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Abstract

To examine the relationship between club rugby participation, collegiate experiences, and perceived gains, 25 rugby players and 25 non-athlete students completed the Student-Athlete Experiences Inventory-Revised, Student-Athlete Gains Inventory, and Perceived Stress Scale at the start and end of a semester. A RM-ANOVA and partial-η2 effect sizes determined if group and time differences were present. We selected variables associated with the post-scores for practical and liberal arts gains with the lasso method. Rugby players engaged in more diverse social interactions (partial-η2 = 0.091) and were more actively involved on campus (partial-η2 = 0.0914) than non-athlete students, but paradoxically had lower practical arts gains ($p < 0.0001$). All students reported increasing stress levels from start to end of the semester (partial-η2 = 0.109), which contributed to decreasing practical arts gains. Students need help with stress management near semester's end. Club rugby players should seek support services on campus to improve career preparedness.

Keywords: active involvement in university life, club sports, practical arts gains, liberal arts gains, career preparedness

Universities provide students extracurricular opportunities that may add value to their education. Astin's theory of student involvement states that the number and richness of experiences a college student engages in determines the benefits they derive (Astin, 1999). A large body of evidence supports that greater student involvement leads to better freshman adjustment and retention (Friedlander, Reid, Shupak, & Cribbie, 2007; Huesman, Brown, Lee, Kellogg, & Radcliffe, 2009; Kuh, Cruce, Shoup, Kinzie, & Gonyea, 2008; Melendez, 2007; Tieu & Pancer, 2009; Tieu et al., 2010), self-esteem improvements (Carruthers, Busser, Cain, & Brown, 2010; Friedlander et al., 2007; Tieu & Pancer, 2009; Tieu et al., 2010), stress reduction (Beiter et al., 2015; Thompson, Clark, Walker, & Whyatt, 2013; Tieu & Pancer, 2009; Tieu et al., 2010; VanKim & Nelson, 2013; Weinstein & Laverghetta, 2009) and career success (Clark, Marsden, Whyatt, Thompson, & Walker, 2015; Hall-Yannessa & Forrester, 2004; Tchibozo, 2007; Thompson et al., 2013). It is important to recognize that quality of involvement matters more than quantity (Tchibozo, 2007; Tieu & Pancer, 2009; Tieu et al., 2010), and that students can become over-involved in one or more activities to the detriment of other areas of their student life (Gardner, Koeppel, & Morant, 2010; Koehler, 2014; Linnemeyer & Brown, 2010; Roddy, Pohle-Krauza, & Geltz, 2017).

Sports, whether at an intramural, club, or varsity (i.e. National Collegiate Athletic Association or National Association of Intercollegiate Athletics) level, provide students opportunities for socialization and leadership, creating community identity within their institution, and engaging in vigorous physical activity for the associated physical and mental health benefits (Chen, Snyder, & Magner, 2010; Chu & Zhang 2018; Gould & Carson, 2008; Hall-Yannessa & Forrester, 2004; Lower-Hoppe, Beattie, Wary, Baily, Newman, & Farrell, 2020; Melendez, 2007; Mikulec & McKinney, 2014; VanKim & Nelson, 2013). College sport

participation provides documented added value to academic achievement compared to non-athlete students, such as better academic adjustment (Melendez, 2007), better retention rates (Forrester, McAllister-Kenny, & Locker, 2018; Kiss 2017), higher grade point averages (GPAs) (Roddy et al. 2017; Vasold, Deere, & Pivarnik, 2019), and higher graduation rates (National Collegiate Athletic Association, 2017; U.S. Department of Education, 2017). However, sports participation creates stresses that may interfere with the academic gains of students, including time commitments to practices, games, and team meetings; physical and mental fatigue; and both self-imposed and external pressures to excel in sports performance (Henderson, 2013; Lower, Turner, & Petersen, 2013). Prior studies indicated that high stress levels negatively impact the experiences college students engage in (Regehr, Glancy, & Pitts, 2013; VanKim & Nelson, 2013), mental health (Friedlander et al., 2007; Regehr et al., 2013; VanKim & Nelson, 2013), life satisfaction (Weinstein & Laverghetta, 2009), and adjustment to university life (Friedlander et al., 2007; Tieu & Pancer, 2009). Additionally, intercollegiate athletes have reported negative issues such as problems with perceived career readiness, isolation from segments of the campus community outside of sports, poor mental health, and risk of creating an environment for hazing and alcohol abuse (Henderson, 2013; Lifschutz, 2012; Linnemeyer & Brown, 2010; McGinley, Rospenda, Liu, & Richamn, 2016; Parietti, Lower, & McCray, 2016; VanKim & Nelson, 2013). Therefore, it is important to control for student stress levels when examining their experiences during and perceived outcomes from university.

Research on college sport participants has mostly examined varsity athletes, though they represent a minority of university athletes. The majority of college sport participants compete at an intramural level (Dugan, Torrez, & Turman, 2014; Lower et al., 2013; Vasold et al., 2019), which may provide qualitatively and quantitatively different stresses than intercollegiate

competition. While the stresses of varsity competition are well documented, club level intercollegiate competition provides a unique source of opportunities and stresses for students. Lifschutz (2012) highlighted that by nature, student run club sports often have little non-student and administrator supervision, which increases the risk and burden of work on student officers, though conversely provides opportunity for students to develop leadership and administrative skills (Glenn, 2015; Hall-Yannessa & Forrester, 2004; Lifschutz, 2012). Less research has examined club sports compared to varsity and intramural athletics, though some recent studies provide interesting and sometimes conflicting insights into the pros and cons of club sports. According to Astin's (1999) theory of involvement, the qualitatively different experiences experienced by college sport participants should lead to different benefits to those students, necessitating research in this unique group. The benefits that students may perceive gaining can be divided into two general categories: practical arts gains, which encompass items related to academic achievement and career preparedness, and liberal arts gains, which encompass what may be termed soft or social skills (Cox, Ivey, Martens, Sandstedt, Ward, & Webber, 2004; Cox, Sadberry, McGuire, & McBride, 2009).

Lower, Turner, & Peterson (2013) published an analysis of 1,176 students who participated in club sports, intramural sports, or fitness classes on campus. Club sport participants reported perceiving significantly higher overall, intellectual, fitness, and social benefits compared to intramural and fitness class participants. In contrast, Sanderson, DeRousie, &Guistwite (2017) conducted a similar study, but instead of perceived benefits measured GPA, course credit completion, and persistence to graduation. Analyzing 21,239 students during one academic year, they found that club sport participation, when tested by itself, had a strong positive relationship with GPA, but when put into the larger regression model did not

significantly contribute to the prediction models for any dependent variable. These two studies indicate that while club sport participants may subjectively perceive benefits to their involvement, there may or may not be any objective benefits to academic performance. Two recent studies continue to provide equivocal results. A multi-site survey of 85,316 students found that participating in club sports was a strong predictor of students reporting a higher GPA (Vasold et al., 2019). But another study found that club sport participants experienced significantly lower perceived academic gains than non-athlete students (Martin, Unfried, & Beckham, 2019). This pair of studies provide opposite results compared to Lower et al., (2013) and Sanderson and colleagues (2017), and indicate a need for further study into the potential benefits and negative externalities of participating in club sports. One major limitation to all four studies is their cross-sectional rather than longitudinal design. Additionally, only one (Martin et al., 2019) examined the relationship between students' experiences and perceived benefits, following Astin's theory (1999). In light of the contrasting findings, and the lack of longitudinal studies, research examining the relationship between college sport participants' experiences and perceptions of perceived benefits over time is needed.

This study examined how students' perceived experiences, gains, and stress change across a semester, and if club sport participation relates to these changes. Per Astin's (1999) theory, engaging in more quantitatively and qualitatively enriching experiences (such as by participating in club sports) should enhance the perceived benefits students experience. However, if the club sport increases the students' stress levels over what a non-athlete student may experience, the increased stress may negatively impact a students' perception of gains. Therefore, we developed the following research questions:

1. Do students' stress, experiences, and perceived academic and social gains change across a semester, and do they differ between club sport members and non-athlete students?
2. What factors, including stress, experiences, and demographics, predict the students' perceived academic and social gains at the end of a semester?

Methods

During a Spring semester, adult men and women club rugby players and non-athletes (no participation in NCAA, club, or intramural sports on campus) participated in this study. All rugby players were asked to participate. Non-athletes were recruited as a convenience sample from students enrolled in kinesiology courses. Rugby was chosen as they were the largest sports clubs on campus and could provide the best potential sample without introducing confounding factors that including other club sports would do such as time commitment, club culture, etc. The University Committee for the Protection of Human Subjects approved this research. After signing informed consent, participants completed printed copies of the questionnaires at baseline (within the first 2 weeks of the semester) and at the end of the semester (within the 2 weeks before final exams).

Instruments

Cox and colleagues (2004, 2009) created the Student-Athlete Experiences Inventory-Revised (SEI) and the Student-Athlete Gains Inventory (SGI). These questionnaires measure the types and frequency of experiences a student engaged in during college and what gains they perceived from their college experience, and are explicitly worded to also allow assessment of non-athlete students for comparative purposes (Cox et al., 2004; Cox et al., 2009). The development of their questionnaires was explicitly informed by both Astin's student

development theory (Astin, 1999) and the College Student Experiences Questionnaire (Gonyea, Kish, Kuh, Muthiah, & Thomas, 2003).

The SEI contains three subscales: active involvement in university life, social interaction/enrichment, and academic pursuits/library. Higher scores on each subscale indicate more frequent involvement in those types of activities. Overall Cronbach's alpha = 0.91 for the SEI (Cox et al., 2004). The SGI asks students to rate to what degree they have achieved 12 outcomes during college and categorizes half as practical arts gains, which demonstrate career preparedness, and half as liberal arts gains, which demonstrate social skills. Higher scores indicate stronger endorsements of each gain. Overall Cronbach's alpha = 0.84 for the SGI (Cox et al., 2004). Students reported global perceived stress experienced in daily life over the previous month using the Perceived Stress Scale (PSS) (Cohen, Kamarck, & Mermelstein, 1983). The PSS has demonstrated good validity and reliability in both athlete and non-athlete populations (Chiu et al., 2016). For each instrument, we relied on the factor structures determined in the original validation articles and assessed the reliability using baseline scores from our study. Cronbach's alpha = 0.75 for the male version of the SEI, indicating acceptable reliability, and 0.82 for the female version, indicating good reliability. For the SGI, Cronbach's alpha = 0.84, indicating good reliability, and Cronbach's alpha = 0.82 for the PSS, indicating good reliability. The instruments are assumed valid for our sample based on the original validation papers, and because our own subject population is similar to those on which the instruments were originally validated.

Students answered 13 demographics questions about their living situation, student status, and employment; these factors potentially have significant impact on stress levels, opportunity to

participate in certain activities, and perceived gains from university experiences (Gonyea et al., 2003; Vasold et al., 2019).

Data Analysis

Demographic factors between the groups (rugby players and non-athletes) were compared with two-sample t-tests if continuous or Pearson's Chi-Squared tests if categorical using SPSS v 24 (IBM, Armonk, NY). Research question 1 focused on how outcomes change across a semester and how these changes differed between groups, and was addressed by a repeated measures mixed MANOVA (RM-MANOVA) using SPSS v 24 (IBM, Armonk, NY). This statistical model assumes that the multiple dependent variables follow a multivariate normal distribution without too strong correlations and extreme outliers. Under the model, time was a within-subjects factor and rugby status was a between-subjects factor for the variables stress, academic involvement, social interaction, academic pursuits, practical arts gains, and liberal arts gains. Significance for the RM-MANOVA was set at $p \leq 0.05$. Interaction was tested first; since no interactions were found, main effects of time and rugby status were tested using univariate RM-ANOVAs. In the univariate analysis, Bonferroni correction was used to account for the increase in Type 1 error rate due to multiple dependent variables; therefore, statistical significance was set at $p \leq 0.008$ for univariate RM-ANOVAs. The Bonferroni correction is known to be conservative particularly when the number of parameters is large, making the univariate RM-ANOVA tests suffer from low statistical power. Therefore, effect sizes were quantified using partial-η2. According to Cohen's scales (Cohen, 1988), partial-$\eta^2 < 0.06$ is considered a small effect size, $0.06 \leq$ pa rtial-$\eta^2 < 0.14$ a medium effect size, and partial-$\eta^2 \geq 0.14$ a large effect size.

Research question 2 focused on identifying factors associated with the perceived practical and liberal arts gain at the end of the semester (i.e., post-scores). A set of variables included the baseline of the six variables, the change in these variables over the semester, and the 13 demographic variables in the survey. Note that this analysis was for the purpose of exploration and description, not for the purpose of confirming a hypothesis. Since the number of variables was large relative to the sample size, the lasso was used for variable selection (Tibshirani, 1996). The lasso method is a well-known statistical method for variable selection, but introduces bias in the estimation of regression parameters in order to reduce variance, which was alleviated by the ordinary least square when the regression parameters were estimated with the variables selected by the lasso (Belloni and Chernozhukov, 2013). Models were tested using R statistical software Version 3.4.2 (R Core Team, 2017).

Results

Seventy-two subjects enrolled in the study; two subjects completed the demographics questionnaire only and were removed from analysis. One student chose to not complete any of the demographics questions, but did complete the outcome questionnaires—this subject was retained for the RM-MANOVA. Per instrument scoring instructions, when any respondent skipped an individual question, the subscale score was created by averaging the answered questions; in total, three questions were unanswered in all instances of the PSS, three questions were unanswered in all issuances of the SEI, and one question went unanswered in all instances of the SGI. At baseline, 37 rugby players and 33 control subjects completed the questionnaires. Twenty-five rugby players and 25 non-athlete students completed the post-assessment.

Most students were female (71%), in their second or third year at university (72%), had parents who did not graduate college (45%), intended to enroll in graduate school (88%), and

worked for pay (58%). Significant baseline differences included: rugby players tended to be younger; most were native students whereas almost half of non-athletes transferred from another institution; most rugby players lived in campus housing with other students, while a fourth of non-athletes lived with family; most rugby players took 15-16 credit hours during the Spring semester, while non-athletes had a more even spread of academic load between 12 and 17+ credit hours (Table 1).

[INSERT TABLE 1 ABOUT HERE]

The RM-MANOVA results indicated no significant interaction ($F(6,43)=.742$, $p=.619$, partial-$\eta 2=.094$). This implies that the change in the dependent variables over time does not depend on rugby player status. However, the main effects of time ($F(6,43)=2.583$, $p=.032$, partial-$\eta 2=.265$) and rugby status ($F(6,43)=4.897$, $p=.001$, partial-$\eta 2=.406$) were both significant. This implies that time and group do have a significant association with the combination of perceived stress levels, experiences, and gains. Assumptions for RM-MANOVA were assessed; Box's Test of Equality of Covariance Matrices was passed ($F(78, 7275.65)=.994$, $p=.32$), and residual QQ plots showed no severe departures from normality.

The estimated mean for the outcomes at both time points, as well as results from the univariate RM-ANOVA models, can be seen in Table 2. After the RM-MANOVA indicated significant main effects of time and group, univariate RM-ANOVA models were used, and the effect sizes were interpreted based on partial-$\eta 2$ values to understand the proportion of variance explained in the dependent variables. Interaction effects were ignored due to the lack of significance in the RM-MANOVA model. Sphericity was not of concern since there are only two

groups and two time points, and QQ plots showed no severe departures from normality for residuals. Effect sizes for time were moderate for stress (partial-η2 =.109) and practical arts gains (partial-η2 =.073). Students, regardless of rugby status, increased stress levels across the semester on average; the partial-η2 indicated a medium effect size. Students also decreased practical arts gains on average. Effect sizes for rugby status were moderate for active involvement (partial-η2 =.094), social interaction (partial-η2 =.091), academic pursuit (partial-η2 =.093), and practical arts gains (partial-η2 =.076). Rugby players reported more frequent active involvement and diverse social interactions than non-athletes. However, on average they reported less academic pursuits and practical arts gains than non-athletes.

[INSERT Table 2 ABOUT HERE]

Results for the variable selection by the lasso (research question 2) are as follows. Post-liberal arts gain scores were positively related with pre-liberal arts gain, pre-social interaction, and change in academic pursuit scores. Post-liberal arts gain was higher among transfer students than among native students on average and showed a non-monotonic relationship with work hours. When compared to those who do not work, the post-liberal arts gain was lower among those who work for 1-10 hours per week and those who work for 31 hours or more per week, but was not significantly different among those who work for 11-30 hours per week (Table 3).

[INSERT Table 3 ABOUT HERE]

Post-practical arts gain (response variable) was positively related with pre-practical arts gain, pre-social interaction, and change in academic pursuit, and had a non-monotonic relationship with work hours. Post-practical arts gain tended to be higher for older students,

lower as stress increased over the semester, and higher among those who want to pursue an advanced degree program (Table 4).

The models selected by the lasso had adjusted R-squared values of 0.49 and 0.61 for the liberal and practical arts gain, respectively.

[INSERT Table 4 ABOUT HERE]

Discussion

The results indicated that students, regardless of sport participation, reported an average increase in stress and decrease in practical arts gains (signifying career preparedness) from the start to the end of a Spring semester. The regression models confirmed a significant negative impact of stress on career preparedness. Stress levels of both groups of students, on average, ended up higher than levels reported for adults younger than 25 years old (Cohen & Janicki-Deverts, 2012). Engaging in more social interaction experiences, increasing the amount of academic pursuits engaged in across the semester, being older, and wanting to apply for a graduate degree program helped bolster career preparedness. The results of this study support the alignment of specific experiences to practical arts gains, which are related to career preparedness, originally shown by Cox and colleagues (Cox et al., 2004; Cox et al., 2009) and supported by other research (Chen et al., 2010; Huesman et al., 2009; Tieu & Pancer, 2009; Tieu et al., 2010). Namely, more frequent participation in experiences labeled as active campus involvement and social interaction led to a greater perceived career preparedness

Rugby players reported lower practical arts gains than non-athletes at the end of the semester, indicating that club sport participation may negatively impact students' perceived

career preparedness. The regression models tested indicated that changes in academic pursuits predicted final perceived career preparedness, and rugby players reported lower academic pursuit scores than non-athletes at the end of the semester, which partially explains the negative association between rugby participation and career preparedness. Prior research has shown that involvement in athletics may have a negative impact on aspects of career preparedness like career maturity (Linnemeyer & Brown, 2010). Sometimes, students have too much of an athletic identity or become over-involved in athletics, which overshadows the student part of being a student-athlete (Chen et al., 2010; Cox et al., 2009; Linnemeyer & Brown, 2010). While some athletes may over-identify with their sport performance to the detriment of their academic success, most recent research has highlighted the benefits of athletics at both varsity and non-varsity levels for student success (Chen et al., 2010; Hall-Yannessa & Forrester, 2004; Lower-Hoppe, Petersen, & Hutton, 2020; Melendez, 2007; National Collegiate Athletic Association, 2017). Research has demonstrated that over-involvement in any one area, even in academics, can be detrimental to undergraduate students' overall development (Astin, 1999; Gardner et al., 2010; Koehler, 2014). Instead, both college sport participants student-athletes and non-athlete-students should engage in a diversity of campus activities to ensure a well-rounded individual (Cox et al., 2009; Kuh et al., 2008). Another recommendation for student-athletes college sport participants is to interact with non-athlete peers; this integration seems beneficial, while isolation to only fellow athletes seems to negatively impact student success (Aries, McCarthy, Salovey, & Banaji, 2004; Henderson, 2013).

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Surveys of graduates and employers have indicated that extracurricular activities, and sports participation in particular, have benefits in the post-graduation workplace on items such as how quickly a graduate was hired, their starting salary, and the position of their first job (Clark et al., 2015; Tchibozo, 2007; Thompson et al., 2013). The qualities that led to employment benefits may be deemed soft, life, or social skills (Clark et al., 2015; Mikulec & McKinney, 2014; Thompson et al., 2013), which would fall under the umbrella of liberal arts gains as measured by Cox et al's (2004, 2009) questionnaires. In the present study, rugby players reported engaging in more diverse social interactions and being more actively involved on campus than non-athlete students. However, despite social interaction experiences being a predictor of social skill development (Cox et al., 2004), in the present study there was not a significant association between club-athlete status and perceived social skills, nor did change in social interaction scores contribute to the model to predict end of semester perceptions of social skills.

Gould and Carson (2008) discuss one potential reason for the discrepancies in reported positive or negative effects of sports participation. While many people assume that sports participation builds life skills—such as teamwork, cooperation, self-confidence, and discipline—the authors make the distinction that such skills may not translate to other settings beyond sports unless intentional focus on learning and transferring the skills is made (Gould & Carson, 2008). Several studies focused on leadership roles in club sports, which might be the specific involvement needed to transfer skills developed from the sport to the employment setting (Carruthers et al., 2010; Dugan, Turman, & Torrez, 2015; Hall-Yannessa & Forrester, 2004; Mikulec & McKinney, 2014). Undergraduates may find opportunity to intentionally apply and build general life skills by taking leadership positions in a student club rather than just playing the sport. The model proposed by Gould and Carson (2008) indicates that this intentional focus

of transfer of life skills starts with the coach's leadership, philosophy, and willingness to take a proactive approach. However, this model assumes that a coach has been trained in coaching and is self-aware, intentional, and self-reflective enough to implement Gould and Carson's model. In reality, most university club sports are coached either by fellow students or volunteer coaches who may have no training in how to be a coach, but are simply former athletes in the sport who volunteer to give back to their sporting community. In these cases, there can often be a communication gap between volunteer coaches who are otherwise external to the university community and the campus recreation departments, especially due to the idea that club sports are meant to be student run, and thus the club officers handle all the administrative duties, and the coach is just there to teach the sport skills and develop on-field or on-court strategy (Lower & Czekanski, 2019). Therefore, campus recreation departments may choose to focus on outreach to volunteer coaches and offer them training on how to make their coaching more intentional and to promote development of life skills within their athletes.

Research has previously shown a significant impact of demographic factors such as gender, living arrangements, and parental education on university student experiences and gains (Beiter et al., 2015; Parietti et al., 2016). Few demographic factors measured in this study contributed to the predictive models of practical or liberal arts gains, with the only shared factor being hours of paid employment. This may indicate that demographic factors are not as important as student engagement and experiences. Kuh et al. (2008) analyzed data collected via the National Survey of Student Engagement and other academic records at 18 colleges and universities to determine what explains first-year GPA and student retention. They found that student engagement decreases the contribution of demographic factors in a regression model, and

even eliminated some classically included factors like parental education. Therefore, it is possible that in the current study, student engagement amongst the whole sample was sufficient to negate the differences in demographic characteristics seen between groups.

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Some of this potential paradox may be explained by the limitations of this study. Though the two groups were relatively matched for total size and gender distribution, the overall sample was small, had a 26% drop out rate, and participants were a convenience sample. Part of that convenience sample was that all non-athlete students were recruited from the same academic department (Kinesiology), thus limiting the generalizability to other majors. Additionally, several demographic factors differed between the groups, and though the regression analyses were not able to detect much impact of these factors (while consistently including work hours, which did not differ between groups) on the perceived gains, they could still be contributing to the unaccounted variance of the models. Another limitation is that participation in non-sport extracurricular activities or other campus involvements were not captured and accounted for in either group. Lastly, the end of semester assessment occurred almost a month after the end of the rugby season. Therefore, rugby players' self-identity may have shifted more towards that of a non-athlete student as they prepared for final exams than they would have perceived themselves during the rugby season.

Conclusion

Stress levels increased during the semester for both club sport athletes and non-athletes. Relative to the group of non-athletes, this study shows that the group of athletes tends to have higher active involvement and social interaction but lower academic pursuit and practical art

gain on average (medium effect sizes were shown in the data). While extracurricular activities, including sports participation, are intended to provide benefits toward student development, students need to keep the balance between their roles as athletes and students. In addition, university faculty and staff can better support the system of club sports by encouraging the use of campus resources (e.g., library, tutoring centers, and academic advisors), promoting and helping stress management particularly toward the end of a semester, and outreaching to volunteer coaches and training intentional coaching to develop life skills of their athletes.

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Table 1. Baseline Demographics of Sample

Demographic Variable	Rugby Players *n* = 36[a]	Non-athlete students *n* = 33	Comparison
	M (SD)	M (SD)	***p***
Age (years)	20.6 (2.8)	23.6 (6.0)	**0.017***
	n (%)	*n* (%)	Chi-square
Females	25 (67.6%)	24 (72.7%)	0.76
Year in school (#, %)			0.21
Freshman/first year	2 (5.6)	0	
Sophomore	13 (36.1)	7 (21.2)	
Junior	14 (38.9)	16 (48.5)	
Senior	6 (16.7)	10 (30.3)	
Unclassified	1 (2.8)	0	
Native Student	31 (86.1)	18 (54.5)	**0.004***
Transfer Student	5 (13.9)	15 (45.5)	
Live in dormitory or other campus housing	26 (72.2)	13 (39.4)	**0.006***
Live in private residence	10 (27.8)	20 (60.6)	
Other			
Live with other students	32 (88.9)	19 (57.6))	**0.017***
Live with family	3 (8.3)	9 (27.3)	
Live alone	0	4 (12.1)	
Other	1 (2.8)	1 (3.0)	
Both parents graduated college	11 (30.6)	10 (31.3)	0.46
Only mother graduated college	4 (11.1)	5 (15.6)	
Only father graduated college	5 (13.9)	1 (3.1)	
Parents did not graduate from college	15 (41.7)	16 (50.0)	
Don't know	1 (2.8)	0	
Expects to enroll in an advanced degree program	30 (83.3)	31 (93.9)	0.17
Credit hours enrolled in this semester			**0.012***
7-11	0	1 (3.0)	
12-14	9 (25.0)	12 (36.4)	
15-16	21 (58.3)	7 (21.2)	
17 or more	6 (16.7)	13 (39.4)	

Hours per week spent on coursework outside of class			0.74
< 5	2 (5.6)	3 (9.1)	
6-10	16 (44.4)	13 (39.4)	
11-15	6 (16.7)	5 (15.2)	
16-20	6 (16.7)	5 (15.2)	
21-25	5 (13.9)	5 (15.2)	
26-30	0	2 (6.1)	
> 30	1 (2.8)	0	
Hours per week during the semester working for pay			0.24
Doesn't work	18 (50.0)	11 (33.3)	
1-10	7 (19.4)	3 (9.1)	
11-20	5 (13.9)	8 (24.2)	
21-30	5 (13.9)	10 (30.3)	
31-40	1 (2.8)	1 (3.0)	
How does work affect school			0.23
Doesn't work	18 (50.0)	11 (33.3)	
Work does not interfere with school	9 (25.0)	6 (18.2)	
Work takes some time from school	9 (25.0)	15 (45.5)	
My job takes a lot of time from school	0	1 (3.0)	

Notes: mean values are calculated based on cases reported; some participants chose not to respond to some questions. [a] one rugby player did not answer any demographic questions; * indicates significant group differences

Table 2. Changes in Stress, Experiences, and Perceived Gains Across the Semester: Summary Statistics and Univariate RM-ANOVA Results

Rugby Status	Time	Stress M (SD)	Active Involvement M (SD)	Social Interaction M (SD)	Academic Pursuits/Library M (SD)	Practical Arts Gain M (SD)	Liberal Arts Gain M (SD)
Non-athlete	pre (*n* = 33)	17.6 (6.7)	17.4 (5.9)	22.9 (6.4)	28.1 (5.7)	3.16 (0.51)	3.06 (0.56)
	post (*n* = 25)	18.4 (8.3)	15.8 (4.8)	20.8 (4.7)	29.0 (7.5)	2.97 (0.62)	2.95 (0.54)
Rugby	pre (*n* = 37)	15.9 (4.5)	18.7 (4.5)	25.0 (5.0)	26.2 (7.3)	2.87 (0.57)	3.05 (0.46)
	post (*n* = 25)	18.4 (5.1)	19.3 (5.2)	24.7 (5.6)	24.8 (6.5)	2.71 (0.50)	2.79 (0.55)
All subjects	pre (*n* = 70)	16.7 (5.6)	18.1 (5.2)	24.0 (5.8)	27.1 (6.6)	3.01 (0.56)	3.05 (0.51)
	post (*n* = 50)	18.4 (6.8)	17.5 (5.3)	22.7 (5.5)	26.9 (7.3)	2.84 (0.57)	2.87 (0.55)
Time	*p*	0.019	0.86	0.30	0.52	0.058	0.091
	Partial-η2	**0.109**[a]	0.001	0.022	0.009	**0.073**[a]	0.058
Rugby Status	*p*	0.66	0.031	0.034	0.031	0.053	0.38
	Partial-η2	0.004	**0.094**[a]	**0.091**[a]	**0.093**[a]	**0.076**[a]	0.016
Interaction effect	*p*	0.42	0.26	0.29	0.76	0.96	0.61
	Partial-η2	0.013	0.026	0.023	0.002	<0.001	0.006

Notes: [a] = medium effect size

Table 3. The selected model by the lasso and regression parameters estimated by ordinary least square (for predicting post-score of liberal arts gain)

	Estimate	SE	T	*p*
Intercept	1.3799	0.4231	3.2612	0.0025
Pre-score of liberal arts gain	0.3710	0.1481	2.5051	0.0170
Pre-score of social interaction	0.0193	0.0107	1.7980	0.0808
Change in score of academic pursuit	0.0260	0.0110	2.3660	0.0237
Transfer students [a]	0.4111	0.1515	2.7142	0.0102
Work hours 1-10 [b]	-0.5711	0.1831	-3.1185	0.0036
Work hours 11-20 [b]	-0.0960	0.1938	-0.4952	0.6235
Work hours 21-30 [b]	-0.2624	0.1500	-1.7497	0.0889
Work hours 31-40 [b]	-0.8820	0.2855	-3.0891	0.0039

Notes: [a] the reference group is native students; [b] the reference group is those who do not work.

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Table 4. The selected model by the lasso and regression parameters estimated by ordinary least square (for predicting post-score of practical arts gain)

	Estimate	SE	T	p
Intercept	-0.1378	0.5959	-0.2312	0.8186
Pre-score of practical arts gain	0.3579	0.1428	2.5064	0.0173
Pre-score of social interaction	0.0231	0.0111	2.0850	0.0449
Change in score of academic pursuit	0.0068	0.0118	0.5782	0.5670
Change in score of stress level	-0.0263	0.0111	-2.3749	0.0235
Age (years)	0.0568	0.0229	2.4816	0.0183
Pursuing an advanced degree [a]	0.2577	0.1675	1.5386	0.1334
Work hours 1-10 [b]	-0.1602	0.1980	-0.8090	0.4243
Work hours 11-20 [b]	0.3548	0.1900	1.8669	0.0708
Work hours 21-30 [b]	-0.1174	0.1767	-0.6646	0.5110
Work hours 31-40 [b]	-0.8820	0.2855	-3.0891	0.0039

557 Notes: [a] the reference group is those who do not pursue an advanced degree; [b] the reference
558 group is those who do not work.