

ANALYSIS OF THE INFLUENCE OF LINEARITY OF STUDY FIELDS ON THE SUCCESS OF STUDIES OF SCHOLARSHIP RECIPIENTS OF EDUCATION FUND MANAGEMENT INSTITUTIONS

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ARTICLE HISTORY

Received : 12-07-2026

Revised : 13-08-2026

Accepted : 17-09-2026

KEYWORDS

LPDP scholarship
academic success
field of study linearity
higher education
regression

ABSTRACT

This study examines the association between field of study linearity and the academic success of LPDP scholarship recipients, using a dataset of 17,810 alumni. The independent variables include the linearity of the study field at both cluster and sub-cluster levels. Control variables include initial GPA, marital status, age at the start of study, ranking of both the origin and destination universities, level of study, and study cluster. Academic success is measured through graduation timeliness, final GPA, and total study duration. Using binary logistic regression and linear regression analysis, the results show that linearity is significantly associated with certain aspects of academic success, particularly study duration and final GPA. For study duration, the positive regression coefficient indicates that linearity is associated with a longer study duration rather than greater efficiency. For graduation status, the estimated odds ratio and marginal effect indicate a negative association with linearity. The association at the sub-cluster level is more prominent than at the cluster level, although its direction and magnitude vary across academic outcomes. Moreover, the relationship between linearity and academic success varies by education level, scholarship type, gender, and study destination country. These findings provide empirical evidence for scholarship selection policies by indicating that the relationship between academic background alignment and subsequent academic outcomes is not uniformly positive and should therefore be considered alongside other factors in supporting Indonesia's development priorities.

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INTRODUCTION

The Golden Indonesia Vision 2045 targets Indonesia to become a developed and prosperous country through sustainable development, with a focus on improving the quality of human resources, technological innovation, and the economy. The RPJPN 2025–2045 places the development of superior human resources as a top priority, including education, health, and job skills, supported by targeted national education infrastructure and policies. One of the main strategies is the provision of scholarships through LPDP to support the younger generation to pursue higher education, both at home and abroad, in order to produce globally competitive human resources.

Higher education is the main pillar of competitive human resource development, and the government supports it through the LPDP scholarship program, part of the allocation of 20% of the education budget in the State Budget (Abdillah, 2024; Dalla & Kewuel, 2023). As a Public Service Agency under the Ministry of Finance, LPDP manages an education endowment fund to finance scholarships, research, and competency improvement programs in accordance with PMK No. 47/PMK.01/2020 and Presidential Regulation No. 111 of 2021. From 2013 to June 30, 2024, LPDP has distributed scholarships to 49,838 recipients, consisting of 23,415 General Scholarships, 13,907 Targeted, 12,258 Affirmations, and 258 Co-Funding.

Table 1. Composition of Punctuality of LPDP Alumni Graduation

Description	On Time (Amount,%)	Late (Total,%)	Total
Doctor	2.205 (50.0%)	2.204 (50.0%)	4.409
Domestic	1.571 (52.5%)	1.424 (47.5%)	2.995
Overseas	634 (44.8%)	780 (55.2%)	1.414
Magister	14.481 (78.9%)	3.864 (21.1%)	18.345
Domestic	6.861 (72.2%)	2.639 (27.8%)	9.500
Overseas	7.620 (86.2%)	1.225 (13.8%)	8.845
Specialists	305 (74.4%)	105 (25.6%)	410
Domestic	295 (73.8%)	105 (26.3%)	400
Overseas	10 (100.0%)	0 (0.0%)	10
Total Amount	16.991 (73.4%)	6.173 (26.6%)	23.164

The data in Table 1 shows that some LPDP scholarship recipients graduated beyond the scholarship contract period, so the timeliness of study completion is one of the important aspects in evaluating the success of the scholarship recipient's studies. The success of study in higher education is influenced by various factors such as academic ability, motivation, independent study skills, quality of instruction and learning environment (Rugutt & Chemosit, 2009), as well as social interaction and campus involvement (Koçak et al., 2021; York et al., 2015). The linearity between educational background and field of study is also related to students' ability to follow the academic process because the continuity of previous knowledge can support understanding of advanced fields of study (Herman & Hilton, 2017; Rugutt & Chemosit, 2005).

However, the literature referenced in this study discusses academic success more through the factors of academic ability, motivation, learning environment, student involvement, and knowledge continuity in general (Herman & Hilton, 2017; Koçak et al., 2021; Rugutt & Chemosit, 2005, 2009; York et al., 2015). The academic success outcomes discussed have also not specifically integrated the timeliness of graduation, length of study, and final GPA in the context of LPDP scholarship recipients. In addition, the linearity of the field of study has not been tested in more detail based on the degree of proximity of the scientific field, especially by distinguishing linearity at the cluster and sub-cluster levels. Thus, the scientific gap in this research does not only lie in the context of LPDP

scholarship recipients, but also in the operationalization of the linearity of the field of study at two levels of grouping and its testing of the three indicators of the success of the study.

Based on these gaps, this study aims to analyze the relationship between the linearity of the field of study and the success of the study of LPDP scholarship recipients, which is measured through the timeliness of graduation, length of study, and final GPA. Linearity was analyzed at the cluster and sub-cluster levels by considering other supporting factors such as initial GPA, marital status, age, and university ranking. Analysis was also conducted on groups based on education level, type of scholarship, gender, and study destination country to illustrate the pattern of linearity relationships in each group. However, because the analysis was carried out through sample separation, the results were used to describe the association patterns in each group and were not interpreted as formal evidence that the magnitude of the linearity relationship differed between groups without interaction testing.

Theoretical Review

The linearity of the field of study is the suitability between the educational background and the field of further study, which is considered important to deepen competence, minimize academic difficulties, and accelerate graduation and support academic careers (Attyyatullatifah & Kamayani, 2024; Moerdyanto & Nuryana, 2023). In Indonesia, this concept has become a general policy in higher education, both for advanced levels and lecturer recruitment. However, a linearity approach that is too strict can actually limit creativity and multidisciplinary perspectives (Goenner & Snaith, 2004). The provisions for linearity are regulated in the Directorate General of Higher Education Number 163/E/KPT/2022, which classifies study programs into clusters, subclusters, and study programs. In this study, the grouping is the basis for distinguishing linearity at the cluster and sub-cluster levels so that the proximity of the field of study is not treated as a uniform category.

The success of the study is understood as the achievement of academic goals through perseverance, adaptability, and effective scientific research. Institutional factors such as the campus mission that are implemented clearly also affect student success (Beckwith, 2023; Bolli et al., 2015; Kezar & Kinzie, 2006). In this study, the study success indicators include the timeliness of graduation, the length of study, and the final GPA (Decree of the Director General of Higher Education Number 163/E/KPT/2022 concerning the Names of Study Programs in the Type of Academic Education and Professional Education, 2022). Specifically for the LPDP program, the success of the study is measured based on the suitability of the graduation time with the scholarship contract and the study completion report of each awardee. Thus, the relationship between the linearity of the field of study and the success of the study was analyzed through these three indicators, while analysis based on educational level, type of scholarship, gender, and country of destination was used to look at patterns within each group and not as a basis for concluding differences between groups without formal interaction testing.

METHOD

This study examines the relationship between the linearity of the field of study and the success of the study of LPDP scholarship recipients, which is measured through the accuracy of graduation, length of study, and final GPA. Linearity is comprehensively analyzed at the level of the cluster and subcluster of the field of study to determine the extent of the suitability of the field of study related to the academic achievement of the scholarship recipient.

Based on the objectives of the study, the hypothesis tested is formulated as follows: H1: the linearity of the field of study at the cluster level has a significant relationship with the accuracy of the graduation of LPDP scholarship recipients; H2: the linearity of the field of study at the subcluster level has a significant relationship with the accuracy of the graduation of LPDP scholarship recipients; H3: the linearity of the field of study at the cluster level has a significant relationship with the length of study of LPDP scholarship recipients; H4: the linearity of the field of study at the subcluster level has a significant relationship with the length of study of LPDP scholarship recipients; H5: the linearity of the field of study at the cluster level has a significant relationship with the final GPA of LPDP scholarship

recipients. The hypothesis was formulated to test the relationship of linearity at the two levels of grouping of fields of study to each of the study success indicators.

Because it involves different *characteristics of outcome data*, two analysis methods were used. The relationship between linearity and graduation accuracy was analyzed using logistic regression, appropriate for binary variables (Ardiansyahroni et al., 2023). Meanwhile, the relationship with study length and GPA was measured by linear regression because both variables are continuous. The combination of this method was used to provide a comprehensive picture of the relationship between the linearity of the field of study and the success of the study of LPDP scholarship recipients. The model of study cluster linearity and study subcluster linearity on study success is formulated as follows:

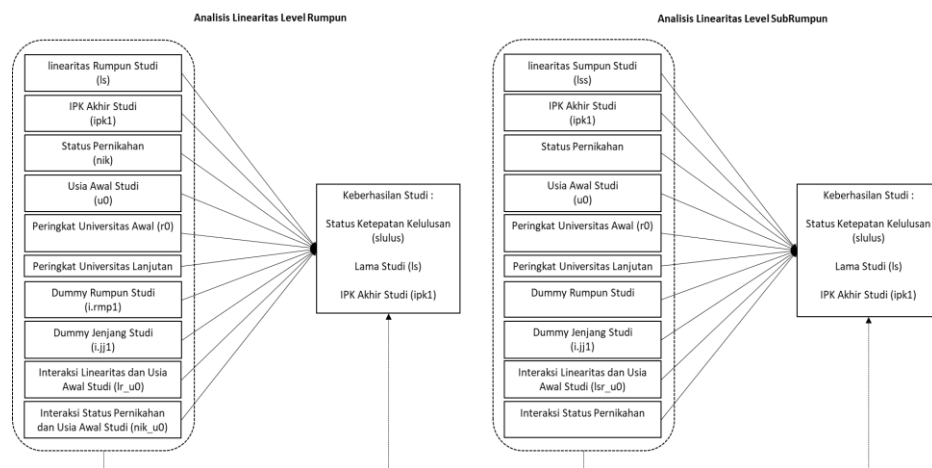


Figure 1. Mathematical Model of Research.

RESULT AND DISCUSSIONS

This research went through *the data preparation stage* to ensure data quality, starting with cleaning from duplication and missing data. Of the 23,164 alumni data, there were 17,810 data that were worth analysis, classified based on the type of scholarship program, education level, gender, and destination country. The data was converted to an analysis format, including the transformation of qualitative variables into numerical. The variables used included numerical such as length of study, initial and final GPA, age of early study, and university ranking, and categorical variables to enrich the context of the analysis. Descriptive statistics were presented to describe the characteristics of the data as a whole.

Table 2. Statistical Description of Study Success Data

Variable	Remarks	Mi n	Ma x	Mea n	p50	SD
Outcome - Approval Status (slulus)	Category	bins	-	1	0,737	1
	1 = Pass on time = 13,130 (73,72)*			2		0,44
	0 = Inaccurate Pass = 4.680(26.28%)					02
Variables - Length of Study (ls)	Continuous	Numeric	1	26	4,513	4
Study	Number of Study Semesters			3		2,31
						67

y	Final	Study	GPA	Continuous Numeric	1	4	3,489	4	0,43
Succ	(GPA1)						8		06
ess									
Varia	Clump	Linearity		Category	bins	-	1	0,546	1
ble	(lr)			1 = linear = 9.730 (54,63%)*			3		0,49
Inter				0= non-linear =8.080 (54.63%)					79
est -	Subcluster	Linearity		Category	bins	-	1	0,425	-
Linea	(lrs)			1 = linear = 10.241 (57,50%)*			0		0,49
arity				0= non-linear = 7.569 (42.50%)					44
of the									
Field									
of									
Stud									
y									
Varia	Initial Study	GPA (GPA		Continuous Numeric	2	4	3,548	4	0,26
ble	0)						4		80
Contr	Marital Status (nik)			Category	bins	-	1	0,117	-
ol				1 = nikah = 2.085 (11,71%)*			1		0,32
				0= unmarried = 15,725 (88.29%)					15
	Early Age of Study (u0)			Continuous Numeric	20	50	27,65	26	4,60
				Year Number			64		30
	Early University			Continuous Numeric	0	3.22	83,51	12	243,
	Ranking (r0)					5	82		088
	Advanced University			Continuous Numeric	1	12.0	694,2	561	1.11
	Ranking (r1)					14	22		0,09
	Clump Variable (rmp1)			Categorical	1	1	19	8,15	7
				18 types of clusters of fields of study				35	
	Education Level (jj1)			3 Categorical consisting of Masters, Doctors, Specialist Doctors	1	1	3	1,89	2
								15	
	Linearity and Early Age of Study (lr_u0)			Numerik	0	0	50	15,0	23
				Multiplying between lr and u0				50	
	Marital status and age (nik_u0)			Numerik	0	0	50	11,6	0
				Multiplication between nik and u0				46	

The data obtained were analyzed to estimate the relationship between the linearity of the field of study and the success of the scholarship recipient's studies, which was measured through graduation status, length of study, and final GPA. Graduation status was analyzed by logistic regression because it was binary, while study length and GPA were analyzed using linear regression. All models were tested through diagnostic tests such as normality, multicollinearity, heteroscedasticity, and autocorrelation to ensure statistical feasibility. After that, various regression models were compared to determine the best model in explaining the influence of the linearity of the field of study on study success, the results of which are presented in Table 3 below.

Table 3. Intervariable Regression Modeling

Outcomes	Predictors	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
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Approval Status	Clump Linearity	0.9981 (0.0343)	0.9912 (0.0342)	0.9811 (0.0342)	0.9966 (0.035)	0.9938 (0.0382)	0.6373 ** (0.1387)
	Pseudo R	0.0053	0.0152	0.03	0.0367	0.0887	0.0891
	Linearity of Sub Clumps	0.8373 *** (0.0289)	0.8367 *** (0.029)	0.8177 *** (0.0287)	0.8414 *** (0.0297)	0.8765 *** (0.0339)	0.6031 *** (0.1311)
	Pseudo R	0.0066	0.0164	0.0315	0.0379	0.0893	0.0896
Length of Study	Clump Linearity	0.2638 *** (0.0349)	0.2628 *** (0.0349)	0.2901 *** (0.0321)	0.2646 *** (0.0319)	0.1312 *** (0.0265)	1.0154 *** (0.1517)
	Pseudo R	0.0033	0.0034	0.1577	0.171	0.4989	0.5035
	Linearity of Sub Clumps	0.274 *** (0.0351)	0.274 *** (0.0351)	0.3328 *** (0.0323)	0.2875 *** (0.0322)	0.1884 *** (0.0267)	0.876 *** (0.152)
	Pseudo R	0.0035	0.0037	0.1588	0.1715	0.4996	0.5039
Final IP	Clump Linearity	0.0357 *** (0.0064)	0.034 *** (0.0064)	0.0064 ** (0.0000)	0.0299 *** (0.0064)	0.0398 *** (0.0067)	0.0537 (0.0387)
	Pseudo R	0.0212	0.0355	0.0358	0.0454	0.0622	0.0635
	Linearity of Sub Clumps	0.0533 *** (0.0065)	0.0534 *** (0.0064)	0.0529 *** (0.0064)	0.0459 *** (0.0064)	0.058 *** (0.0068)	0.0565 (0.0388)
	Pseudo R	0.0232	0.0377	0.0379	0.0469	0.0642	0.0655
	obs	17810	17810	17810	17810	17810	17810
Control:							
	Initial GPA	YES	YES	YES	YES	YES	YES
	Marital Status	NO	YES	YES	YES	YES	YES
	Early Age of Study	NO	NO	YES	YES	YES	YES
	Ranking of Universities of Origin	NO	NO	NO	YES	YES	YES
	Destination University Rankings	NO	NO	NO	YES	YES	YES
	I.c.	NO	NO	NO	NO	YES	YES
	i. Level of education	NO	NO	NO	NO	YES	YES

Linearity * age	NO	NO	NO	NO	NO	YES
Age * Marital Status	NO	NO	NO	NO	NO	YES

In Model 1, regression was carried out with the main variables of the linearity of the field of study at the clump and subclan level as well as the control of previous GPA, the results showed that the linearity of the subclump was not significant to on-time graduation, while the linearity of the clump had no effect at all. The length of study and the final GPA were significantly influenced by linearity at both levels ($p \leq 0.01$). Because Model 1 was not optimal, control variables were added gradually from Model 2 to Model 6, including marital status, initial GPA, university rank, dummy clump/subclum/level, to the interaction of linearity and age. As a result, Model 6 was most significant for the length of study ($p \leq 0.01$), significant enough for graduation ($p \leq 0.05$), but not for final GPA ($p > 0.1$). Based on the AIC and BIC criteria (Vandekerckhove et al., 2015), Model 6 was selected as the best model for graduation and length of study, while Model 5 was more suitable for final GPA due to the balance between model fit and efficiency.

Research Discussion

This study estimated the influence of linearity of the field of study on graduation status, length of study, and final GPA. For graduation, the results of the Model 6 logistic regression showed that the linearity of the field of study had a significant effect, with an odds ratio of 0.6373 at the cluster level, meaning that non-linear students had a 36.27% lower chance of graduating on time. The marginal effect, linearity increased the probability of graduation by 7.77%. (Wollast et al., 2018)

Table 4. Results of Linearity Regression of Study Fields to Graduation Status

Approval Status					
	Clump			Subrumpun	
	Logistic Regression	Effect	Model	Logistic Regression	Effect Model
		6			6
Linearitas	0.6373 ** (0.1387)	-0.0777 ** (0.0375)		0.6031 *** (0.1311)	-0.0872 ** (0.0374)
Variable Control					
Initial GPA	1.9961 *** (0.1387)	0.1192 *** (0.0119)		2.025 *** (0.1407)	0.1216 *** (0.0119)
Marital Status	1.0741 (0.4912)	0.0123 (0.0789)		1.0373 (0.4734)	0.0063 (0.0787)
Early Age of Study	0.9961 (0.0067)	-0.0007 (0.0012)		0.9981 (0.0063)	-0.0003 (0.0011)
Ranking of Universities of Origin	0.9999 (0.0001)	0.0000 (0.0000)		0.9999 (0.0001)	0.0000 – (0.0000)
Destination University Rankings	0.9999 *** (0.0000)	0.0000 *** (0.0000)		0.9999 *** (0.0000)	0.0000 *** (0.0000)
I.c.	YES	YES		YES	YES
i. Level of education	YES	YES		YES	YES
Linearity * age	1.0161 ** (0.0079)	0.0028 ** (0.0013)		1.0135 * (0.0078)	0.0023 * (0.0013)

Age * Marital Status	1.0277 *	0.0047 *	1.0291 **	0.0049 **
	(0.0144)	(0.0024)	(0.0144)	(0.0024)

The results of the logistic regression and marginal effect analysis showed that the linearity of the field of study had a significant effect on on-time graduation. At the cluster level, non-linear students had a 36.27% lower chance of graduating on time, while linearity increased the probability of graduation by 7.77%. This effect was stronger at the subcluster level, with a 39.69% decrease in the chance of graduation for non-linear, and an 8.72% increase for linear ones. These findings are in line with previous studies that affirmed the importance of linearity in predicting graduation. In the context of LPDP, linearity at both levels has been shown to increase study success, so the evaluation of linearity policies needs to consider students' academic backgrounds, interests, and ages to support optimal academic achievement. (Dickson et al., 2020) (Al-Haddad et al., 2018; Creighton, 2007; Nieuwoudt, 2023)

Table 5. Results of Linearity Regression of Study Fields to Study Length

Length of Study		
	Clump	Subrumpun
Linearitas	1.0154 *** (0.1517)	0.876 *** (0.152)
Variable Control		
Initial GPA	0.2928 *** (0.0483)	0.2845 *** (0.0482)
Marital Status	2.8433 *** (0.2757)	2.9024 *** (0.2753)
Early Age of Study	0.0555 *** (0.0047)	0.0496 *** (0.0044)
Ranking of Universities of Origin	0.0002 *** (0.0001)	0.0002 *** (0.0001)
Destination University Rankings	0.0001 *** (0.0000)	0.0001 *** (0.0000)
I.c.	YES	YES
i. Level of education	YES	YES
Linearity * age	-0.0319 *** (0.0054)	-0.0247 *** (0.0054)
Age * Marital Status	-0.0948 *** (0.0087)	-0.0969 *** (0.0086)

The results of the Model 6 regression showed that the linearity of the field of study had a significant effect in accelerating the length of study of the scholarship recipients, both at the cluster (coefficient of 1.0154) and subcluster (0.876) levels with $p < 0.001$, in line with the findings, and the academic integration theory of Tinto (1993) which emphasized the role of study continuity in facilitating academic adaptation; however, this influence weakened when combined with age and marital status factors, which showed the importance of considering demographic variables in the selection policy and study support by LPDP and universities. Belouiza et al. (2024) (Galvao et al., 2024)

Table 6. Results of Linearity Regression of the Field of Study on the Final GPA

Final GPA		
	Clump	Subrumpun

Linearitas	0.0398 *** (0.0067)	0.058 *** (0.0068)
Variable Control		
Initial GPA	0.2175 *** (0.0123)	0.2161 *** (0.0123)
Marital Status	0.1463 *** (0.0107)	0.146 *** (0.0107)
Early Age of Study	0.0036 *** (0.0009)	0.0038 *** (0.0009)
Ranking of Universities of Origin	0.000 (0.000)	0.000 (0.000)
Destination University Rankings	0.000 *** (0.000)	0.000 *** (0.000)
I. Clumps	YES	YES
i. Level of education	YES	YES

The regression results showed that the linearity of the field of study, both at the cluster and subcluster levels, had a significant effect on the final GPA of LPDP scholarship recipients, where the linearity coefficient of the subcluster (0.058) was higher than that of the cluster (0.0398), indicating that the continuity of more specific fields of study contributed more to academic achievement. Students with linear studies tended to have a stronger knowledge base, were more adaptable, and had higher motivation, while non-linearity could lower motivation and academic performance. These findings are in line with the importance of considering linearity in scholarship selection and management, where LPDP can improve academic success through assessment of suitability of fields of study and provide additional support for non-linear students. This policy includes tutoring, academic evaluation, and cooperation with partner universities, to ensure excellent graduates and contribute to the development of national human resources. (Banks & Dohy, 2019; Denning & Turner, 2024; Malik et al., 2016)

Table 7. Description of Education Level

Jenjang	Freq.	Percent	How.	lr=0	lr=1	lrs=0	lrs=1
Doctor	2.291	12,86	12,86	991	1.300	1.200	1.091
Magister	15.161	85,13	97,99	7.043	8.118	8.822	6.339
Specialist Doctor	358	2,01	100	46	312	219	139
Total	17.810	100		8.080	9.730	10.241	7.569

The data separation step aims to enrich the analysis by revealing the influence of linearity at each level of education in more detail, so that specific patterns hidden in the combined analysis can be identified. This approach is in line with best practices in regression analysis, where segregation by relevant categories, such as education level, helps to produce more accurate and contextual findings. Using Model 6 as the main model and applying regression according to the dimensions of study success, this analysis is expected to provide a solid basis for data-driven decision-making, especially regarding the timeliness of scholarship recipients' graduation. (Ardiansyahroni et al., 2023)

The results of the regression analysis of the linearity of the field of study on the timeliness status of study graduation by level of education showed that the linearity of the study cluster had a significant effect on the accuracy of graduation of master's level students, but not at the doctoral and specialist levels, while the linearity of subclusters was not significant at all levels. Master's students who took linear studies tended to graduate faster because they had a strong knowledge base and access to relevant academic support. On the other hand, at the doctoral and specialist levels, the accuracy of graduation was more influenced by work experience, high motivation, and focus on independent

research than the alignment of previous fields of study. Subcluster linearity was considered to have no significant effect due to the flexibility of the postgraduate curriculum and the focus on individual student goals. Other factors such as motivation, financial support, and individual characteristics also play an important role in the accuracy of graduation, so further studies are needed to expand understanding of this dynamic. (Braxton, 2019; Wollast et al., 2018) (Bolli et al., 2015; Braxton, 2019; Creighton, 2007; Dickson et al., 2020)

The application of Model 6 linear regression to data per level of education shows that the linearity of the field of study has a significant effect on the length of study of LPDP scholarship recipients, with the strongest influence at the Doctoral level (coefficients of 1.4428 and 1.3305, $p < 10\%$) and Master's (0.3868 and 0.434, $p < 5\%$), while at the Specialist level the results are mixed, with large positive (11.6027, $p < 1\%$) and negative (-4.3282, $p < 10\%$) coefficients indicating the complexity of the impact. The interaction of linearity with age was not significant in the Master's degree, but was significantly negative in the Doctoral (-0.0438 and -0.0393, $p < 5\%$) and very significant in the Specialist (-0.3765, $p < 1\%$), indicating that the older the initial age of study, the less the impact of the acceleration of linearity. In addition, marital status and university rank also affect the length of study; students from highly-ranked universities tend to graduate faster at the Master's and Doctoral levels, while highly-ranked destination universities actually extend their studies at the Doctoral and Specialist levels.

The results of estimating the influence of the linearity of the field of study on the final GPA of LPDP scholarship recipients at the master's, doctoral, and specialist levels showed that the linearity of the field of study had a significant effect on the final GPA of LPDP scholarship recipients at the Master's level (coefficients of 0.0379 and 0.0574, $p < 1\%$) and Doctoral (0.0566 and 0.0553), where the suitability of the field of study with the previous academic background was positively correlated with academic achievement; meanwhile, at the Specialist level, the effect was inconsistent—one model showed a negative coefficient that was not significant (-0.1313), while the other model showed a significant positive influence (0.0817, $p < 10\%$). In general, the linearity of the field of study has more impact on increasing the final GPA at the Master's and Doctoral levels, while at the Specialist level, other factors such as initial GPA, marital status, early age of study, and university ranking are likely to be more dominant in determining academic achievement.

To deepen the analysis, after regression on the overall data and per level of education, the researcher also separated the data by type of scholarship program and analyzed them separately using the same model as before; the description of the data by Scholarship Program is shown in the following table.

Table 8. Data Description by Scholarship Type

Types of Scholarships	Freq.	Percent	How.	lr = 0	lr = 1	lsr = 0	lsr = 1
General	10.339	58,05	58,05	4.928	5.411	2.099	2.281
Targeted	3.091	17,36	75,41	1.424	1.667	1.828	1.263
Affirmation	4.380	24,59	100	1.728	2.652	2.099	2.281
Total	17.810	100					

The separation of data by type of scholarship program is crucial in research because each scholarship program has different selection criteria, objectives, and support. By separating the data, researchers can identify how the linearity of the field of study affects academic success in the context of each scholarship program. This allows researchers to provide more targeted policy recommendations.

The results of the analysis of the influence of the linearity of the field of study on the graduation status of LPDP scholarship recipients based on the type of scholarship showed that the majority of LPDP scholarship recipients came from the General (58.05%), followed by Affirmation (24.59%) and Targeted (17.36%). The results of the

analysis revealed that the linearity of the study field group had a significant effect on graduation in the General (odds ratio 1.7429, $p < 10\%$) and Affirmation (odds ratio 2.5643), but not significantly in the Targeted group (odds ratio 1.2762). Overall, the linearity of the field of study contributed positively to graduation in the General and Affirmation scholarships, while in the Targeted, other factors such as initial GPA and age played a role, so that these findings can be used as a basis for formulating scholarship selection and development policies in the future.

Table 9. The Effect of Linearity of Study Fields on the Study Length of LPDP Scholarship Recipients Based on the Type of Scholarship

Length of Study												
Variabel	General				Targeted Group				Affirmation			
	Clump		Subrumpu n		Clump		Subrumpu n		Clump		Subrumpun	
Linearitas	-0.1525 (0.3028)		0.1071 (0.3085)		1.0174 (0.576)	*	0.6929 (0.5826)		-0.7379 (0.347)	**	-0.4435 (0.346)	
Control:												
Initial GPA	0.8936 (0.0791)	***	0.8913 (0.079)	***	0.0459 (0.1607)		-0.0041 (0.1603)		0.418 (0.098)	***	0.4235 (0.098)	***
Marital Status	4.2146 (0.8765)	***	4.2359 (0.8759)	***	3.6386 (0.6494)	***	3.809 (0.6473)	***	1.2703 (0.5525)	**	1.1346 (0.5543)	**
Early Age of Study	0.2242 (0.0083)	***	0.23 (0.0074)	***	0.2607 (0.0132)	***	0.2503 (0.0124)	***	0.0917 (0.0109)	***	0.0991 (0.0103)	***
Ranking of Universities of Origin	-0.0008 (0.0001)	***	-0.0008 (0.0001)	***	0.0004 (0.0001)	***	0.0004 (0.0001)	***	-0.0002 (0.0001)	***	-0.0002 (0.0001)	***
Destination University Rankings	0.0003 (0.000)	***	0.0003 (0.000)	***	0.0001 (0.000)	***	0.0001 (0.000)	**	0.0001 (0.000)	***	0.0001 (0.000)	***
I.Subcluster	YES		YES		YES		YES		YES		YES	
i. Level of education	YES		YES		YES		YES		YES		YES	
Linearity * age	0.0182 (0.0111)		0.0102 (0.0114)		-0.0337 (0.0173)	*	-0.0131 (0.0174)		0.0336 (0.0134)	**	0.022 (0.0134)	
Age * Marital Status	-0.1671 (0.0294)	***	-0.168 (0.0294)	***	-0.1483 (0.0194)	***	-0.1541 (0.0193)	***	-0.0465 (0.0186)	**	-0.0414 (0.0187)	**

The results of the Model 6 linear regression estimation (Table 9) show that the influence of the linearity of the field of study on the length of study of LPDP scholarship recipients varies according to the type of scholarship: in general scholarships, linearity has no significant effect; in targeted scholarships, the linearity of the cluster is positively related to the duration of study (coefficient of 1.0174, significant 10%); while in affirmation scholarships, the linearity of the cluster has a significant negative effect on the length of study (coefficient -0.7379, significant 5%), indicating higher study efficiency for those whose fields of study are linear. These findings provide important input for scholarship managers in developing selection policies and academic assistance based on the characteristics of scholarship recipients.

Table 10. The Effect of Linearity of Study Fields on the Final GPA of LPDP Scholarship Recipients Based on Scholarship Type

Final GPA									
Variabel	Magister			Doctor			Specialists		
	Clump	Subrumpun		Clump	Subrumpun		Clump	Subrumpun	
Linearitas	0.0124 (0.0091)	0.0301 (0.0093)	***	0.0565 (0.016)	0.0737 (0.0155)	***	0.0124 (0.0091)	0.0301 (0.0093)	***
Variable Control									
Initial GPA	0.1569 *** (0.016)	0.1555 *** (0.016)	***	0.1685 *** (0.026)	0.1679 *** (0.0259)	***	0.1569 *** (0.016)	0.1555 *** (0.016)	***
Marital Status	0.1438 *** (0.0191)	0.1442 *** (0.0191)	***	0.1249 *** (0.0147)	0.1251 *** (0.0147)	***	0.1438 *** (0.0191)	0.1442 *** (0.0191)	***
Early Age of Study	-0.0099 *** (0.0012)	-0.0099 *** (0.0012)	***	0.0056 *** (0.0015)	0.0054 *** (0.0015)	***	-0.0099 *** (0.0012)	-0.0099 *** (0.0012)	***
Ranking of Universities of Origin	0.000 (0.000)	0.000 (0.000)		-0.0001 *** (0.000)	-0.0001 *** (0.000)	***	0.000 (0.000)	0.000 (0.000)	
Destination University Rankings	0.000 *** (0.000)	0.000 *** (0.000)	***	0.000 *** (0.000)	0.000 *** (0.000)	***	0.000 *** (0.000)	0.000 *** (0.000)	***
I.c.	YES	YES		YES	YES		YES	YES	
i. Level of education	YES	YES		YES	YES		YES	YES	

The results of the estimation in Table 10 show that the influence of linearity of the field of study on the final GPA of LPDP scholarship recipients varies according to the level of education and the level of suitability; at the Masters and Specialists, linearity at the cluster level is not significant, but significantly positive at the subcluster level (coefficient 0.0301, $p < 0.01$), while at the doctoral level, linearity at both the cluster level (0.0565) and subcluster (0.0737) has a significant positive effect ($p < 0.01$), indicating that the continuity of the field of study, especially at a more specific level, contributes to better academic achievement, especially at the higher education level.

The separation of data by gender is important in educational research because men and women face different academic challenges; it helps to identify the influence of factors such as the linearity of the field of study and social support on the success of the study, as well as allow for the formulation of more specific and effective policies for each group. (Nieuwoudt, 2023)

Table 11. Description of data by gender

Gender	Freq.	Percent	How.	lr = 0	lr = 1	lsr = 1	lsr = 0
Male Male	8,183	45.95	45.95	3930	4.253	4.815	3.368
Women	9,627	54.05	100	4150	5.477	5.426	4.201
Total	17,810	100					

Using separate data per gender, Model 6 was implemented on the STATA application, both at the cluster and subcluster levels. The results of the regression of the linearity of the field of study on the status of the accuracy of graduation by gender showed that the effect of linearity of the field of study on the accuracy of graduation differed by gender; in men, linearity did not have a significant effect on on-time graduation, while in women, linearity at both the

cluster and subcluster levels had a significant positive effect, although the coefficient became negative in the effect model but remained significant. These findings indicate that women are more sensitive to the suitability of the field of study in completing studies on time than men, so it is important to consider the factor of linearity in the academic planning of scholarship recipients, especially for the female group.

Table 12. Results of Linearity Regression of Study Fields to Study Duration by Gender

Length of Study								
Variabel	Laki				Women			
	Clump		Subrumpun		Clump		Subrumpun	
Linearitas	0.9838 (0.2285)	***	0.9131 (0.2307)	***	1.0381 (0.2058)	***	0.8535 (0.2035)	***
Variable Control								
Initial GPA	0.3102 (0.0707)	***	0.3019 (0.0706)	***	0.2766 (0.0665)	***	0.2673 (0.0664)	***
Marital Status	2.7003 (0.4251)	***	2.7253 (0.4246)	***	3.0171 (0.3616)	***	3.1038 (0.3608)	***
Early Age of Study	0.0544 (0.0068)	***	0.0502 (0.0064)	***	0.0566 (0.0067)	***	0.0491 (0.0061)	***
Ranking of Universities of Origin	0.0001 (0.0001)	**	0.0001 (0.0001)	**	0.0003 (0.0001)	***	0.0003 (0.0001)	***
Destination University Rankings	0.0001 (0.000)	***	0.0001 (0.000)	***	0.0001 (0.000)	***	0.0001 (0.000)	***
I.c.	YES		YES		YES		YES	
i. Level of education	YES		YES		YES		YES	
Linearity * age	-0.0297 (0.008)	***	-0.0249 (0.0081)	***	-0.0338 (0.0075)	***	-0.0249 (0.0074)	***
Age * Marital Status	-0.0871 (0.0133)	***	-0.0881 (0.0132)	***	-0.1039 (0.0114)	***	-0.1069 (0.0114)	***

The results of the linear regression in Table 12 show that the linearity of the field of study has a significant effect on the length of study of LPDP scholarship recipients, both men and women, with a significance level of 1% in all categories. For men, the linearity coefficient of the field of study is 0.9838 (cluster) and 0.9131 (subcluster), while for women it is 1.0381 (cluster) and 0.8535 (subcluster), indicating that the more linear the field of study chosen, the longer the duration of study tends to be longer. The impact of this linearity is slightly greater in women, which indicates that the suitability of the field of study affects the duration of women's studies more than men's.

Table 13. Results of Linearity Regression of Study Fields to Final Study GPA by Gender

Final GPA								
Variabel	Male Male				Women			
	Clump		Subrumpun		Clump		Subrumpun	
Linearitas	0.0342 (0.0098)	***	0.0561 (0.0101)	***	0.0462 (0.0093)	***	0.0598 (0.0092)	***
Variable Control								
Initial GPA	0.211 (0.0173)	***	0.2087 (0.0173)	***	0.2263 (0.0175)	***	0.2259 (0.0175)	***

Marital Status	0.116 (0.0149)	***	0.1158 (0.0149)	***	0.173 (0.0154)	***	0.1727 (0.0154)	***
Early Age of Study	0.0041 (0.0013)	***	0.0042 (0.0013)	***	0.0027 (0.0013)	**	0.0028 (0.0013)	**
Ranking of Universities of Origin	0.000 (0.000)		0.000 (0.000)		0.000 (0.000)		0.000 (0.000)	
Destination University Rankings	0.000 (0.000)		0.000 (0.000)		0.000 (0.000)		0.000 (0.000)	
I.c.	appendix		appendix		appendix		appendix	
i. Level of education	appendix		appendix		appendix		appendix	

The regression results in Table 13 show that the linearity of the field of study has a significant effect on the final GPA of LPDP scholarship recipients, both in men and women, with significant coefficients at the cluster and subcluster levels (1%). The more linear the field of study chosen, the higher the final GPA obtained, with a greater influence on women than men. These findings confirm that the suitability of the field of study with previous academic background plays an important role in academic achievement, especially for women. Separating data based on domestic and foreign study objectives is important because differences in educational characteristics and policies affect learning outcomes, student experience, and policies implemented, thus allowing for in-depth analysis and the preparation of more effective educational strategies and according to the needs of each program.

Table 14. Data Description by Study Objectives

Study Objectives	Freq.	Percent	How.	lr = 0	lr = 1	lsr = 1	lsr = 0
Domestic	8,684	48.76	48.76	3114	5.570	4.066	4.619
Overseas	9,126	51.24	100	4966	4.160	6.175	2.951
Total	17,810	100					

With the application of Model 6 as the selected model, the results of the regression of the linearity of the field of study on the accuracy status of graduates by the study destination country showed that the linearity of the field of study had no significant effect on the status of graduation, both in the domestic and foreign study objectives, although the logistic regression coefficient and the effect model showed variation. However, there was a significant influence on the interaction between linearity and early age of study in the domestic group, indicating that the initial age of study could strengthen the influence of linearity on graduation, while in the overseas group this interaction was not significant.

Table 15. Results of Linearity Regression of Study Fields on the Length of Study Accuracy of Graduates Based on Study Destination Countries

Length of Study							
Variabel	Domestic				Overseas		
	Clump		Subrumpun		Clump	Subrumpun	
Linearitas	0.3595 (0.1618)	**	0.3425 (0.1572)	**	0.1531 (0.2601)	0.0033 (0.2781)	
Control:							
Initial GPA	-0.3313 (0.0573)	***	-0.3366 (0.0573)	***	0.4642 (0.072)	0.4649 (0.0719)	***
Marital Status	2.9191 (0.2721)	***	2.9301 (0.2719)	***	0.2166 (0.5669)	0.1925 (0.5675)	

Early Age of Study	0.0333 (0.0055)	***	0.0312 (0.0051)	***	0.0471 (0.0073)	***	0.0447 (0.0067)	***
Ranking of Universities of Origin	0.0001 (0.000)		0.0001 (0.000)		0.000 (0.0001)		0.000 (0.0001)	
Destination University Rankings	0 *** (0.000)		0 *** (0.000)		0.0004 (0.0001)	***	0.000 (0.000)	
I. Clumps	YES		YES		YES		YES	
i. Level of education	YES		YES		YES		YES	
Linearity * age	-0.0149 (0.0057)	***	-0.0135 (0.0055)	**	-0.0044 (0.0094)		0.0024 (0.0101)	
Age * Marital Status	-0.1044 (0.0084)	***	-0.1049 (0.0084)	***	0.0005 (0.0184)		0.0013 (0.0184)	

The regression results showed that the linearity of the field of study had a significant effect on the length of study in the domestic study destination group, both at the clump (coefficient 0.3595) and subcluster (0.3425) levels, both of which were significant at the level of 5%. On the other hand, in the foreign group, the effect of linearity was not significant. The interaction with the early age of the study was also only significant in the domestic group (coefficient -0.0149), indicating that the influence of linearity decreased with increasing the age of the initial study. Overall, the linearity of the field of study had more effect on the length of study in the country than abroad.

Table 16. Results of Linearity Regression of Study Fields to Final GPA of Accuracy Study Based on Study Destination Country

Length of Study							
Variabel	Domestic				Overseas		
	Clump		Subrumpun		Clump		Subrumpun
Linearitas	0.0335 (0.0089)	***	0.0338 (0.0085)	***	-0.0269 (0.0094)	***	-0.0147 (0.0103)
Control							
Initial GPA	0.21 *** (0.0163)		0.21 *** (0.0163)		0.1647 (0.017)	***	0.1636 (0.017)
Marital Status	0.1328 (0.0127)	***	0.1337 (0.0127)	***	0.0603 (0.0166)	***	0.0603 (0.0166)
Early Age of Study	0.0014 (0.0012)		0.0014 (0.0012)		0.0002 (0.0014)		0.0002 (0.0014)
Ranking of Universities of Origin	-0.0001 (0.000)	***	-0.0001 (0.000)	***	-0.0001 (0.000)	***	-0.0001 (0.000)
Destination University Rankings	0.000 ** (0.000)		0.000 ** (0.000)		0.000 ** (0.000)		0.000 ** (0.000)
I.Subcluster	YES		YES		YES		YES
i. Level of education	YES		YES		YES		YES

The regression results showed that the linearity of the field of study had a positive and significant effect on the final GPA in domestic graduates, both at the cluster level (coefficient 0.0335) and subcluster (0.0338), both of which were significant at the 1% level. On the other hand, in foreign graduates, the influence of linearity at the cluster level was negative and significant (coefficient -0.0269), while at the subcluster level was not significant. These

findings show that the linearity of the field of study tends to increase the final GPA in the country, but can decrease the GPA abroad, indicating that the domestic education context is more supportive of the benefits of study linearity.

CONCLUSION

The linearity of the field of study shows a diverse relationship with the success of the study of LPDP scholarship recipients. In the timeliness of graduation, linearity indicates the direction of a negative relationship, while in the study duration the positive coefficient shows that linearity is related to a longer study duration, not accelerating the completion of the study. In the final GPA, linearity shows a positive relationship, with the coefficient at the subcluster level being greater than that of the cluster. Thus, the results of the study do not show that linearity consistently strengthens all study success indicators, but shows different relationships according to the success indicators used.

Analysis based on education level, gender, type of scholarship, and country goals showed variations in the pattern of linearity relationships in each group. However, because the analysis was conducted through sample separation and did not use formal interaction testing, the difference in coefficients and significance between groups could not be directly interpreted as evidence that the linearity relationship was statistically different between groups. This study was also limited to the variables available in LPDP alumni data so that it did not include other factors, such as academic motivation, social support, work experience, study program characteristics, and individual conditions during education, which may be related to the success of the study.

Based on these findings, the linearity of the field of study needs to be considered carefully and is not used as the only basis in assessing the potential success of the scholarship recipient's studies because the direction of the relationship is different in each academic indicator. The next study is recommended to conduct a formal interaction test to test the possible role of the level of education, gender, type of scholarship, and study objectives as a moderator, as well as to include other academic and non-academic factors. For LPDP, the results of this study can be considered to place the suitability of the field of study with academic indicators and other characteristics of scholarship recipients in the selection process and management of study support.

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