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Multivariate analysis of academic and sport performance among Indonesian university student-athletes

Análisis multivariado del rendimiento académico y deportivo entre estudiantes universitarios-atletas de Indonesia

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Abstract. Research on student-athletes' academic performance reveals a complex interplay of factors. Interestingly, few studies have investigated the achievement of studentç-athletes in both academics and athletics, the two areas in which they are usually evaluated. In this study, we investigated the association between factors that may affect student athlete academic performance with their sports achievement. In this study, 166 students from 20 sport faculties universities within faculty of sports who had at least a provincial sports accomplishment were involved. The factors that were strongly connected with student-athletes' academic achievement were analyzed using a logistic regression analysis. According to this study, there is a considerable correlation between the academic achievement of student athletes, their gender and internet access. It has been found that academic achievement is strongly influenced by students' proficiency in establishing an internet connection significantly impacts their academic performance. In addition, gender makes a major contribution to the prediction of academic grades in student athletes in Indonesia. Athletes may be eligible for specialized academic programs that are intended to help them continue to improve in both their academic and athletic endeavors. As a result, Indonesian universities mandate the establishment of a mentorship center development organization to assist student-athletes. Curriculum modifications may also be implemented in response to the time allotted to students for academic and sports performance.
Keywords: Academic performance, Academic Stress, Indonesian Athletes, Sports Achievement, Student-Athletes.

Resumen. Muchas personas han expresado interés en los logros académicos y deportivos de los estudiantes deportistas en la educación superior. Curiosamente, no muchas investigaciones han examinado el éxito de un estudiante deportista tanto en lo académico como en lo deportivo, los dos dominios en los que se los suele evaluar. En este estudio, analizamos las relaciones entre los niveles de estrés, el rendimiento deportivo y la posición socioeconómica y las calificaciones de los estudiantes deportistas. En este estudio, participaron 166 estudiantes de 20 universidades indonesias con una facultad de deportes que tenían al menos un logro deportivo provincial. Los factores que estaban fuertemente relacionados con el rendimiento académico de los estudiantes deportistas se encontraron utilizando un análisis de regresión logística. Según este estudio, existe una correlación considerable entre el rendimiento académico de los estudiantes deportistas y su género, semestre y acceso a Internet. Se ha descubierto que el rendimiento académico está influenciado por la capacidad de los padres para pagar la conexión a Internet. La investigación también mostró que los estudiantes deportistas varones obtuvieron mejores resultados académicos que las estudiantes deportistas mujeres y que los estudiantes deportistas de universidades con más semestres finalizados tenían más probabilidades de recibir calificaciones sobresalientes. Los atletas pueden ser elegibles para programas académicos especializados que tienen como objetivo ayudarlos a seguir mejorando tanto en sus esfuerzos académicos como deportivos. Como resultado, las universidades indonesias exigen el establecimiento de una organización de desarrollo de centros de tutoría para ayudar a los estudiantes deportistas. También se pueden implementar modificaciones curriculares en respuesta al tiempo asignado a los estudiantes para las actividades académicas y deportivas.
Palabras clave: Calificación académica, estrés académico, deportistas indonesios, nivel socioeconómico, logros deportivos, estudiantes deportistas.

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Introduction

The academic and sports performance of student-athletes is a keystone indicator of the implementation of the University Student Athlete supporting policies in college. Previous research on student-athletes' academic performance reveals a complex association between sports involvement and academic achievement. While higher athletic identity predicts lower GPA among football players (Bimper, 2014), a broader study across NCAA divisions found no significant differences in athletic or academic identity impacts on GPA between divisions or genders (Beron & Piquero, 2016a). Student-athletes generally perceive more benefits than drawbacks from sports involvement, reporting positive relationships between sports and academics (Porto Maciel et al., 2022). Notably, a study of Danish high school athletes found that elite athletes outperformed non-athlete peers academically when controlling for relevant factors (Storm & Eske, 2022). Although these results indicate that an intensive athletic commitment can present obstacles to academic performance, it may also develop behaviours and skills which promote academic success. Based on the specific context of the athletic involvement and the circumstances of the individual, the impact of sports on academics appears to vary. The dual responsibilities of being an athlete and a student present a challenge for student athletes in the form of academic stress. Student athlete stressors can take various forms, including sporting time, injuries, dissatisfaction with coaching style, poor academic performance, relationships with teammates, and their win-loss record (Holden et al., 2019a). Athletes that experience stress related to psychological, academic, training, or performance

concerns are more susceptible to illness and injury as well as a decline in performance (Hamlin et al., 2019). The academic role and performance of collegiate student-athletes are contentious issues with negative stereotypes. Student-athletes have been chastised for being sluggish and uninterested in their academic pursuits (Huml et al., 2019). Some studies, on the other hand, highlight the academic benefits of student-athletes and indicate that they do better than their non-athlete classmates (Menke, 2016), although they spent most of their time in training or competitions (3.9 hours per day), but rather in studies (3.2 hours per day) (Nichols et al., 2019).

Several studies have reported the contribution of gender differences in student-athlete academic. While one study found no significant gender differences in the impact of athletic identity on academic outcomes across NCAA divisions (Beron & Piquero, 2016a), another reported that female athletes contributed more to differences in GPAs and dropout rates compared to non-athletes (Lumpkin & Favor, 2012). Stereotype threat can negatively affect student-athletes' academic performance, regardless of gender (Riciputi & Erdal, 2017a). Overall, athletes tend to outperform non-athletes academically, with higher GPAs, graduation rates, and state assessment scores (Lumpkin & Favor, 2012). However, mental health issues may impact academic performance differently for athletes and non-athletes. Although athletes reported lower rates of mental health diagnoses, this difference appeared to be due to gender composition rather than athletic status. Notably, athletes sought treatment less often and reported unique academic impediments such as anxiety, sleep issues, and injuries (Edwards & Froehle, 2023).

Research on internet usage and academic performance among college students, including student athletes, has yielded various results. While some studies suggest that heavier recreational internet use correlates with impaired academic performance (Kubey et al., 2001), others find no significant relationship between general internet usage and academic outcomes (Acut et al., 2016). However, internet use for academic purposes has been positively associated with academic performance (Kubey et al., 2001). The impact of internet use on face-to-face communication skills has also been examined, with findings indicating that internet usage and student interest in university significantly predict face-to-face communication abilities (Ellore et al., 2014). Overall, the research suggests that controlled and purposeful internet use, combined with appropriate support systems, can positively influence students' academic performance and communication skills.

Numerous research has been conducted to explain the complex aspect of student-athletes' academic performance to improve our understanding of the situation. A study indicated that non-academic performance in sports faculties can adversely impact academic results, underscoring the necessity for tailored academic provisions (Nuryadi et al., 2024). In contrary, a study of teenage athletes identified significant associations between academic achievement and commitment to sports. Moreover, female athletes had better academic achievement relative to their male counterparts (Capdevila Seder et al., 2014) . These findings highlight the complex nature of student-athletes' academic achievement and the necessity of considering diverse elements in facilitating their educational and sports achievements.

There are currently few studies in Indonesia that focus on factors like the academic stress, socio economic factors, internet accessibility, gender difference that student athletes face. On the other hand, the expectations of continuing to achieve in sports must be always met. According to this context, the purpose of this study was to investigate the association between factors that may affect student athlete academic performance with their sports achievement.

Materials and Methods

Participants

The population involved in this study are student athletes came from 20 universities within sport faculties in 16 provinces in Indonesia. Sample size was measured by cross-sectional sample size formula with p (prevalence) at 30% (Lumpkin & Favor, 2012). Therefore, 166 respondents were attended this study. Respondents were taken purposively using the accidental sampling technique. The inclusion criteria set out in this study are (1) students who have completed the first year of university (2) have a minimum sports achievement at the regional championship level (3) provided their consent to be involved in the study. Meanwhile, the exclusion criteria in the study were students who currently taking an academic leave. This research procedure has received ethical approval from Universitas Gajah Mada, Indonesia with the number KE/FK/0537/EC/2021.

Measurements and Instruments

The instrument used in this study was a questionnaire distributed via Google Form, which included: (1) Respondent characteristics including age, gender, and current semester (2) Involvement in sports including sports categories (individual/ team), debut, sports achievement (none/ local, regional, national, international), and exercise duration/ frequency (3) Socioeconomic status student-athletes (PISA 2021 & OECD , 2019); (4) stress measurement instruments, including the Academic Stress Instrument which assessed by 30 statements about academic overload, interactions with colleagues, family pressure, and future perspectives (García-Ros et al., 2018), and the Perceived Stress Scale (PSS) instrument that the most widely used tool for measuring the perception of stress, with 10 items asking about feelings and thoughts during the last month (Cohen, Kamarck, Mermelstein, 1983). PSS comprises six negative (items 1,2,3,8,11 and 14) and four positive items (items 6,7,9 and 10). The total score of PSS is obtained by reversing the scores on the positive items and then summing across all the items, with a higher score indicating higher perceived stress. Validity and reliability of the instruments

were measured by previous studies (Huang, et al. 2020; García-Ros et al., 2018). Meanwhile, preliminary analyses of all simple logistic regression analyses were conducted to ensure that the normality, linearity, multicollinearity, and homoscedasticity assumptions were not needed.

Data collection and analysis

Descriptive analysis was conducted to define the characteristics of respondents. Furthermore, the chi-square bivariate test was used to determine the relationship between two categorical variables, where significant variables showed a significance value of $p < 0.05$. Moreover, a multivariate test is carried out to determine which variable met the logistic regression equation model. Logistic regression is a method of predictive analysis used when the dependent variable is categorical data with two categories (binary). The analysis was carried out using SPSS ver.22 software.

Results

Respondent Characteristic

This research was conducted from June to August 2021 and involved 166 student-athletes from 20 Sports Faculty in Indonesia. A total of 78 male athletes (47%) and 88 female athletes (53%) participated in the research. Most participants were in their second year at university. The education of the student athletes' parents, both father and mother, is described in Table 1. Student athletes' performance in various levels of competition, as well as characteristics of academic accomplishment, were also examined in this study. Table 2 outlines the various factors that impact the academic performance of student athletes. The data analysis reveals that a significant portion of student-athletes, 48.8%, participate in regional sports competitions, whilst a smaller percentage, 11.4%, competed at the international level. Moreover, over half of the participants are individual competitors, which amounts to 60.8%. Furthermore, 66.3% of them participate in training for less than 3 hours daily, whilst 66.9% train less than 5 days each week.

Table 1.
Student athlete's characteristic

Variables	N (166)	%
Age (mean+SD; min-max)	20.4±2.06	17-33
Gender		
Male	78	47
Female	88	53
Father's education		
Primary (<9 years)	45	27.1
Secondary (>9 years)	121	72.9
Mother's education		
Primary (<9 years)	66	39.8
Secondary (>9 years)	100	60.2

Table 2.
Factors Influencing Academic Performance in Student Athletes

Variables	N (166)	%
Length of study		
Second years	90	54.2
Third years	43	25.9
Four years/ more	33	19.9
Sport categories		
Individual	101	60.8
Team	65	39.2
Sports achievement		
Regional	81	48.8
National	66	39.8
International	19	11.4
Debut (mean+SD; min-max)	11.77±3.94	3-22
Exercise duration		
Low (< 3 hours)	110	66.3
High (≥ 3 hours)	56	33.7
Exercise frequency		
Low (< 5 hours)	111	66.9
High (≥ 5 hours)	55	33.1
Internet accessibility		
Rarely	14	8.4
Occasionally	31	18.7
Often	121	72.9
Perceived stress		
Moderate	109	65.7
High	65.7	34.3
Academic stress		
Moderate	127	76.5
High	39	23.5
Academic grade		
Excellent	87	47.6
Low	79	52.4

This study also examines other variables that might influenced the academic performance of student athletes. The analysis indicated that 79 students (47.59%) obtained low academic grades, whereas the remaining 87 students (52.41%) achieved excellent academic grades. Compare to those who access the internet infrequently or with difficulty, more students (72.9%) access it frequently. This study also investigated the levels of academic stress and perceived stress encountered by student athletes. As many as 34.3% of students reported experiencing a high level of perceived stress, while 23.5% reported experiencing a high level of academic stress.

Factors related to academic grades

Table 3 presents the results of a logistic regression analysis examining the relationship between various factors and academic grades. Among the variables considered, several demonstrated significant associations with academic performance. Notably, gender difference (p-value: 0.048; OR:0.495; CI 95% 0.246-0.994) is positively correlated with academic performance which is associated with better academic outcomes. Additionally, internet accessibility (p-value: 0.045; OR:1.737; CI 95% 1.014-2.976) emerged as a strong predictor, with students having access to the internet exhibiting significantly higher odds of achieving good grades compared to those without access. These findings underscore the complex interplay of factors influencing academic success and highlight the importance of considering both personal and environmental factors when investigating academic performance.

Multivariate Logistic Regression Test

The variables that fulfil the criterion (p-value<0.25) are tested in multivariate analysis. In the academic grades

of student-athletes, there are seven determining variables: gender, age, sports category, age of debut, internet accessibility, perceived stress level, and academic stress level. Data was analyzed by Multivariate logistic regression and was described in Table 4. Results from multivariate analysis showed that gender (p-value: 0.036; OR:0,487; CI 95% 0.249-0.955) and internet accessibility (p-value: 0.048; OR:1.686; CI 95% 1.004-2.831) partially had a significant correlation with academic grades of the students. The analysis is followed by changing other variables from the modelling in turn, changes in the value of the odds ratio (OR) for each variable are calculated to determine the variables that can be included in the model. If the difference in the OR value is more than 10%, subsequently the variable can be re-entered into the logistic regression modelling

Table 3.
Factors Related to Academic Grades

Variable	p-value	OR	95% C.I.for EXP(B)	
			Lower	Upper
Gender	0.048[a]*	0.495	0.246	0.994
Age	0.127[a]	0.900	0.787	1.030
Length of study	0.847	1.052	0.625	1.771
Sports achievement	0.845	1.052	0.630	1.757
Sports categories	0.100[a]	0.532	0.251	1.128
Debut	0.254[a]	1.053	0.964	1.149
Exercise duration	0.999	1.000	0.438	2.282
Exercise frequency	0.608	0.802	0.345	1.864
Father's education level	0.717	1.169	0.504	2.712
Mother's education level	0.831	0.918	0.417	2.018
Internet accessibility	0.045[a] *	1.737	1.014	2.976
Perceived stress	0.206[a]	1.577	0.778	3.193
Academic stress	0.093[a]	2.022	0.890	4.595

a: continued to multivariate analysis (p< 0.25),
*: statistically significant (p< 0.05)

Table 4.
Multivariate analysis factors related to academic grades

Variable	p-value	OR	95% C.I.for EXP(B)	
			Lower	Upper
Gender	0.036*	0.487	0.249	0.955
Age	0.056	0.905	0.817	1.003
Sports categories	0.122	0.585	0.297	1.155
Debut	0.316	1.044	0.959	1.137
Internet accessibility	0.048*	1.686	1.004	2.831
Perceived stress	0.291	1.546	0.772	3.095
Academic stress	0.073	2.020	0.937	4.354

*: statistically significant (p< 0.05)

Table 5.
Fix model of factors related to academic grades

Variable	p-value	OR	95% C.I.for EXP(B)	
			Lower	Upper
Gender	0.028*	0.483	0.253	0.923
Internet accessibility	0.058	1.649	0.984	2.764
Academic stress	0.067	2.080	0.950	4.553
Perceived stress	0.230	1.528	0.765	3.053
Model	0.014*	0.093		

*: statistically significant (p< 0.05)

Based on the final modelling, it was revealed that academic grades of student athletes were influenced by gender, internet accessibility, academic stress, and perceived stress (p=0.014). In addition, gender was partially also associated with academic grade (p-value: 0.028; OR:0.483; CI 95% 0.253-0.923). The final model from the multivariate logistic regression analysis is summarized in Table 5. The model from logistic regression analysis showed that gender significantly related to the academic grade of athlete-students. Academic grades were influenced with gender and controlled by internet accessibility, perceived stress level, and academic stress.

Discussion

The transition from high school to college may be challenging for any student, however this study reveals that athletes may face even greater stress as a result of the twin demands of athletics and academics imposed on them in university. The purpose of this study was to investigate the factors that influence the grades of student-athletes in Indonesia. According to the findings of multivariate logistic regression analysis, gender, internet accessibility, academic stress, and perceive stress, all have a statistically significant impact on student-athlete performance

Some previous studies indicated that gender significantly affects both academic outcomes and athletic engagement, with varying implications for male and female students. This relationship is dose-dependent, meaning the more teams students participate in, the better their academic outcomes and this association varies slightly across gender and grades (Chen et al., 2021). For physical education and sports undergraduate students, academic achievement is associated with gender, high school GPA, core self-evaluations, and mastery-approach achievement goal orientation (Şahin et al., 2018). While physical activity is generally associated with improved cognitive and academic outcomes in youth (Barbosa et al., 2020; Haverkamp et al., 2020). Gender differences were noted, with males and females showing different predictors of academic success.

Students' adaptability to the academic environment is another essential factor that helps them achieve higher academic and athletic performance in their subsequent college years. The findings of this study confirmed the earlier observation that the GPAs of male and female student-athletes were regularly altering and improving semester after semester (Montecalbo-Ignacio et al., 2017). Sports participation may successfully boost learning efficiency and development, as well as a greater degree of academic achievement (Certel & Kozak, 2017). A prior study likewise discovered that participation in athletics has no detrimental influence on first-year students' grade point averages or credit hours earned (McElveen & Ibele, 2019). Another finding from this study was that students who had spent time as freshmen performed better academically. It has previously been reported that freshmen athletes are more susceptible to depressive symptoms as a result of the multiple challenges that come with adjusting to college life (Wilson & Pritchard, 2005). Acclimating to a new environment, homesickness, integrating into a new team, forming connections with new teammates and coaches, and losing star-athlete status earned in high school are just a few of the obstacles that freshman college students faced (Papanikolaou et al., 2003). Many of these variables, such

as homesickness and the desire to establish connections with new coaches, may fade over time, explaining the lower ratings recorded by upperclassmen. Particular consideration should be given to the mental health of both freshmen and sophomores as they attempt to acclimate to the demands of college (Charles E. Cox et al., 2017)

For some Indonesian students, access to the internet is a privilege. Not all parents can afford to offer resources that can assist a student's learning process, such as an internet connection and computers. Parents must prepare their finances for their children's educational needs as well as living expenditures while their children attend college. In a low-middle-income country like Indonesia, parents frequently face financial challenges when it comes to supporting their children's education, particularly in terms of providing internet access. Currently, the internet is recognized as a beneficial source of knowledge for student-athletes, while some of them indicated that other sources of information were equally important in their studies (Condello et al., 2019).

The socioeconomic background of the student is one of the most critical elements in educational attainment (Rutkowski & Rutkowski, 2013). Parents' degree of education, students' educational resources, household commodities, and the quality of the learning environment may all be described as characteristics of socioeconomic status and are commonly employed as indicators of socioeconomic status (Konstantopoulos & Hedges, 2006). A household's socioeconomic level is determined by five fundamental criteria, one of which is an internet connection (Yelgün & Karaman, 2015). We discovered in our study that students who have sufficient bandwidth had a greater likelihood of getting low grades. Which found that having an internet connection at home or school, as well as having a private room at home, had a positive impact on academic attainment (Erdogdu & Erdogdu, 2015).

Parents play an essential role in supporting athletes with their academic and athletic success. The jobs of fathers were shown to be positively connected with students' academic grades in this study. This result is consistent with (Rodríguez-Hernández et al., 2020)) findings in the literature that family SES is positively correlated with academic achievement. Those from higher-income households, in particular, had a larger likelihood of academic success. A recent 2021 study found that monthly family income has a favourable influence on social capital and educational goals. Students' social capital backgrounds influenced their educational goals, allowing them to complete their university courses. (Lee et al., 2021).

Academic stress is defined as emotional anguish caused by some disappointment related to failing to achieve academic grades. There is a significant negative relationship between perceived stress and academic performance (GPA) among college student-athletes. Higher stress levels are associated with lower GPA (Holden et al., 2019b). It also includes the psychological experience of anxiety or distress as a result of a bad educational environment (Khan & Alam, 2015). In contrast, while gender influences the dynamics of academic and athletic performance, the interplay of self-efficacy, identity, and competitive success complicates the narrative, indicating that both genders face unique challenges and advantages in balancing academics and athletics (Beron & Piquero, 2016b; Riciputi & Erdal, 2017b). Student-athletes who are committed to academic activity exhibit good attributes such as content knowledge, a sense of self-esteem, improved interest and motivation, as well as a sense of personal responsibility (Nichols et al., 2019). Students with great coping techniques have demonstrated the ability to work effectively in managing school and exercise routines (Tessitore et al., 2021). Internal elements such as mentality, self-improvement drive, and student-athlete experiences are equally beneficial to university success, development, and well-being (Nichols et al., 2019). Student-athletes are subject to stress since they must satisfy their commitments as athletes as well as students. Furthermore, intellectual stress may have a greater influence on athletes than physiological exertion (Mann et al., 2016).

Several studies have proposed a way to assist student-athletes in managing stress and improving their educational attainment. Prior study mentioned that Faculty mentorship has been shown to positively influence student-athletes' academic identities, promoting a balance between their academic and athletic roles (Comeaux, 2010; Navarro, 2015). Mentorship programs also can enhance the holistic development of student-athletes, particularly in navigating sociocultural challenges (Bimper, 2017). In 2020, researchers proposed building an early intervention system based on monitoring technologies that recognize the detrimental effects of risk factors for the development of appropriate stress management strategies (Lopes Dos Santos et al., 2020). Parental education programs, as well as parent-athlete-teacher/coach engagement, were deemed critical types of assistance (Martin et al., 2018). The establishment of a mentorship centre comprised of many stakeholders, such as parents, coaches, and university sports administrators can support students who are experiencing difficulties during their educational journey (Hamlin et al., 2019).

Conclusion

This study investigates the factors that influence the grades of student-athletes in Indonesia, focusing on gender, internet accessibility, academic stress, and perceived stress. Previous studies have shown that gender significantly influences academic performance and sports participation, impacting male and female students in distinct ways. Engaging in physical activity is typically linked to enhanced cognitive and academic performance in young individuals. Gender differences were noted, with males and females showing different predictors of academic success.

Adaptability to the academic environment is crucial for students to achieve higher academic and athletic performance in their college years. Male and female student-athletes show a consistent increase in their GPAs each semester, with sports involvement enhancing learning efficiency and

academic success. However, freshmen athletes face more challenges due to adjusting to college life, such as homesickness, integrating into a new team, and losing star-athlete status. These factors may fade over time, leading to lower ratings for upperclassmen. Prioritizing the mental well-being of freshmen and sophomores is essential.

The socioeconomic background of a student significantly influences their educational success. A student's socioeconomic status is determined by factors like parental education, resources, household possessions, and the quality of the learning environment. Internet connection is a key factor in determining a household's socioeconomic status. Fathers' jobs positively impact students' academic grades, indicating that family socioeconomic status is positively correlated with academic achievement. Higher-income households have a higher likelihood of success.

Academic stress is emotional distress caused by failing to achieve academic grades. Success in university settings is influenced by personal attributes, drive for self-improvement, and athletic experiences. Ways to assist student-athletes in handling stress include parental education programs, a mentorship center, and the involvement of different stakeholders. The establishment of mentorship centers for student-athletes plays a crucial role in supporting their academic and athletic achievements. These centers provide tailored guidance, addressing the unique challenges faced by student-athletes, and fostering their dual career development. These resources provide guidance and support for students facing academic challenges.

Conflicts of Interest

The authors state that there is no conflict of interest.

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