




Exploring the relationship between demographic characteristics, academic procrastination, social support, and academic performance among open distance learning students: A random forest analysis

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ABSTRACT

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This study explored the relationship between demographic characteristics, academic procrastination, social support and academic performance among Open Distance Learning (ODL) students using a random forest approach. The study employed a quantitative research approach. The study participants consisted of 315 students from an ODL institution in Nigeria. The study used adapted scales to measure procrastination and social support and a self-reported performance scale to measure academic performance. Data were analyzed using chi-square analysis for classification while R-studio was used to fit a random forest model to classify and predict the study's constructs. Results of the study revealed a significant relationship between academic performance and age. Similarly, gender has a significant influence on academic performance. Marital status significantly impacted academic performance, procrastination, and social support. Furthermore, it was revealed that programme level influences academic performance. Employment status was found to influence procrastination tendencies. Lastly, students with lower procrastination and higher social support achieved better academic performance. This study underscored the need for ODL institutions to implement demographic-specific support programmes focusing on procrastination reduction, time management skills, and robust social support networks. These can help enhance academic performance and address the diverse challenges faced by ODL students.

Contribution/Originality: The study explored the interrelationships among demographic characteristics, academic procrastination, social support and academic performance among Open Distance Learning (ODL) students in Nigeria. The study contributes to existing literature by utilizing the random forest machine learning approach to classify and predict the interrelationships among the study's constructs. This approach provided a unique perspective for analyzing a complex dataset, especially in an ODL context.

1. INTRODUCTION

In recent years, Open and Distance Learning (ODL) has emerged as a significant educational modality, offering flexible learning opportunities and catering to a diverse student population who may have limited access to traditional formal education systems (Itasanmi, Oni, & Adelere, 2020; Mohamed & Victor, 2012). ODL refers to any learning activities within formal, informal and non-formal domains supported by information and communication

technologies that aim to bridge physical and psychological distances, enhancing interactivity and communication among learners, learning resources and facilitators (Yetik, Ozdamar, & Bozkurt, 2020). It is more cost-effective and can be pursued while maintaining full-time employment (Magaji & Adelabu, 2012). ODL provides access to programmes that would otherwise be unavailable for those living in remote areas (Mhishi, Bhukuvhani, & Sana, 2012). This mode of education is especially vital in developing countries where access to traditional educational institutions is often limited (Itasanmi et al., 2020; Mhishi et al., 2012). However, the success of ODL students depends on several factors including their time management skills and willingness to seek support when necessary (Ahmad, Mohd Khairi, Hassanuddin, Mamat, & Rosly, 2023). Academic procrastination which has been considered a failure of self-regulation directly impacts these success factors (Ucar, Bozkurt, & Zawacki-richter, 2021).

Academic procrastination refers to the tendency of students to delay or postpone academic tasks such as studying for an exam, doing homework or writing an essay despite being aware of the need to complete these tasks by a specific deadline (González-Brignardello, Sánchez-Elvira Paniagua, & López-González, 2023). It is particularly characterized by the intentional delay of tasks despite knowing the potential negative consequences and this has become a common issue among students especially ODL students (Ucar et al., 2021). ODL provides an opportunity for students to attend classes and review lessons at their convenience. However, they lack in-person peer contact and a structured environment with a set routine. This can affect students particularly those with present-biased preferences causing them to skip assignments and postpone tasks that require effort (De Paola, Gioia, & Scoppa, 2023). This can significantly impact their academic performance. Understanding the predictors and correlates of academic procrastination in ODL settings becomes essential for institutions to develop effective interventions that will help students overcome procrastination and enhance their educational success.

Social support, encompassing emotional, informational and instrumental assistance plays a critical role in students' academic success (Mishra, 2020). Social support refers to the sense of being valued, respected, cared for, and loved by the people in one's life (Gurung, 2010). This support can come from various sources, including family, friends, teachers, the community or any social groups to which the student belongs. It may take the form of tangible assistance from others or perceived social support which reflects an individual's confidence in the availability of adequate support when needed (Roohafza et al., 2014). Studies have indicated that social isolation can be a significant challenge for ODL students leading to feelings of loneliness, decreased motivation and increased stress (Badruesham, Hasan, Nikman, Ismail, & Muhamad Arib, 2023; Izham, Anuar, & Khairuddin, 2022; Nawi, Yusof, Kamaludin, & Sain, 2021). According to Nair, Bhatia, Kumar AV, Pothakani, and Benedict (2024), students who perceive higher levels of social support often experience lower levels of stress, anxiety and depression. It has been observed that the lack of in-person interaction with peers and teachers within the ODL context can exacerbate the feeling of social isolation making it difficult for students to stay engaged and committed to their studies with a consequential effect on their academic performance (National University, 2021). The importance of social support for ODL students cannot be overemphasized. Social support mitigates the adverse effects of procrastination by providing the necessary encouragement and resources to stay on track contributing to better academic performance and a more positive learning experience for ODL students (Madjid, Sutoyo, & Shodiq, 2021; Yang, Zhu, & Hu, 2023).

Several studies have examined procrastination tendencies (Cheng & Xie, 2021; De Paola et al., 2023; Klingsieck, Fries, Horz, & Hofer, 2012; Pulist, 2018; Ucar et al., 2021) perceived social support (Huang et al., 2022; Selvarani, 2011; Sulistyorini & Roswiyani, 2021) and factors associated with academic performance (Dadigamuwa & Senanayake, 2012; Oladejo & Onyeagbako, 2017; Rajadurai, Alias, Jaaffar, & Hanafi, 2018; Venter et al., 2011; Zamri, Omar, Anwar, & Fatzel, 2021) of ODL students worldwide. No study has attempted to explore the relationship between academic procrastination, social support and academic performance among ODL students especially in a developing country like Nigeria. Additionally, it is believed that demographic characteristics such as age, gender, employment status and programme level may influence ODL students' procrastination behaviours,

the availability or perception of social support and academic performance. Thus, this study explores the intricate relationships between demographic characteristics, academic procrastination, social support, and academic performance among ODL students.

This research seeks to identify key predictors and provide insights into how these factors collectively influence the academic outcomes of ODL students using random forest analysis, a robust machine learning technique capable of handling complex interactions and non-linear relationships (Vigneau, Courcoux, Symoneaux, Guérin, & Villière, 2018). This is expected to help not only by contributing to the existing body of knowledge but also by addressing the unique challenges faced by ODL students in developing countries. The findings of the study inform policy and practice, offering guidance on how to enhance academic support structures and improve student performance in ODL environments.

2. LITERATURE REVIEW

2.1. Social Support and Academic Procrastination

The impact of social support on academic procrastination has continued to be a subject of considerable research interest among scholars, practitioners and educationists with findings consistently highlighting the significant role that social support plays in mitigating procrastination tendencies among students. Studies by Al-Rosyid (2018), Sari and Fakhruddiana (2019); Maulidia and Usman (2019); Madjid et al. (2021) and Li (2023) have shown that social support is a valuable resource for students struggling with procrastination as it equips them with coping mechanisms to manage academic workload and resist procrastination. For instance, Madjid et al. (2021) conducted a study examining the effects of social support and resilience on students' academic procrastination. The study found social support to reduce the level of academic procrastination among the students. The researcher suggested that fostering social support among the students buffers against academic stress and challenges that often contribute to procrastination behaviours. Similarly, Li (2023) explores the relationship between social support and academic procrastination among high school students. His findings revealed a significant negative relationship between perceived social support and procrastination tendencies. The researcher suggests a need for students to recognize the importance of a social support system in helping them adjust their self-perceptions to fully engage in the learning process, thereby reducing the inclination to procrastinate. Moreover, Al-Rosyid (2018) explored the effect of self-efficacy and perceived social support on the academic procrastination of students. He found that students' academic procrastination reduces when perceived social support increases. The researcher suggested that students' family members, friends and relatives should endeavor to provide support and motivation that will allow them to stay on track with their academic responsibilities and prevent academic procrastination.

2.2. Social Support and Academic Performance

Social support holds significant importance in students' lives and serves as a cornerstone for academic success. Scholars have posited that social support plays a pivotal role in promoting students' learning and perseverance thereby impacting their academic performance (Dupont, Galand, & Nils, 2015). Extensive existing research on the effect of social support on academic performance has shown the significant and positive impact that social support has on students' academic performance. For example, a study by Apeh and Nteh (2020) investigated how social support affects high school students' academic achievement. The researcher observed that social support had a significant impact on the academic performance of students. They proposed encouraging parents, teachers, classmates, and friends to maintain and enhance their support for students through activities such as seminars, workshops and the distribution of educational materials to improve students' academic performance. Similarly, Yasin and Dzulkifli (2011) explored the relationship between social support and academic performance among undergraduate students. The study found a significant and positive relationship between social support and the academic performance of the students. Therefore, they emphasized the need for teachers to realize that students'

academic performance is influenced not only by academic factors but also by the social support they receive from people around them. Furthermore, research by Saeed, Ahmed, Rahman, and Sleman (2023) investigated the relationship between social support and academic achievement with an exploration of the mediating role of self-esteem in the relationship. The research findings revealed that social support positively impacts academic performance by enhancing self-esteem. They advocated concerted efforts by stakeholders in the education sector to increase perceived social support from family and friends during learning activities in pursuit of students' academic success. Moreover, a qualitative study conducted by Kunateh Abubakar (2021) established the relationship between social support and the academic performance of students in a developing country and revealed that social support enhances students' mental health which boosts their cognitive engagement in learning activities, thus influencing their academic success. Therefore, he suggested that education stakeholders such as teachers, policymakers, parents and the government should consider providing adequate psychosocial needs that could enhance students' academic performance.

2.3. Academic Procrastination and Academic Performance

Procrastination and its effects on academic outcomes have become an interesting research subject worldwide as the prevalence of academic procrastination among students continues to grow (Kim & Seo, 2015). According to O'Brien (2000) and Özer, Demir, and Ferrari (2009) over 80% and at least half of all students engage in procrastination particularly when it comes to completing assignments and studying for examinations (Ahmed, Bernhardt, & Shivappa, 2023). A significant number of empirical studies exist examining the relationship between procrastination and academic performance. However, the results have largely been inconsistent. Some studies including Rotenstein, Davis, and Tatum (2009); Jiao, DaRos-Voseles, Collins, and Onwuegbuzie (2011); Lakshminarayan, Potdar, and Reddy (2013); Kim and Seo (2015); Goroshit (2018) and Jones and Blankenship (2021) found a negative impact of procrastination on students' academic performance. Some writers (Calonia, Doller, March, Velle, & Mojado, 2023; Janssen, 2015) found no significant relationship. Yet, a study by Schraw, Wadkins, and Olafson (2007) reported a positive impact of academic procrastination on academic performance. Generally, the inconsistencies in the findings related to the relationship between procrastination and academic performance remain unclear, thereby making it difficult to have a unified conclusion on the subject matter.

2.4. Demographic Characteristics, Academic Procrastination, Social Support and Academic Performance

The demographic dynamics in students' academic procrastination, social support and academic performance have been widely studied and results have often indicated a complex interaction that significantly affects educational outcomes. Research has consistently shown that demographic factors such as age, gender and marital status can influence academic procrastination tendencies, the availability and effectiveness of social support and ultimately, academic performance (He, 2017; Khan, Arif, Noor, & Muneer, 2014; Prezza & Giuseppina Pacilli, 2002). However, the results of these studies have shown a mixed picture of the influence of demographic characteristics on academic procrastination, social support and academic performance. For example, Khan et al. (2014) and He (2017) found a significant difference in academic procrastination among students based on age and gender. Tavakoli (2013) found no age and gender difference in academic procrastination among students. Similarly, Vaux (1985) and Prezza and Giuseppina Pacilli (2002) revealed in their studies that the availability and effectiveness of perceived social support vary based on age, gender and marital status. Their study suggests that young adults, female and married tend to receive more social support than older, male and single people. Furthermore, Tabassum and Akhter (2020) found a significant difference in students' academic performance based on gender and employment status. Adaeze and Chukwu (2022) found no significant gender difference in students' academic performance.

2.5. Research Gap

Extensive research has been conducted on the interrelationships among demographic characteristics, academic procrastination, social support and academic performance. However, the majority of the existing studies largely focused on traditional, on-campus students with limited attention to ODL students. ODL students often feel isolated as a result of a lack of direct peer and teacher support and usually face difficulties in self-regulation and time management (Kirmizi, 2013). Therefore, research is needed to understand the interrelationships within the ODL context especially in a developing country like Nigeria. Moreover, there is a dearth of studies on how demographic characteristics such as age, gender, marital status, employment status and programme level influence academic procrastination, social support and academic performance among ODL students. Lastly, the existing studies are majorly correlational and qualitative while there is a gap in employing advanced quantitative methods like random forest analysis that could provide a better understanding of the complex interactions among the study's constructs. Therefore, this study presents an opportunity to address these gaps and contribute not only to the theoretical understanding of the study's constructs in an ODL context but also to practically support ODL institutions and policymakers in enhancing academic success through targeted support systems and intervention strategies for ODL students in the country.

3. METHODOLOGY

3.1. Research Design

This study adopted a quantitative research approach to explore the relationship between demographic characteristics, academic procrastination and social support among ODL students in Nigeria. This approach is considered appropriate because it allows the researcher to collect large data that can be quantitatively analyzed. This will help to identify trends and levels of association among the study's variables.

Table 1. Demographic distribution of participants.

Variables	Freq.	Percentage
Age		
16-20	113	35.9
21-25	55	17.5
26-30	40	12.7
31-35	33	10.5
36-40	33	10.5
41-45	21	6.7
46-50	13	4.1
51-55	4	1.3
56-60	2	0.6
61 % above	1	0.3
Gender		
Male	148	47
Female	167	53
Marital status		
Single	208	66
Married	101	32.1
Divorced/ Widowed	6	1.9
Employment status		
Employed	135	42.9
Self-employed	111	35.2
Unemployed	69	21.9
Programme level		
100	88	27.9
200	88	27.9
300	37	11.7
400	40	12.7
500	62	19.7

3.2. Research Population

The population of this study consists of ODL students in Nigerian universities. However, ODL students in the University of Ibadan Distance Learning Centre are the target population for this study. 315 ODL students from the Distance Learning Centre, University of Ibadan participated in the study. A demographic analysis of the participants' biodata indicates that over one-quarter (35.9%) are in the age range of 16-20. The majority (53%) are female. Similarly, 66% of the ODL students are single and about half (42.9%) are employed. Similarly, 100- and 200-level students constituted the majority of the participants with 55.8% (27.9% respectively for 100 and 200). Table 1 presents the demographic distribution of the participants.

3.3. Instrument

The academic procrastination of the students was measured using adapted items from the *Turkman Procrastination Scale* (Tuckman, 1991) while the social support domain was measured using *the Multidimensional Scale of Perceived Social Support* developed by Zimet, Dahlem, Zimet, and Farley (1988). The two scales were anchored on a five-point Likert-type scale (strongly disagree=1, strongly agree=5). The current study calculated Cronbach's alpha reliability coefficient for the procrastination and social support scales to be .69 and .72 respectively which were considered acceptable. Students were categorized as low (<50) and high (>50) based on their total score on the scales. Regarding academic performance, a self-reported performance scale (first class, second class upper, second class lower, third class and pass) was presented to the student and they were asked to indicate their current result category (see Appendix 1 for the research instrument).

3.4. Research Procedure

The data for this study was collected through an online survey administered in the 2021-2022 academic session. The researcher got the approval of the management of the Distance Learning Centre of the University and an invitation email highlighting the objectives of the study. The link to participate in the study was sent to all registered students. Participants were informed that participation in the survey was voluntary and assurance was given as regards the confidentiality of the information they provided. The data collection period spans from December 1, 2022 to February 31st, 2023.

3.5. Method of Data Analysis

This study utilized SPSS and R software to analyse the data collected for the study. Specifically, SPSS was used for data coding and chi-square analysis for the classification of relationships among demographic characteristics, academic procrastination, social support and academic performance. R-studio was applied to fit a random forest model that classified and predicted academic performance with the demographic characteristics, academic procrastination and social support in the model. The random forest predictive model adopted for this study was specified as follows:

Academic performance (AP) = f(demographic characteristics, academic procrastination and social support).

AP = f(x_i) where x_i are the predictor variables such as demographic characteristics, academic procrastination, and social support while AP is the academic performance which is the dependent or outcome variable.

Age of the participants were categorized as young adult (<=30), middle-aged adult (31-50) and old adult (>=51).

4. RESULT

Table 2 shows that the predicted academic performance category of the students under study is classified correctly with a prediction accuracy of 92.51% and an error rate of less than 7% which indicates that the specified random forest model is adequate for the data.

Table 2. Model confusion matrix.

Academic performance	First class	Pass	Second class (Lower division)	Second class (Upper division)	Third class	Class error
First class	65	0	0	0	0	0.00
Second class (Lower division)	5	0	3	0	0	1.00
Second class (Upper division)	0	0	40	0	0	0.00
Third class	0	0	0	106	0	0.00
Pass	0	0	0	6	2	0.75

Note: Type of random forest: classification; number of trees: 500; no. of variables tried at each split: 3; OOB estimate of error rate: 6.17%; accuracy: 0.9251.

Figure 1 shows the visualization of the variables in the random forest model. It was revealed in the figure that low procrastination contributes to higher academic performance. Moreover, a high social support level contributes to higher academic performance. The demographic variables' contribution pattern was also indicated in the model variable graph.

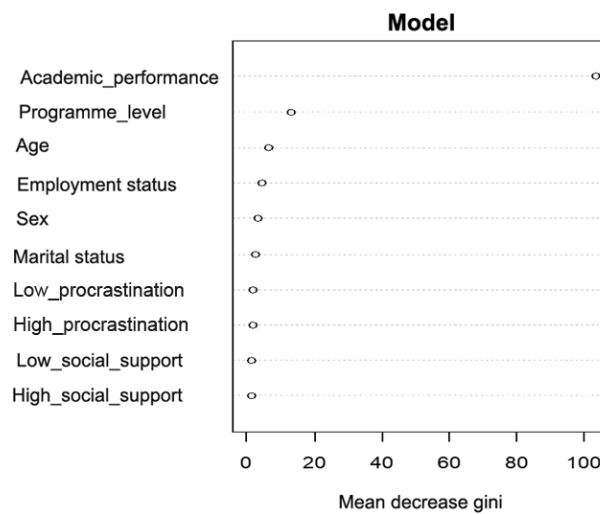


Figure 1. Visualizing the importance of variables to the model.

Figure 2 is the random forest model plot demonstrating the fact that the model has a minimal error rate that makes it reliable for data classification and prediction.

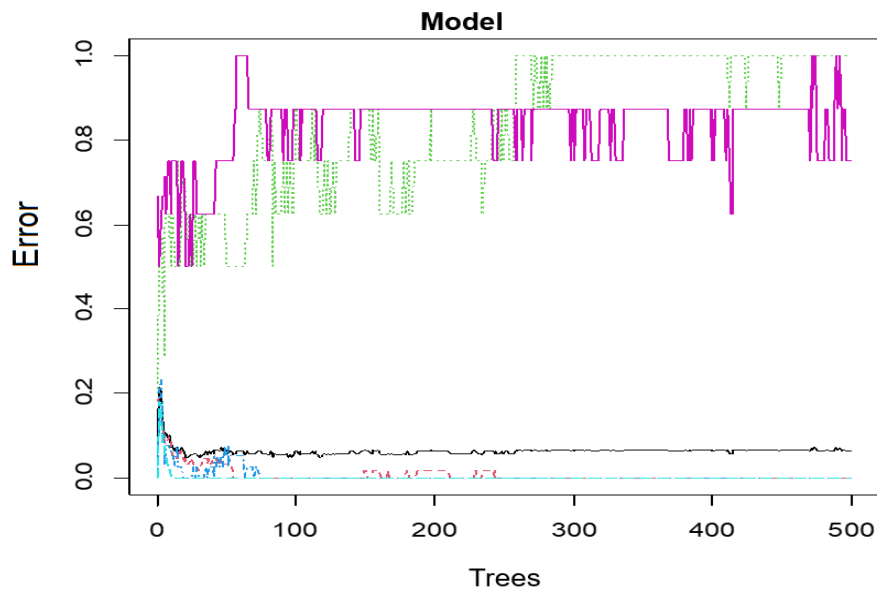


Figure 2. Model plot.

Tables 3 and 4 show the train and test variable classifications respectively with the train variable higher than the test variable which implies adequacy as the train data is expected to be greater than the test data. Meanwhile, the $p\text{-value} < 0.05$ for both train and test variables suggests that the random forest is statistically significant and this suggests a significant relationship between academic performance, academic procrastination and demographic variables.

Table 3. Prediction by train variable.

Academic performance	First class	Pass	Second class (Lower division)	Second class (Upper division)	Third class
First class	65	0	0	0	0
Pass	0	8	0	0	0
Second class (Lower division)	0	0	40	0	0
Second class (Upper division)	0	0	0	106	0
Third class	0	0	0	0	8

Note: Accuracy: 1; 95% CI: (0.9839, 1); No information rate: 0.467; P-value [Acc > NIR]: < 2.2e-16; Kappa: 1.

Table 4. Prediction by test variable.

Academic performance	First class	Pass	Second class (Lower division)	Second class (Upper division)	Third class
First class	30	3	0	0	0
Pass	0	1	0	0	0
Second class (Division)	0	0	15	0	0
Second class (Upper division)	0	0	0	32	3
Third class	0	0	0	0	4

Note: Accuracy: 0.9318; 95% CI: (0.8575, 0.9746); No information rate: 0.3636; P-value [Acc > NIR]: < 2.2e-16; Kappa: 0.9018.

Table 5. Demographic factors and academic performance of ODL students.

Variables	Academic performance					Chi-square value	P value
	First class	Second class (Upper division)	Second class (Lower division)	Third class	Pass		
Age							
<=30	57	61	17	1	7	26.001	0.011
31-50	28	57	29	11	4		
>=51	10	20	9	3	1		
Gender							
Male	36	61	36	10	5	13.581	0.009
Female	59	77	19	5	7		
Marital status							
Single	73	93	27	6	9	18.556	0.017
Married	21	42	27	8	3		
Divorced / separated/ widowed	1	3	1	1	0		
Programme level							
100L	52	25	5	1	5	81.532	0
200L	28	41	15	3	1		
300L	6	21	8	1	1		
400L	2	26	8	2	2		
500L	7	25	19	8	3		
Employment status							
Employed	37	57	29	9	3	11.807	0.16
Unemployed	24	24	14	3	4		
Self-Employed	34	57	12	3	5		

Table 5 revealed that ODL students' academic performance is significantly associated with age group (young adults (≤ 30), middle-aged adults (31-50) and old adults (≥ 51) ($P = 0.011 < 0.05$ gender ($P = 0.009 < 0.05$), marital status ($P = 0.017 < 0.05$) and programme level ($P = 0 < 0.05$). However, Table 5 shows that the academic performance of the ODL students is not significantly associated with employment status ($P = 0.16 > 0.05$).

Table 6 shows that ODL students' academic procrastination is significantly associated with age ($P = 0.007 < 0.05$), marital status ($P = 0.003 < 0.05$) and employment status ($P = 0.024 < 0.05$). However, their academic procrastination is not significantly associated with gender ($P = 0.283 > 0.05$), and programme level ($P = 0.545 > 0.05$).

Table 6. Demographic factors and academic procrastination of ODL students.

Variables	Academic procrastination		Chi-square value	P value
	Low	High		
Age			9.874	0.007
≤ 30	77	66		
31-50	93	36		
≥ 51	25	18		
Gender			1.153	0.283
Male	87	61		
Female	108	59		
Marital status			11.543	0.003
Single	115	93		
Married	76	25		
Divorced / separated/ widowed	4	2		
Programme level			3.079	0.545
100L	56	32		
200L	49	39		
300L	23	14		
400L	24	16		
500L	43	19		
Employment status			7.427	0.024
Employed	89	46		
Unemployed	33	36		
Self-employed	73	38		

Table 7. Demographic factors and social support.

Variables	Social support		Chi-square value	P value
	Low	High		
Age			2.033	0.362
≤ 30	21	122		
31-50	19	110		
≥ 51	10	33		
Gender			1.940	0.164
Male	28	120		
Female	22	145		
Marital status			18.930	0
Single	39	169		
Married	7	94		
Divorced / separated/ widowed	4	2		
Programme level			7.235	0.124
100l	20	68		
200l	14	74		
300l	7	30		
400l	3	37		
500l	6	56		
Employment status			2.413	0.299
Employed	25	110		
Unemployed	7	62		
Self-employed	18	93		

Table 7 revealed that ODL students' social support was significantly influenced by their marital status ($P = 0 < 0.05$). Singles have higher social support than married and divorced/separated/widowed students. Age ($P = 0.362 > 0.05$), gender ($P = 0.164 > 0.05$), programme level ($P = 0.124 > 0.05$) and employment status ($P = 0.299 > 0.05$) have no significant influence on the perceived social support of the students.

Table 8 shows clearly in the classification that students with low procrastination have higher academic performance with first-class and second-class upper and lower division compared with students with high procrastination.

Table 8. Relationship between academic performance and academic procrastination.

Variables		Academic procrastination		Total
		Low	High	
Academic performance	First class	64	31	95
	Second class (Upper division)	86	52	138
	Second class (Lower division)	32	23	55
	Third class	8	7	15
	Pass	5	7	12
Total		195	120	315
Chi-square tests				
	Value	Df	Asymptotic significance (2-sided)	—
Pearson chi-square	4.087	4	0.394	—

Table 9 shows that students with high social support have higher academic performance in first class and second class compared with students with lower social support.

Table 9. Relationship between academic performance and social support.

Variables		Social support		Total
		Low	High	
Academic performance	First class	14	81	95
	Second class (Upper division)	20	118	138
	Second class (Lower division)	12	43	55
	Third class	2	13	15
	Pass	2	10	12
Total		50	265	315
Chi-square tests				
	Value	df	Asymptotic significance (2-sided)	—
Pearson chi-square	1.823	4	0.768	—

5. DISCUSSION

This study explored the relationship between demographic characteristics, academic procrastination, social support, and academic performance among ODL students using a random forest approach. Results of the study revealed that ODL students' academic performance and academic procrastination were significantly associated with their age. The result indicated that young adults perform better academically. However, they procrastinate more than middle-aged and older adults. This result is consistent with the findings of Pellizzari and Billari (2012) and Khan et al. (2014) but inconsistent with Akkaya (2007) and Dixson, Worrell, Olszewski-Kubilius, and Subotnik (2016) who found age not to be a contributor to academic procrastination and performance respectively. However, this result corroborates the assertion made by Steel and Ferrari (2013); Svartdal et al. (2016) and He (2017) that as

age increases, students' procrastination tends to decrease. This result could be attributed to differences in cognitive abilities, technological proficiency, involvement in extracurricular activities and family and work commitments. According to the researchers' perspective, young adults tend to have higher cognitive abilities such as memory and problem-solving skills and are generally more technologically proficient which can enhance their academic performance compared to middle-aged and older adults. Conversely, young adults are more involved in social activities and other non-academic pursuits with low time management skills which can lead to procrastination. Unlike middle-aged and older adult' students who juggle family and work responsibilities along with academics. This might reduce their time for academic tasks but necessitate better planning and less procrastination.

Results also revealed that the academic performance of the ODL students is significantly dependent on their gender as the academic performance of females is higher than that of males. This result is consistent with the findings of similar studies (Khwaileh & Zaza, 2011; Ngozi, 2011; Parajuli & Thapa, 2017). However, the result is in contrast with the research findings of Oladejo and Onyeagbako (2017) and Adekunle, Seyi, and Falilat (2020) who found no significant gender difference in academic performance among ODL students in Nigeria.

The study indicated a significant influence of marital status on ODL students' academic performance, academic procrastination, and social support. The findings regarding academic performance aligned with previous research by Nasu (2018); Aboderin and Govender (2019) and Aboderin and Govender (2023) suggesting a relationship between marital status and academic performance among ODL students. Similarly, the relationship between marital status and social support corroborated prior work by Prezza and Giuseppina Pacilli (2002). However, the study's finding that marital status influences procrastination tendencies among ODL students contradicts existing research by Asgari, Bolbolian, Sefidi, and Zadeh (2021) and Lu, He, and Tan (2022) which found no significant impact of marital status on student procrastination. Specifically, the study revealed that single students perform better academically and procrastinate more than married and divorced students while having higher social support. The researchers attribute these results to several factors. Single students might have more time to dedicate to their studies leading to better academic performance. However, they also exhibit higher levels of procrastination, potentially due to a lack of the structure and accountability that marriage or cohabitation can provide. Additionally, according to Kim and Seo (2015) single students may have larger social support networks compared to their married or divorced peers. On the other hand, married or divorced ODL students may face competing priorities due to family commitments or the stress of divorce which can impact their academic focus. Despite these challenges, a stronger sense of urgency to succeed (driven by career advancement or personal fulfilment) might lead the married to procrastinate less than single students (Krause & Freund, 2014). However, their social support networks might be smaller compared to those of single students.

Furthermore, the academic performance of students significantly depends on their programme level with the chances of obtaining a first-class grade being higher at the 100 level compared to other levels. This finding suggests that students entering ODL programmes often exhibit high levels of enthusiasm and motivation. Prior knowledge helps students revisit concepts and knowledge areas from their previous education, potentially enhancing their academic performance and increasing their chances of achieving a first-class grade at the 100 level. However, as students' progress in the programme, the coursework becomes more complex and demanding. Advanced levels involve a cumulative increase in academic workload including more challenging courses, project work, and research requirements. This heightened difficulty can make it harder for ODL students to balance their responsibilities potentially impacting their academic performance.

Academic procrastination depends on students' employment status. Employed students showed both the lowest and highest levels of procrastination compared to unemployed and self-employed students, reflecting the diverse challenges they face in the ODL context. Those in flexible and supportive work environments manage academic responsibilities effectively leading to lower procrastination. In contrast, students in demanding and inflexible jobs struggle more resulting in higher procrastination. Self-employed students may experience disruptions due to the

unpredictable nature of their work while having greater control over their schedules. Unemployed students may face financial stress and uncertainty that affects their motivation and increases procrastination despite having more time to study. Thus, employment status significantly influences academic procrastination among ODL students shaped by the specific demands and flexibility of their work conditions.

Lastly, the study indicates that students with low procrastination and higher social support achieve higher academic performance with more students obtaining first-class and second-class upper and lower-division grades compared to those with high procrastination and low social support. This result aligns with previous studies (Achdiyah, Latipun, & Yuniardi, 2023; Akinsola, Tella, & Tella, 2007; Cerezo, Esteban, Sánchez-Santillán, & Núñez, 2017; Kim & Seo, 2015; Lakshminarayan et al., 2013; Mishra, 2020; Song, Bong, Lee, & Kim, 2015; Tinajero, Martínez-López, Rodríguez, & Páramo, 2020; Ucar et al., 2021). According to researchers' perspectives, students who exhibit low levels of procrastination are typically good at time management, setting priorities, and adhering to study schedules. This disciplined approach enables them to complete assignments on time, prepare thoroughly for exams, and engage deeply with their coursework, leading to higher academic performance (Hailikari, Katajavuori, & Asikainen, 2021). Similarly, students with robust social support systems receive emotional encouragement, practical help and academic assistance from family and friends. This high level of support can mitigate the stress of academic challenges, providing a buffer that enhances their ability to cope and achieve academic success (Mishra, 2020). Conversely, students who procrastinate heavily are more likely to experience stress, incomplete assignments and poor preparation for exams leading to poor performance (Gadosey, Schnettler, Scheunemann, Fries, & Grunschel, 2021). Additionally, students who lack a strong support network may feel isolated and miss the emotional and practical assistance needed to navigate academic challenges. The absence of encouragement and accountability can decrease motivation negatively impacting their performance (Stadtfeld, Vörös, Elmer, Boda, & Raabe, 2019).

6. CONCLUSION

The current study offers significant insight into the relationship between demographic characteristics, academic procrastination, social support, and academic performance among ODL students in Nigeria. The results of the study highlight the complex interplay among the study variables emphasizing that demographic factors (age, gender, marital status, programme level and employment status) are critical factors influencing students' learning outcomes in the ODL context. Specifically, this study underscored the need for ODL institutions to implement demographic-specific support programmes that will focus on procrastination reduction, time management skills, career counselling, family support services, flexible scheduling, and robust social support networks. This can help enhance academic performance and address the diverse challenges faced by ODL students.

6.1. Suggestion

The following are suggested based on the results of the study:

1. ODL institutions should implement support programs tailored to the needs of different age groups. Programmes for young students should focus on procrastination reduction and time management skills, while older students should receive career counselling and support for balancing academic and personal responsibilities.
2. ODL institutions should develop and implement initiatives such as gender-specific advising and inclusive practices to address the needs of both male and female students.
3. Stakeholders should introduce flexible scheduling, childcare support, family counselling services, and online support networks to cater to the unique needs of students based on their marital status.
4. ODL institutions should ensure a gradual increase in coursework complexity and provide continuous support to help students transition smoothly through different program levels.

6.2. Limitations and Suggestions for Further Studies

This study involved 315 ODL students from the Distance Learning Centre, University of Ibadan. While the study's findings offer valuable insights, they may not be easily generalizable to other ODL institutions in Nigeria or other developing countries due to variations in institutional structures and student demographics. Expanding the study to include multiple ODL institutions across different regions of Nigeria and other developing countries would enhance the generalizability of the findings and allow for comparative analyses. This study employed a cross-sectional design capturing data at a single point in time and relying on self-reported measures for academic performance and procrastination. These self-reported measures may be subject to social desirability bias or inaccuracies in self-assessment. Future research should adopt a longitudinal design to track changes in academic procrastination, social support, and academic performance over time. This approach would allow for a better understanding of causality and the dynamics of these relationships. Additionally, the current study utilized only a quantitative approach. Future studies should complement quantitative data with qualitative methods such as interviews or focus groups. This mixed-method approach would provide richer, contextual insights into the experiences of ODL students particularly regarding their struggles with procrastination and the types of social support they find most beneficial.

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Transparency: The authors declare that the manuscript is honest, truthful and transparent, that no important aspects of the study have been omitted and that all deviations from the planned study have been made clear. This study followed all rules of writing ethics.

Competing Interests: The authors declare that they have no competing interests.

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APPENDIX

Appendix 1 presents the modified scale used in measuring academic procrastination.

Appendix 1. Academic procrastination.

S/N	Items	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
	I needlessly delay completing my academic assignments until the last minute					
	Whenever I make study plans, I hardly keep to it					
	I get easily distracted by other, more fun things when I am supposed to work on my academic work					
	I always delay studying for exams until the exam approaches					
	I am an incurable time waster when it comes to academic activities generally					
	I postpone meeting with my instructor or academic advisor for support					
	I manage to find an excuse for not attending classes, especially during the interactive sessions					
	I manage to find an excuse for not attending classes, especially during the interactive sessions					
	I delay making tough academic decisions					
	When academic exercise proves too challenging to tackle, I believe in postponing it					
	I don't feel moved when colleagues are looking for additional materials to complement our course manuals					
	I am not a library enthusiast. I don't feel comfortable using the library					

Appendix 2 presents the modified scale used in measuring social support.

Appendix 2. Social support.

S/N	Items	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
	There is a special person who is around when I am in need.					
	There is a special person with whom I can share my joys and sorrows					
	My family tries to help me.					
	I get the emotional help and support I need from my family					
	I have a special person who is a real source of comfort to me					
	My friends try to help					
	I can count on my friends when things go wrong					
	I can talk about my problems with my family					
	I have friends with whom I can share my joys and sorrows					
	There is a special person in my life who cares about my feelings					
	My family is willing to help me make decisions					
	I can talk about my problems with my friends					

Appendix 3 presents the self-reported scale for academic performance.

Appendix 3. Academic performance.

Academic performance	Grade point
First class	3.5-4.00
Second class upper	3.0-3.49
Second class lower	2.0-2.99
Third class	1.0-1.99
Pass	<1.0

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