community, and campus experiences are for IC and non-IC athletes. Integration addresses the efforts of athletic departments and coaches in aligning athletic programs with the educational mission of the institution. Optimally, during their collegiate experience, student-athletes should be representative of the overall student population in terms of academic preparation, learning outcomes, and college community participation. Integration requires knowingly promoting and coordinating cooperation among athletic departments, academic interests, and student-centered groups to bring educational outcomes into parity for student-athletes.

The USAFA provides a unique opportunity for testing the principles of representativeness and integration. Furthermore, the results of the present study should be generalizable to other student populations. While a minority (17%) of USAFA students' parents served in the military, the majority of cadets come from the same candidate pool as used by other highly-selective universities and colleges in the United States. Burton, Carson, Chilton, and Hutchinson (2007) find that students at USAFA and Queen's University, Belfast, exhibit statistically equivalent behavior, which supports the argument for similarity of student body populations.

Additionally, each of the USAFA's four classes includes approximately 1,000 cadets, for a total Cadet Wing population of approximately 4,000. USAFA faculty members received their graduate degrees from diverse, high-quality programs, similar to comparable undergraduate institutions. In a further similarity to its non-military peer schools, many (approximately 25%) of the cadets are also IC athletes. Given it has qualities emblematic of many levels of postsecondary institutions, the conclusions drawn from this USAFA-centric study are relevant for other colleges and universities.

The USAFA attempts to standardize its academic, military, and athletic programs for all cadets—athletes or not—inasmuch as doing so is practical. It also recognizes the unique capabilities and interests of its cadets. But this concept of common experiences occurs through many venues and consequently shortens the distance between the program ICs and non-ICs undertake. On their first day at the USAFA, all cadets undergo Basic Cadet Training for approximately 6 weeks before beginning their academic year. Each member of an incoming class receives a random assignment into 1 of the 40 cohorts, or squadrons, with approximately 25 other cadets from their own class year. These squadrons are not predicated on a sports team or academic major. Cadets live in these squadrons for their entire first academic year, at which time they are randomly shuffled into a different cohort, or squadron. While social groups naturally form based upon various clubs, academic interests, and sports teams, every night cadets return to their own dormitory rooms where attendance is taken. These rooms are proximate to other squadron mates, effectively disallowing any socially based groups to persist around the clock. Thus, there are no such things as sports team dorms or fraternities and sororities.

Another way that ICs and non-ICs share similar experiences is via promotion. Although in some college settings it is conceivable that a freshman athlete competing at the highest levels could receive favorable treatment, all USAFA freshman cadets undergo a "fourthclass system." This system ensures all first-year cadets remain subordinate to all upper-class cadets until a time-based promotion to upper-class status occurs. This promotion occurs in the spring semester of the freshman year, at which time all freshman are promoted to upper-class status. Further military "promotions" occur each successive year, for ICs and non-ICs alike.

ICs and non-ICs at the USAFA also experience a remarkably similar academic program. While there are 32 academic majors, most cadets do not select a major until partway through their sophomore year. As a result, almost the entire first and second years are similar for the majority of cadets. These 2 years consist primarily of a relatively common battery of "core" or general courses that all cadets must take. In total, there are approximately 96 hours of these core courses, and by completing them, every cadet graduates with a bachelor of science degree, whether it is in English or electrical engineering. This relative standardization of core courses, which occur in every year of a cadet's career, is the primary way to compare academic performance in a consistent manner. Because cadets can select their academic majors, comparing their GPAs in these courses would induce a self-selection bias. All cadets

graduate in 4 years—a few minor exceptions notwithstanding—with an approximately equal total load of 147 academic credit hours. These academic requirements translate to semester course loads between five and seven academic courses for ICs and non-ICs.

Finally, although cadets do have a measure of control over which courses they take based on the selection of their academic major, randomness permeates much of their coursework. Specifically, cadets do not make decisions about their class schedules (e.g., morning or afternoon section) or faculty members (e.g., Professor Smith) who teach their courses. Instead, these are random assignments.[1] This dynamic leads to sections that routinely have a representative sample of ICs and non-ICs, particularly in core courses, and further enhances the representative experience for athletes.

USAFA Cadet Performance: Data and Results

Data

The data in this study come from a database that catalogs many attributes of cadets currently at the USAFA. This database is available to faculty members serving as academic advisors to cadets.[2] From this database, we extract a cross-sectional sample of the 4,095 U.S. cadets enrolled at the USAFA on October 17, 2012.[3] At this time, there were 1,077, 1,074, 972, and 972 cadets in the graduating classes of 2013, 2014, 2015, and 2016, respectively.

Table 1 contains some of the basic demographic and performance data for the cadets in this sample. Besides statistics for the entire sample, it also divides the whole sample into IC and non-IC subsamples. Note that some cadets have missing data for certain characteristics, a fact that explains some of the sample size variation in this and other tables. In every case, we use all available data, never excluding, trimming, or winsorizing observations. Overall, Table 1 shows that the cadet wing consists of 78% males and 22% females. Of all the 1,025 IC athletes, however, females represent a higher proportion (25%) than males (75%) compared to their representation across the cadet wing. This phenomenon occurs across each of the class years. Approximately 25% of the cadets in the cadet wing are ICs. The proportion of ICs increases monotonically as the graduating year increases; the class of 2013 (2016) has 20% (35%) ICs. Caucasians and Blacks have greater representation in the IC category relative to their representation across the cadet wing, whereas Asian, American Indian, and cadets of "Unknown" race tend to be less represented in the IC category compared to the entire cadet wing. There are some specific violations of these trends in certain class years. Preparatory school graduates are overrepresented in the IC category relative to their representation in the entire wing, a trend that holds universally across each respective class year. Finally, there is virtually no age difference between non-ICs and ICs.

Table 1. Demographic Summary for the USAFA Sample.

	Whole Sample			2013			2014			2015			2016		
	All	Non-IC	IC	All	Non-IC	IC	All	Non-IC	IC	All	Non-IC	IC	All	Non-IC	IC
Total count	4,095	3,070	1,025	1,077	865	212	1074	852	222	972	719	253	972	634	338
Proportion		0.750	0.250		0.803	0.197		0.793	0.207		0.740	0.260		0.652	0.348
Male	0.781	0.789	0.755	0.796	0.798	0.788	0.767	0.783	0.707	0.776	0.786	0.747	0.784	0.790	0.772
N=	3,197	2,423	774	857	690	167	824	667	157	754	565	189	762	501	261
Female	0.219	0.211	0.245	0.204	0.202	0.212	0.233	0.217	0.293	0.224	0.214	0.253	0.216	0.210	0.228
N=	898	647	251	220	175	45	250	185	65	218	154	64	210	133	77
Black	0.070	0.051	0.125	0.054	0.047	0.080	0.068	0.055	0.117	0.078	0.054	0.146	0.080	0.047	0.142
N=	285	157	128	58	41	17	73	47	26	76	39	37	78	30	48
Caucasian	0.701	0.700	0.704	0.732	0.728	0.745	0.695	0.694	0.698	0.685	0.687	0.680	0.691	0.686	0.701
N=	2,872	2,150	722	788	630	158	746	591	155	666	494	172	672	435	237
Asian	0.073	0.082	0.047	0.071	0.072	0.066	0.080	0.089	0.045	0.071	0.075	0.059	0.070	0.093	0.027
N=	299	251	48	76	62	14	86	76	10	69	54	15	68	59	9
American Indian	0.010	0.011	0.006	0.007	0.009	0.000	0.006	0.006	0.005	0.013	0.015	0.008	0.013	0.016	0.009
N=	40	34	6	8	8	0	6	5	1	13	11	2	13	10	3
Unknown	0.023	0.023	0.023	0.017	0.018	0.009	0.024	0.020	0.041	0.025	0.026	0.020	0.027	0.028	0.024
N=	94	70	24	18	16	2	26	17	9	24	19	5	26	18	8
Prep School	0.211	0.190	0.273	0.184	0.171	0.236	0.178	0.171	0.203	0.226	0.192	0.324	0.261	0.238	0.305
N=	863	583	280	198	148	50	191	146	45	220	138	82	254	151	103
Age (years)	20.0	20.0	19.8	21.3	21.3	21.4	20.4	20.4	20.4	19.4	19.4	19.5	18.5	18.5	18.5
N=	4,095	3,070	1,025	1,077	865	212	1074	852	222	972	719	253	972	634	338

Note. USAFA = U.S. Air Force Academy. This table shows the proportions and counts of the USAFA cadet sample representing various demographic characteristics and separates the whole sample and respective class years into non-intercollegiate (Non-IC) and intercollegiate (IC) categories.

Table 2. Mean Academic Performance for Intercollegiate (IC) Athlete Cadets and Non-Intercollegiate (Non-IC) Cadets at the USAFA.

	Whole Sample			2013			2014			2015		2016
	Cum GPA	Core GPA	Maj GPA	Cum GPA	Core GPA	Maj GPA	Cum GPA	Core GPA	Maj GPA	Cum GPA	Core GPA	Cum GPA
All	2.873	2.881	3.005	2.923	2.903	3.040	2.884	2.901	2.987	2.853	2.873	2.826
N=	4,062	4,095	2,860	1,061	1,077	1,055	1,057	1,074	1,054	972	972	972
Non-IC	2.927	2.934	3.024	2.943	2.926	3.052	2.912	2.933	3.009	2.911	2.933	2.942
N=	3,039	3,070	2,281	849	865	845	837	852	835	719	719	634
IC	2.714	2.722	2.930	2.846	2.808	2.993	2.777	2.781	2.904	2.689	2.702	2.609
N=	1,023	1,025	579	212	212	210	220	222	219	253	253	338
Delta	0.21***	0.21***	0.09***	0.10***	0.12***	0.06	0.14***	0.15***	0.11***	0.22***	0.23***	0.33***

Note. USAFA = U.S. Air Force Academy. This table shows summary statistics in the areas of cadet academic performance. It shows aggregate data for the entire sample, which is then subdivided into the respective graduating classes. It also includes mean values for both the intercollegiate (IC) and nonintercollegiate (Non-IC) subsamples across the entire sample and by graduating class. Performance measures include the cumulative grade point average (Cum GPA), which is the average grade of all courses taken calculated on a 4.00 scale, with 4.00 representing an "A" grade; the Core GPA, which measures the average grade of all "core" courses taken. These courses represent a 80% plus common battery of courses that all cadets take in pursuit of the common bachelor of science degree; the major GPA (Maj GPA), which is the average grade for all courses taken specifically toward earning 1 of the 32 academic majors the USAFA offers.

***, **, and * indicate significance at the 1%, 5%, and 10% levels.

Since our study focuses on academic performance, Table 2 provides relevant summary statistics in this area of cadet performance. It shows aggregate data for the entire sample, which we then subdivide into the respective graduating classes.[4] It also includes mean values for both the IC and non-IC subsamples across the entire sample and by graduating class. The first academic measure is the cumulative GPA (Cum GPA), which is the average grade of all courses taken calculated on a 4.00 scale, where 4.00 represents an "A" grade. The next column shows the Core GPA, which measures the average grade of all core courses taken. These courses represent an 80% plus common battery of courses that all cadets take in pursuit of the common bachelor of science degree.[5] Next is the major GPA (Maj GPA), which is the average grade for all courses taken specifically toward earning 1 of the 32 academic majors. Given that many academic majors offer various electives, the courses composing this figure can differ substantially among cadets. Because freshman cadets—the class of 2016—have generally not selected their academic majors or taken a major-specific course at the time of data collection, we present only the Cum GPA results here and going forward.[6]

For many reasons (e.g., time spent on the fields vs. in class and innate academic ability), it is not surprising that ICs do not perform at the same academic level as non-ICs in the USAFA sample according to the univariate statistics in Table 2. Table 2 shows there are statistically significant differences among ICs and non-ICs in terms of academic performance. Universally, non-ICs have higher cumulative, core, and major GPAs than ICs. The only exception is for senior cadets in the class of 2013, who have statistically indifferent mean major GPAs between IC and non-IC subpopulations.

Results

The prior univariate statistics are one-dimensional by definition. It is entirely possible that lower academic marks for ICs are anticipated at the USAFA and therefore are an acceptable institutional outcome, particularly considering the merits of athletics described earlier and in the context of developing leaders of character. Considering prior findings, the real question is whether the USAFA's deliberate and continual efforts to bridge the so-called Terrazzo Gap produce the desired results from an academic standpoint. Specifically, do student-athletes experiencing a (subjectively determined) higher level of representativeness and integration still underperform? Or, do such efforts yield a benefit, which in this case would mean athletes perform at the level they are predicted to perform? If so, then it would suggest there exist academic performance benefits from an integrated and representative system.

To test whether the measures in Table 2 are indicative of the ICs' underperformance versus "as expected" performance, it is necessary to have a measure that predicts the cadets' academic performance. Upon cadet accession to the USAFA and prior to the cadet beginning any academic courses, the USAFA admissions office

Table 3. Mean Predicted Academic Performance for Intercollegiate (IC) Athlete Cadets and Nonintercollegiate (Non-IC) Cadets at the USAFA.

	Whole Sample	2013	2014	2015	2016
All	3.260	3.282	3.221	3.262	3.276
N=	4,062	1,061	1,057	972	972
Non-IC	3.309	3.303	3.265	3.324	3.359
N=	3039	849	837	719	634
IC	3.112	3.195	3.051	3.087	3.119
N=	1,023	212	220	253	338
Delta	0.197***	0.108***	0.214***	0.237***	0.240***

Note. USAFA = U.S. Air Force Academy. This table summarizes the Academic Composite (ACACOMP) for the whole sample and by graduating class at the U.S. Air Force Academy. The whole and by-year samples are subdivided into nonintercollegiate (Non-IC) and intercollegiate (IC) subsamples. As Carrell and West (2010) describes, the Academy generates this ACACOMP score as a predictive measure of academic performance based on a cadet's "high school GPA, class rank, and the quality of high school attended."

***indicates significance at the 1% level.

generates a predictive academic composite (ACACOMP) score. As Carrell and West (2010) describe, the ACACOMP score is based on a cadet's "high school GPA, class rank, and the quality of high school attended." The ACACOMP ranges from 2,358 to 4,045 in the sample of cadets we study,[7] and roughly speaking, dividing the score by 1,000 approximates a cadet's predicted GPA (i.e., 2,358/1,000 = 2.358 as the predicted GPA). As a practical matter, each cadet has a faculty advisor, and these advisors often use large discrepancies between ACACOMP and GPA as reasons to inquire about a cadet's general well-being.

Table 3 shows the ACACOMP summary for the whole sample and by graduating class. Akin to the earlier GPA measures, the values differ significantly between non-ICs and ICs across the whole sample and in each graduating class. Non-ICs are predicted to perform better academically than the ICs.[8]

Figure 1 synthesizes these tabular results in Tables 2 and 3 graphically. It shows the one-to-one relationship between ACACOMP and cumulative GPA with a scatterplot of each cadet in the sample. The preponderance of lower (higher) ACACOMP/lower (higher) GPA for ICs (non-ICs) is discernible. And the large markers clearly depict the difference in mean values for these two subgroups.

Considering the programs and activities the USAFA embraces in an effort to combat the separation between ICs and non-ICs, Table 4 contains some of the key findings in this study. Using variants of the GPA as regressands, we examine the relationship between predicted and actual academic performance for ICs and non-ICs according to Model 1.[9]

$$\mathrm{GPA} = \beta_0 + \beta_1 \mathrm{ACACOMP}_i + \beta_2 \mathrm{IC}_i + \varepsilon_i. \quad (1)$$

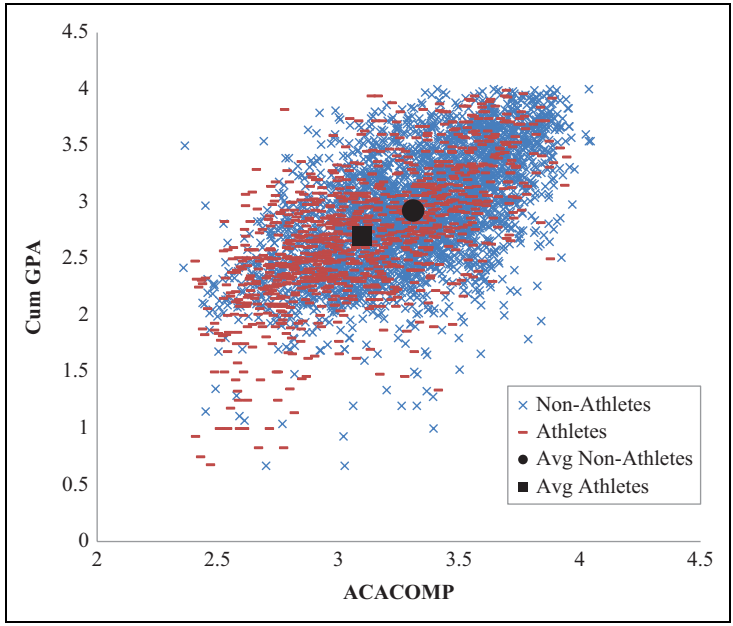

Figure 1. Cumulative GPA and academic composite (ACACOMP) for intercollegiate (IC) cadets and non-intercollegiate (non-IC) cadets at the USAFA.
Note. GPA = grade point average. This figure shows the one-to-one relationship between ACACOMP and cumulative GPA with a scatterplot of each cadet in the sample. The preponderance of lower (higher) ACACOMP/lower (higher) GPA for athletes (nonathletes) is discernible. The large markers clearly show the difference in mean values for these two subgroups.

This specification tests whether ICs underperform academically using an internal predictive measure. Specifically, significant negative values on the β_2 coefficient would indicate ICs systematically underperform relative to non-ICs, conditional upon their predicted performance. In summary, the overall and subsample data lead to the conclusions that (a) in a common set of academic classes, represented by the "Core GPA," ICs perform as expected overall based on this ACACOMP prediction (i.e., they do not underperform), (b) there appears to be some underperformance discrepancy based on an IC's gender, as female (male) ICs perform as expected (outperform and underperform), and (c) these overall findings can vary by graduating class. These conclusions bolster the CSP contention that increased representativeness and integration enhances the educational value of athletes' collegiate experiences.

Table 4, Panel A, initially tests the relationship between cumulative (Cum) GPA and the ACACOMP across the entire sample. The ACACOMP does not explain all the variation in cumulative GPA, given the 0.37 coefficient of determination.

Table 4. Actual and Predicted GPA for U.S. Air Force Academy Cadets Identified by Intercollegiate (IC) Athlete Status.

	Whole Sample			2013			2014			2015		2016	No 2016
Dependent Variable	Cum GPA	Core GPA	Maj GPA	Cum GPA	Core GPA	Maj GPA	Cum GPA	Core GPA	Maj GPA	Cum GPA	Core GPA	Cum GPA	Core GPA
Panel A: All cadets													
Constant (Non-IC)	−29.93***	−38.10***	60.83***	−29.39**	−52.56***	37.34**	0.13	−11.77	78.22***	−3.57	−4.53	−95.15***	−18.78***
ACACOMP	0.97***	1.00***	0.73***	0.98***	1.04***	0.81***	0.89***	0.93***	0.68***	0.89***	0.90***	1.16***	0.94***
IC	−2.05	−1.29	2.84	3.13	−0.32	2.92	5.49*	5.02*	4.06	−1.21	−1.81	−5.43	0.86
Adj. R^2	.37	.39	.15	.38	.42	.22	.37	.39	.16	.36	.37	.40	.39
N=	4,062	4,062	2,860	1,061	1,061	1,055	1,057	1,057	1,054	972	972	972	3,090
Panel B: Female cadets													
Constant (Non-IC)	−56.39***	−71.18***	74.87***	−31.18	−66.17**	63.09*	1.09	−23.62	129.19***	−67.18**	−67.49**	−143.97***	−26.83*
ACACOMP	1.05***	1.09***	0.70***	0.99***	1.08***	0.76***	0.88***	0.95***	0.53***	1.07***	1.07***	1.30***	0.96***
IC	−0.24	0.68	−0.48	3.95	3.97	7.36	−2.50	−2.97	−6.90	0.95	0.40	5.18	−0.44
Adj. R^2	.39	.41	.13	.40	.43	.19	.36	.41	.10	.40	.39	.43	.38
N=	892	892	631	218	218	217	246	246	245	218	218	210	682
Panel C: Male cadets													
Constant (Non-IC)	−23.37	−29.91***	56.45***	−29.63**	−49.57***	28.28	−1.08	−9.43	61.98***	9.32	8.23	−82.96***	−3.68
ACACOMP	0.96***	0.98***	0.74***	0.98***	1.04***	0.83***	0.90***	0.93***	0.73***	0.85***	0.86***	1.13***	0.90***
IC	−2.59	−1.84	3.78	0.19	−1.42	1.72	9.30***	8.85**	8.61*	−1.98	−2.59	−8.46**	2.08
Adj. R^2	.37	.38	.15	.38	.41	.23	.37	.39	.18	.35	.36	.40	.36
N=	3,170	3,170	2,229	843	843	838	811	811	809	754	754	762	2,408

Note. This table shows the cross-sectional relationship between various academic performance measures, such as Cumulative (Cum) GPA, Core GPA, and Majors (Maj) GPA, and the predicted GPA (Academic Composite or ACACOMP) according to the below model. IC is a binary variable equal to 1 if the cadet is an intercollegiate athlete and 0 otherwise. Panel A shows the results for the entire sample. Panels B and C show the results for the female (male) subsample.
***, **, and * indicate significance at the 1%, 5%, and 10% levels.

$$\mathrm{GPA}_i = \beta_0 + \beta_1 \mathrm{ACACOMP}_i + \beta_2 \mathrm{IC}_i + \varepsilon_i.$$

Examining the results for cumulative GPA across the entire sample (again, first column) shows that ICs and non-ICs do not have systematically different GPAs after controlling for predicted performance. This result supports the CSP supposition that integration and representativeness could reduce athletes' underperformance. Significantly, this finding holds across all GPA measures, even the cumulative and majors GPAs, which could be noisy since they encompass all cadets' academic performance in their common core courses as well as (i.e., potentially uncommon) majors courses.

The second column provides the most important results in this study. It shows that across the entire USAFA population, ICs exhibit no systematic underperformance in a common battery of core courses relative to non-IC cadets after controlling for predicted performance. That is, the intercept coefficient for ICs (β_2) is not significantly different between ICs and non-ICs. While the same overall result holds when we examine the majors GPA (i.e., third column), the intercept point estimate (insignificantly) switches signs compared to the core and cumulative GPAs. Considering the by-class performance, the classes of 2013, 2015, and 2016 show no statistical difference between the predicted and actual performance of ICs and non-ICs. The results of class of 2014 suggest that ICs actually outperform their predictions at the mean relative to non-ICs. All told, senior, sophomore, and freshmen ICs perform as expected, while junior ICs perform better than predicted at the time these data were collected. That the point estimates for β_2 in the core GPA columns tend to increase over time could suggest that the benefits to integration and representativeness efforts take time to manifest themselves. Additionally, establishing them as part of the culture early could be critical to achieving the desired CSP outcomes from the outset. The final column (i.e., "No 2016"), which removes the freshman cadets from the sample due to their brief time in the USAFA system, shows that across the upper three classes ICs perform at their predicted levels.

Given the prevalence of gender issues in athletics narrowly and in society more generally, Panels B and C separate the cadet sample in Panel A by gender. Panel B depicts the results for female cadets only. As a group, female ICs appear to perform as expected relative to their predicted levels. This overall finding supports the individual graduating class findings, in which there is no statistical evidence of anything but "as expected" academic performance; none of the IC-related estimates are significant for any variation of GPA for any class. Despite some high β_2 values relative to those in Panel A (e.g., classes of 2013, 2014, and 2016), the female population is a low proportion of cadets, so we would anticipate the male cadet results that would drive the overall findings in Panel A.

Recognizing the relative preponderance of males, the male results located in Table 4, Panel C, generally mimic the results found in Panel A for the overall sample. Yet their strength is attenuated by the female results. Male ICs perform as predicted, except in the case of 2014 (2016), where they outperform (underperform) their academic expectations. The males' outperformance in the class of 2014 is strong enough to drive similar results for that entire class in Panel A. Interestingly, the fact

that the IC females appear to (insignificantly) outperform expectations as freshmen (class of 2016) offsets the male ICs' (significant) underperformance in that same year. One potential interpretation is that for males the integration and representativeness efforts could take time to attain their objectives.

So far we have used only the internal USAFA prediction of academic performance to ascertain that ICs perform at an expected level. Even though the internal USAFA prediction (ACACOMP) does not account for athletic status or performance, perhaps there are latent factors in the ACACOMP that proxy for athletic status. If so, then the prior result could reflect the idea that the USAFA has a "good" prediction tool that accounts for the notion that ICs should underperform. To address this potential concern, we now test whether athletic status is associated with lower academic performance controlling for a host of individual cadet characteristics that do not include the ACACOMP score.

Table 5 shows the results from the following Model 2,

$$\mathrm{GPA}_i = \beta_0 + \beta_i \mathrm{Attribute}_i + \varepsilon, \tag{2}$$

where the list of 15 attributes includes the binary athlete status (IC); continuous variables for precollege ACT component test scores (ACTENG, ACTREAD, ACTMATH, ACTSCIENCE, and ACTWRI); the cadet's age (AGE); and binary variables for whether the cadet attended a preparatory school prior to the USAFA (PREP), whether the cadet has either taken or is scheduled to take an upper-level (i.e., 300-level and above) foreign language at the USAFA (FL), the cadet's race (BLACK, HISPANIC, ASIAN, AMERICANINDIAN, or UNKNOWN), and whether the cadet is FEMALE. Clearly, the coefficients on these binary variables represent the relative effect compared to the most-represented demographic in the sample, which is a non-IC who did not attend preparatory school, is not taking advanced foreign language courses, and is a White male.

The results show that being an IC is almost universally *not* associated with a lower cumulative or core GPA. The lone exception is for the sophomore class of 2015, in which the Core GPA is statistically lower for ICs (at the 10% statistical level). Other factors besides IC status tend to have statistically significant relationships with academic performance at the USAFA. The factors that tend to be strongly positively associated with varying academic performance are higher ACT math (all classes), ACT science (2013 and 2014), and ACT writing (2013, 2014, and 2015) scores; being older (2014 and 2016); and enrolling in advanced foreign language courses (2013, 2014, and 2016). Factors negatively associated with academic performance are attending a preparatory school (2013, 2014, and 2015),[10] being Black (overall, but no class individually), American Indian (2015), and being female (2014). Overall, these data suggest the earlier findings using ACACOMP as a predictive variable are not unique to the predictive variables considered.[11] Thus, using predictive factors not generated internal to USAFA further support the finding that ICs at the USAFA generally do not underperform academically.

Table 5. Cross-Sectional Relationship Between GPA and Demographic Attributes for USAFA Cadets.

	Whole Sample		2013		2014		2015	2015	2016	No 2016
Dependent Variable	Cum GPA	Core GPA	Cum GPA	Core GPA	Cum GPA	Core GPA	Cum GPA	Core GPA	Cum GPA	Core GPA
Constant	12.25	31.80	22.09	1.35	−59.93	−70.57	85.35	93.60	−192.95**	42.95
IC	−1.63	−1.76	1.29	0.58	2.68	1.67	−8.48	−9.98*	0.94	−2.41
ACTENG	−0.24	−0.14	−1.07	−1.04	−0.57	−0.34	0.05	−0.03	0.64	−0.55
ACTREAD	0.36	0.36	1.00*	1.21**	0.38	0.27	−0.30	−0.16	0.39	0.44
ACTMATH	4.78***	4.87***	3.18***	3.60***	4.16***	4.45***	4.73***	4.71***	7.74***	4.24***
ACTSCIENCE	0.98**	0.93**	1.72***	1.52**	1.72**	1.73**	0.36	0.37	−0.27	1.18***
ACTWRI	2.39***	2.24***	2.29**	2.14**	2.95***	2.66**	2.54**	2.40**	2.15	2.37***
PREP	−13.15***	−14.81***	−16.44***	−17.90***	−22.28***	−25.71***	−21.09***	−23.35***	−9.09	−19.03***
AGE	2.16***	1.24	3.14	3.61	5.27**	5.72**	−0.01	−0.14	9.37**	1.59
FL	9.98***	10.05***	14.43***	15.67***	11.53***	10.49***	8.51*	7.27	0.89	11.91***
BLACK	−10.54*	−11.25**	−6.58	−7.46	−9.05	−11.40	−17.13	−17.33	−14.84	−9.90*
HISPANIC	3.30	2.91	−2.99	−4.09	5.86	6.44	0.59	0.92	7.87	0.30
ASIAN	−5.05	−4.21	−6.44	−5.77	3.84	4.09	−21.86**	−21.55**	7.13	−7.31*
AMERICANINDIAN	−17.84*	−17.57*	−4.83	−2.3	−6.73	−6.53	−34.58*	−36.53*	−24.87	−18.14
UNKNOWN	−4.76	−5.34	24.81*	22.80*	6.92	5.95	−27.02*	−28.72**	−29.00	−1.23
FEMALE	−2.43	−4.52*	0.51	−3.71	−8.33*	−8.79*	−7.58	−8.28	8.13	−7.29***
Adj. R^2	.24	.25	.33	.35	.25	.27	.20	.20	.22	.28
N=	1,940	1,940	568	568	476	476	453	453	443	1,497

Note. USAFA = U.S. Air Force Academy. This table shows the results from the below model, where the Attributes include the binary athlete status (IC); continuous variables for precollege ACT component test scores (ACTENG, ACTREAD, ACTMATH, ACTSCIENCE, and ACTWRI); the cadet's age (AGE); and binary variables for whether the cadet attended a preparatory school prior to the USAFA (PREP), whether the cadet spoke a foreign language before entry (FL), the cadet's race (BLACK, HISPANIC, ASIAN, AMERICANINDIAN, or UNKNOWN), and whether the cadet is FEMALE. The coefficients on these binary variables represent the relative effect compared to the most represented demographic in the sample, which is a nonathlete who did not attend preparatory school, does not speak foreign language, and is a White male. The model is estimated using both the Cumulative (Cum) GPA and Core GPA as the dependent variable.

$$\mathrm{GPA}_i = \beta_0 + \beta_i \mathrm{Attribute}_i + \varepsilon_i.$$

Despite these findings and our contention that IC cadets' academic performance suggests integration and representativeness efforts merit consideration for universities, some limitations remain. Although the USAFA system of random class and instructor assignments naturally reduces the self-selection problems inherent in many comparable analyses, USAFA cadets do select into their own academic majors. This fact leads to an inconsistent proportion of ICs and non-ICs within each major, suggesting there are indeed IC-preferred majors. To the extent cadets gain any positive externalities on *core* course (i.e., nonmajors courses) grades from taking preferred majors courses, this study does not measure its effect. Yet we believe the focus on the core GPA across a range of cadet careers mitigates this criticism at some level. Additionally, as with many economic studies, these results exhibit survivorship bias. Cadets leave the USAFA for a variety of reasons and under voluntary and involuntary circumstances. Any cadets who have left for academic reasons are not represented in this sample. While we do not have the data about the IC and non-IC mix of cadets who have left for academic reasons, anecdotally both IC and non-IC cadets have departed for academic reasons. Both the self-selection and survivorship issues warrant consideration in future studies.

Conclusion

The USAFA, with its prescriptive course homogeneity, randomness of course section assignments, uniformity of curriculum, and student body demographic that mimics other academic institutions, represents an excellent environment for testing the impact of giving athletes a representative academic experience and integrating them into the student body. After controlling for predicted academic performance, this study finds that when ICs are educated in a setting that incorporates representativeness and integration, academic performance is on par with their contemporaries who do not compete in IC athletics. Using various specifications, we find that in a common set of academic classes, represented by the "Core GPA," athletes overall perform as expected based on an internal predictive measure (i.e., they do not underperform), there appears to be some underperformance discrepancy based on an athlete's gender and graduating class, as female (male) ICs perform as expected (outperform in the class of 2014 and underperform in the class of 2016). These conclusions bolster the contention that increased representativeness and integration enhance the educational value of athletes' collegiate experiences.

Robustness results show that being an IC is almost universally not associated with a lower cumulative or core GPA. Instead, other factors besides IC status tend to have significant relationships with academic performance at the USAFA. In general, the factors that tend to be strongly positively associated with varying academic performance are higher ACT math, science, and writing scores; being older; and enrolling in advanced foreign language courses. Factors negatively generically associated with academic performance are attending a preparatory school and being Black

(overall, but no class individually). Thus, using predictive factors not generated internal to USAFA further support the finding that ICs at the USAFA generally do not underperform academically.

In conclusion, this study finds that representativeness and integration help "level the playing field" for student-athletes in terms of academic performance. Specifically, the USAFA has made strides in overcoming the "Terrazzo Gap" between ICs and non-ICs. Its decades-old system has incorporated representativeness and integration by embracing natural cultural elements of a military academy, such as standardization, camaraderie, and nonfavoritism. Whether by design or by chance, this system appears to have narrowed the academic–athletic chasm that institutions can experience.

Authors' Note

The views in this article are solely the authors' and do not reflect those of the U.S. Government, Department of Defense, U.S. Air Force, or U.S. Air Force Academy.

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Notes

1. As a side note, most athletes do not have academics in the afternoon, as that time is dedicated practice time.
2. Data on individuals are protected by the Privacy Act of 1974 (5 U.S.C § 552a).
3. There were also 33 international cadets at this time (16 and 17 in the classes of 2013 and 2014, respectively), but we do not include them in this study due to a lack of comparable pre-USAFA performance data for these cadets.
4. Note the class of 2016 only has a Cum GPA measure. The mean shown is only for the mid-semester grades of these cadets in their first fall semester. They are not required to declare an academic major until the fall semester of their second (i.e., sophomore) year. Thus, they do not have a Maj GPA or a class rank (OPA) yet. As of the date we pull these data, these facts also reduce the sample size of the class of 2015 in the Maj GPA column.
5. Each cadet takes 43 core courses in their academic career, for example, Chemistry 100, Economics 201, Behavioral Sciences 310, and Calculus I and II. Of these 43, 32 are 3.0 credit academic courses, 10 are 0.5 credit Physical Education courses; and for the class of 2013, one is a 1.0 credit professional military education course, which is graded Pass/Fail. Of the 32 academic courses, cadets have a choice in five of them (e.g., engineering and

sciences majors take Electrical and Computer Engineering 231, whereas Humanities and Social Sciences majors take Electrical and Computer Engineering 315). Of the 10 PE courses, 2 are open electives.

6. All results for 2016 using the Core GPA are qualitatively identical to those shown for the Cum GPA.
7. This ACACOMP score is unique to each cadet, based upon factors determined before admission to the USAFA and observable only to the Admissions committee. Since many of these factors are unobservable to the authors, ACACOMP is treated as an exogenous variable for this study.
8. While ACACOMP directly accounts for standardized test scores, we also tested for differences between IC and non-ICs in every ACT and SAT component. Non-IC cadets have a statistically significant higher average in every component (i.e., ACT English, Reading, Math, and Writing and SAT Verbal, Math, and Writing), with the exception of ACT Science. For ACT Science, although non-ICs average 0.50 points higher on average, the difference is not statistically significant.
9. Although Core GPA is a bounded dependent variable at [0.00, 4.00] and not normally distributed based on a K-S test for normality, the residuals from this OLS model are independent and identically distributed (i.i.d). and normally distributed according to a K-S test. Additionally, all predicted values from this model fall within the relevant range of measured values. These results obviate the need to transform the dependent variable despite its bounded nature.
10. Concerns about multicollinearity exist, given the perceived positive relationship between Preparatory School attendance and IC status. However, the results shown in Table 5 are robust to deleting the Preparatory School variable from the model.
11. The preponderance of our sample took the ACT as their standardized test, and these are the results shown. The balance of the sample took the SAT. The relevant conclusions discussed in the article also hold for this subsample, chiefly that having IC status is not significantly related to Core or Cumulative GPA when controlling for other demographic and scholastic ability factors. Results are available upon request.

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