The impact of psychological capital on university students' academic achievement mediated through academic engagement

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Abstract

This study examined the impact of psychological capital on university students' academic achievement mediated through academic engagement. A quantitative research method with a cross-sectional correlational design was employed. Data was collected using validated questionnaires from regular undergraduate engineering students (N = 321) at Bahir Dar University in Ethiopia, selected by stratified random sampling. Structural equation modeling was the main data-analyzing technique. The study found that psychological capital significantly and positively impacted students' engagement and academic achievement. Academic engagement played a partial mediation role in the relationship between psychological capital and academic achievement. From the findings, it can be concluded that psychological capital and academic engagement are potential factors for students' better academic outcomes, highlighting the need for interventions that strengthen psychological resources and increase student engagement to improve academic performance.

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Introduction

Academic achievement is one of the predictors of students' success in higher education. It is a multidimensional construct that can be defined from theoretical perspectives, educational goals, academic program outcomes, and assessment methods (Li et al., 2023). In this study, academic achievement refers to the cumulative grade point average obtained by university students in their enrolled program (Slåtten et al., 2021).

Evidence shows that many university students do not perform well in their studies (Lesley et al., 2011). As a result, the high dropout rate due to poor academic performance remains a global issue (Al-Tameemi et al., 2023). Ethiopia is no exception; students' failure to achieve educational goals is a major challenge for most universities (Moges, 2017). Recent

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data from seven universities, including Bahir Dar University, has indicated that, on average, 36% of students leave an academic program before graduation (Wondwosen, 2021).

Several factors contribute to academic achievement variation among students at different educational levels. With the rise of positive psychology, the role of psychological capital (PsyCap) in educational settings has gained much attention in recent years. It is defined as a person's positive psychological state of development and comprises four psychological resources: hope, efficacy, resilience, and optimism (HERO cited in Luthans et al., 2015).

At the university level, PsyCap contributes to students' learning outcomes by helping them to increase engagement, promote psychological well-being, better cope with challenges, and enhance academic adjustment. It is suggested that students with high PsyCap are more emotionally stable and better able to handle stress (Li et al., 2023). PsyCap can help university students to believe in their abilities, put in the necessary efforts and perseverance required to attain their educational goals, have a positive outlook on their success at present and in the future, adapt successfully in the face of adverse situations, and recover from failures (Li et al., 2023). Students with high levels of PsyCap are goal-oriented, exhibit positive learning behavior, work with motivation, and experience a state of flow in doing their tasks, which in turn results in better academic performance (Adil et al, 2020).

Regarding engineering education, PsyCap is crucial to enhancing engineering students' cognitive abilities and social interactions (Zhao et al., 2020), promoting creativity and innovative behavior (Sameer, 2018), and for effective team /group work (Vanno et al., 2015). It also significantly impacts students' soft skills via psychological well-being (Saman et al., 2023).

Student engagement is another important factor determining students' academic success in higher education (Kahu, 2013). It is commonly defined as the amount of time and effort that students invest in meaningful academic activities that contribute directly to desired outcomes (Kuh et al., 2008).

It is suggested that university students who are actively engaged in the learning process will show high interest in coursework, accomplish academic tasks (Schaufeli et al., 2002), have productive study habits and time management skills, learn more and perform better academically, and thus accomplish their university studies (Appleton et al., 2008; Kim & Kim, 2021). This indicates that success in university learning depends upon students' level of engagement.

Engagement is closely linked to cognitive skills such as critical thinking and problem-solving skills, which are fundamental for engineering students. Research reveals that when students are more engaged in the learning process, they are more likely to have a higher level of critical thinking and problem-solving skills (McCormick et al., 2015).

There has been empirical evidence supporting the positive link between PsyCap, academic engagement, and academic achievement. Previous studies have demonstrated that PsyCap positively and significantly correlated with and predicted academic achievement (e.g., Carmona-Halty et al., 2019; Luthans et al., 2007; Luthans et al., 2012; Onivehu, 2020). Luthans et al. (2007) pointed out that undergraduate students with high levels of PsyCap are more likely to score a highergrade point average (GPA). A study by Onivehu (2020) conducted on undergraduate students found that PsyCap explains 36% of the variance in

students' academic performance. Similarly, studies conducted based on various engagement models have reported that engagement is significantly positively related to and predicted academic achievement (e.g., Delfino, 2019; Meseret & Rao, 2018; Reeve & Tseng, 2011; Schaufeli et al., 2002). Meseret and Rao (2018) in their study found that academic engagement accounted for 33.8% of the variance in academic achievement among undergraduate students.

The literature further reveals that PsyCap plays a vital role in shaping students' engagement behavior (e.g., Martínez et al., 2019) and keeps them engaged in academic pursuits (Li et al., 2023). Hopeful, efficacious, optimistic, and resilient students are more likely to exhibit better cognitive, behavioral, and emotional involvement in their academic tasks (Gong et al., 2018). Previous studies have demonstrated that PsyCap has a positive, significant, and direct effect on academic engagement and is a significant predictor of academic engagement (e.g., Jafri, 2017; Kang et al., 2021; Luthans et al., 2016). A study conducted by Kang et al. (2021) found that 28.9 % of the differences observed in student engagement can be attributed to variations in their PsyCap.

In addition, PsyCap can influence students' academic achievement through mediator variables, including academic engagement (e.g., Gebregergis et al., 2024; Wang et al., 2015). Vîrgă et al. (2022) conducted a study among university students (N=420) and found that academic engagement partially mediated the relationship between PsyCap and academic performance. The study suggests that students with a higher level of psychological capital will show a higher level of engagement in their educational activities and achieve better performance in their studies (Vîrgă et al., 2022).

Despite these findings, there have been knowledge and research gaps that need further research. Most studies on PsyCap have been conducted in the USA, Turkey, Australia, and some Asian countries like China, India, and Malaysia. However, the construct remains under-researched in African higher education contexts Gebregergis et al., 2024). Similarly, compared to developed countries like the USA, Australia, and Canada, academic engagement has received limited empirical attention in developing countries (Öz & Boyacı, 2021).

Although previous studies examine the direct effect of PsyCap and academic engagement on academic achievement separately, the interplay effect of these constructs on students' outcomes is not well addressed in the literature. To our knowledge, no study has examined the effect of PsyCap on academic achievement mediated through academic engagement in the Ethiopian context.

The beneficial role of PsyCap in various fields has been reported in previous studies (Luthans et al., 2012). However, due to the focus of the curriculum on technical skills, the value of PsyCap in engineering education is underestimated (Lye 2023).

Therefore, the main objective of the current study was to fill these gaps by examining how and to what extent PsyCap contributes to university students' academic achievement directly and mediated through academic engagement with a focus on engineering undergraduates.

The study was guided by the following research question: How is PsyCap important to enhance university students' academic outcomes? To address the research question and meet the objective of the study, the following two hypotheses were formulated:

H_1: Psychological capital has a significant positive direct impact on the academic achievement of undergraduate students.

H_2: Academic engagement mediates the relationship between psychological capital and academic achievement.

Theoretical Framework

Positive psychology emphasizes strengths-based education that targets student success and suggests thriving as a key element for success (Schreiner, 2015). In the context of higher education, thriving can be seen as fully engaged intellectually, socially, and emotionally in academic tasks and being academically successful (Schreiner, 2015). PsyCap, rooted in positive psychology, is recognized as a valuable personal resource for positive academic outcomes (Luthans et al., 2019). Hope is the capacity to persevere toward goals and find alternative ways when necessary. Self-efficacy refers to the confidence to take on and succeed at challenging tasks. Resilience represents the ability to sustain and bounce back from setbacks and adversity and optimism is about a positive attribution of succeeding now and in the future.

It is argued that the four psychological resources (hope, self–efficacy, optimism, and resilience) that constitute PsyCap as a higher-order construct best meet the inclusion criteria of being theory-and research-based, a valid measure, state-like, and having a positive impact on attitudes, behaviors, performance, and well-being (Luthans & Youssef-Morgan, 2017). Therefore, they are considered an integrative theoretical foundation for psychological capital (Luthans et al., 2007). Given that, the present study used the psychological resources theory as a theoretical basis for PsyCap within the framework of positive psychology theory.

Reeve and Tseng (2011) claimed that despite the three aspects of engagement (behavioral, cognitive, and emotional) being certainly important to understanding student engagement, they are reactive in the learning environments and emerge from a directional process initiated by the teacher (Reeve, 2012). Therefore, they have proposed the fourth type of engagement, agentic engagement, which they defined as "the observable classroom event in which students' constructive contribution to the flow of instruction they receive'' (Reeve & Tseng, 2011, p. 258). In line with this, the current study used the four-dimensional engagement model, which consists of behavioral, cognitive, emotional, and agentic engagement (Reeve & Tseng, 2011) to better understand the role of engagement in students' learning and achievement.

In addition, this study used the conservation of resources (COR) theory (Hobfoll, 2002) to better explain and examine the interplay between PsyCap, engagement, and academic achievement. Consistent with the notion of "resource caravans" (Hobfoll, 2002), psychological resources travel together and interact synergistically to produce desirable outcomes over time and across contexts (Luthans & Youssef-Morgan, 2017). In this study, PsyCap and engagement are assumed to interact with each other to bring about positive outcomes (i.e., academic achievement).

Method

Research Design

The present study employed a quantitative research approach with a cross-sectional correlational design to generate and test hypotheses based on theories, determine the relationship between study variables, analyze numerical data, generalize the obtained results (Creswell, 2017), and collect a large amount of data at a specific point in time through survey questionnaires (Schmidt & Brown, 2019).

Participants

This study was conducted at Bahir Dar University, one of the first-generation universities in Ethiopia, located in Bahir Dar City. The sample consisted of final-year regular undergraduate engineering students (N = 321), selected from eight departments in five faculties using a stratified random sampling method. The sample size was determined by Yamane's (1967) formula. The calculation provides 277 samples. To account for the non-response rate, 56 students (20% of the sample size (Bujang, 2021) were added to the initial sample. Therefore, the total sample size was 333. However, the actual sample size after data cleaning was 321. Table 1 displays the participants' demographic profile.

Table 1

Participants by Gender, Age, Academic Major, and CGPA (N = 321)

Variables	Category	Frequency (n)	Percentag (%)
Gender	Males	244	76.00
	Females	77	24.00
	< 23	8	2.5
Age	24-26	212	66
	27-29	86	26.8
	≥30	15	4.7
	Automotive	15	4.7
	Industrial	26	8.1
	Mechanical	73	22.7
	Chemical	50	15.6
Academic Major in Engineering	Computer	27	8.4
	Electrical	54	16.8
	Civil	37	11.5
	Software	39	12.1
	2.00-2.50	46	14.3
	2.51-2.74	147	45.8
Academic Achievement (CGPA)	2.75-3.25	81	25.2
	3.26-3.74	37	11.5
	3.75-4.00	10	3.1

Note. The CGPA was labeled using the Ethiopian universities' grading system as a benchmark.

Measures

Psychological capital was measured by a short Psychological Capital Questionnaire (PCQ-12; Matos & De Andrade, 2021; Martínez et al., 2021) with slight modifications in some items. The scale contains 12 items grouped into four subscales with three items each: self-efficacy (e.g., 'I can keep up with the technologies that can be used in my studies'), hope (e.g., 'I can think of many ways to reach my current goals regarding my studies'), optimism (e.g., 'I believe better days will come through my studies'), and resilience (e.g., 'I get stronger when facing competition in my studies').

Academic engagement was measured by student engagement scales consisting of 12 items adapted from previous researchers. Nine items were from the University Student Engagement Inventory (USEI; Maroco et al., 2016), with three dimensions: behavioral, cognitive, and emotional engagement. The remaining three items were from Agentic Engagement Sales (AES; Reeve, 2013). The 12 items were distributed equally in four dimensions: behavioral engagement (e.g., 'I usually participate actively in group assignments', cognitive engagement (e.g., 'I try to integrate the acquired knowledge and skills in solving new problems', emotional engagement (e.g., 'I feel excited about the institute work', and agentic engagement (e.g., 'during this class, I express my preferences and opinion.'

Responses on PsyCap and academic engagement questionnaire items were rated on a six-point Likert scale (1= strongly disagree to 6= strongly agree). The average scores were computed with respective items; a higher mean score indicated a higher level of PsyCap and academic engagement among students.

Academic achievement was assessed by cumulative grade point average (CGPA) collected from the registrar. Participants were also requested to provide information about their age, gender, faculty, and field of specialization/academic major in the demographic questions.

Procedure

Permission was obtained from the Bahir Dar Technology Institute, Bahir Dar University, to conduct the study, collect data from students, and access their official grades from the registrar. The study also secured informed consent from participants. Participants were told about the purpose of the study and were assured that their information would be kept confidential and that their participation was voluntary.

Before the main study, the PsyCap and academic engagement measurement scales were piloted with 59 students. Feedback from research and language experts suggests that the scales are valid and understandable, with minor word changes to much of the study context. The alpha values met the recommended threshold value of 0.70 (Nunnally & Beinstein, 1994), indicating acceptable reliability.

A total of 333 hard-copy English version questionnaires were distributed to the respondents by eight undergraduate course instructors, and 328 were returned, with a response rate of 98.49 %. Each participant took about 30 to 35 minutes to complete the questionnaire. The data was collected from June 28 to July 11, 2023.

Data analysis

SPSS 25 and AMOS 23 were applied in the data analysis process. Descriptive statistics (e.g., mean, standard deviation), Pearson correlations, and structural equation modeling (SEM) were employed in data analysis. Structural equation modeling (CB-SEM) with maximum likelihood estimation (MLE) was the main data analysis technique in the present study to test the proposed conceptual model and the hypothesized relationships (direct and indirect effects). A mediation analysis was conducted to verify whether academic engagement mediates the relationship between PsyCap and academic achievement. A bias-corrected bootstrapping method with a 95% Confidence Interval (CI) set at 5,000 resamples was utilized to test the significance of indirect effects (Hair et al., 2009).

Data screening and relevant assumption testing were performed before the main data analysis. Four invalid questionnaires and three cases being outliers were removed from the data, while 10 (3.12%, < 5%) missing items were imputed using the expectation-maximization procedure (Kline, 2011). Little's MCAR test result was insignificant, $\chi 2$ (DF = 207) = 183.258, sig. = .881. The data were confirmed to be normally distributed by univariate normality (skewness: 0.019 to 0.355, < ± 2.00; (kurtosis: -0.273 to -1.180, <± 7.00) (Byrne, 2010) and multivariate normality (total Kurtosis = 6.49, < 10; the critical ratio of kurtosis = 1.648, < 5) (Bentler, 2006). The obtained values of tolerance (PsyCap= .626; AE =.617, >0.20) and VIF (PsyCap = 1.597; AE = 1.620, <5) (Menard, 2002) also confirmed that multicollinearity was not a major concern in the present study.

Results

Common Method Variance/Bias

Harman's single-factor test (Podsakoff et al. 2003) was used to assess the possible presence of common method variance/bias. The total variance extracted by one factor was 35.34%, which was less than the recommended threshold of 50% (Cao et al., 2020). Thus, common method variance is not a serious problem in the current study.

Descriptive Statistics and Correlation Analysis

Before testing the direct and indirect effects of PsyCap on academic achievement, descriptive statistics and correlation analysis were performed to determine the participants' levels of PsyCap and academic engagement and to determine whether a relationship exists between the study variables. The descriptive statistics show that the observed mean score of PsyCap was 3.18(*SD* = 0.83), and the observed mean score of academic engagement was 3.02 (*SD* = 0.84). The results of a one-sample *t*-test affirmed that the mean scores of PsyCap and engagement were significantly below the expected mean of 3.5, PsyCap: $t(320) = 102.12$, $p < .001$, and academic engagement: $t(320) = 93.26$, $p < .001$. Similarly, the observed mean score of academic achievement (CGPA) was ($M = 2.43$, $SD = 0.98$), significantly below the expected mean of 3.00, CGPA: $t(320) = 45.99$, $p < .001$ (see Table 2).

Results of correlation analysis show that PsyCap significantly and positively correlated with academic engagement ($r = .57$, $p < .01$) and academic achievement, as measured by CGPA ($r = .52$, $p < .01$). Also, there was a significant positive association

between academic engagement and academic achievement (r = .51, p < .01). In addition, there was a positive association between the components of PsyCap and academic engagement with academic achievement (see Table 3). It is suggested that significant correlations between variables are one of the prerequisites to conducting path analysis in structural equation modeling. However, high correlations between variables might cause multicollinearity (Hair et al., 2010). The coefficient for intercorrelations between variables in this study was below 0.85 (Brown, 2015). This verifies to continue the structural model analysis.

Table 2

One Sample t-test Results of PsyCap, Academic Engagement, and Academic Achievement

Constructs	Mean	SD	t	DF	P	Test Values
Psychological Capital	3.18	0.83	102.12	320	.***	3.5
Academic Engagement	3.02	0.84	93.26	320	.***	
Academic Achievement (CGPA)	2.43	0.98	45.99	320	***	3.0

N = 321; *** p < .001

Table 3

Correlations between Variables (N = 321)

Variables	1	2	3	4	5	6	7	8	9	10	11
1.PsyCap	1										
2. SE	.69**	1									
3. HO	.64**	.49**	1								
4. RE	.66**	.53**	.49**	1							
5. OP	.54**	.63**	.49**	.54**	1						
6. AE	.57**	.48**	.49**	.49**	.41**	1					
7. BE	.54**	.46**	.47**	.47**	.38**	.70**	1				
8. CE	.44**	.38**	.36**	.35**	.33**	.72**	.55**	1			
9. EE	.45**	.38**	.40**	.41**	.30**	.77**	.58**	.67**	1		
10. AG	.50**	.40**	.41**	.39**	.40**	.76**	.60**	.58**	.67**	1	
11. CGPA	.52**	.44**	.47**	.38**	.37**	.51**	.44**	.38**	.45**	.47**	1

**p < .01 (2_tailed)

To conduct SEM analysis, the current study followed the two-step procedure (Anderson & Gerbing, 1988). First, the measurement model was assessed, and the structural model followed.

Measurement Model

Confirmatory factor analysis (CFA) in AMOS 23 was used to assess the measurement model including the goodness-of-fit and the reliability and validity. In the present study, PsyCap and academic engagement are seen as second-order constructs and their dimensions as first-order constructs. Academic achievement, on the other hand, is a construct with a single indicator (CGPA), and, hence, was not included in the measurement model assessment.

Model fit

Goodness-of-fit in the present study was evaluated using the following fit indices: Normed Chi-square Index (CMIN/DF) < 5 (Schumacker & Lomax, 2016); the Tucker–Lewis index (TLI) and comparative fit index (CFI) with adequate values greater than 0.90 (Byrne, 2010) and good values higher than 0.95 (Keith, 2019); the root mean square error of approximation (RMSEA with a confidence interval (90% CI),) and standardized root mean square residual (SRMR), considering values less than 0.08 as adequate (Byrne, 2010) and good value less than 0.06 (Schumacker & Lomax, 2016).

The CFA results showed that both the first-order and second-order constructs had a good fit to the data (see Table 4). Since the initial model met the recommended fit indices values, model modifications were not performed. As part of CFA, the factor loadings of first-order construct items and second-order construct indicators were assessed. The results showed that both factor loadings exceeded the recommended threshold value of 0.50 (Hair et al., 2014). Thus, no item was deleted (see Figure 1 and Table 5).

Table 4

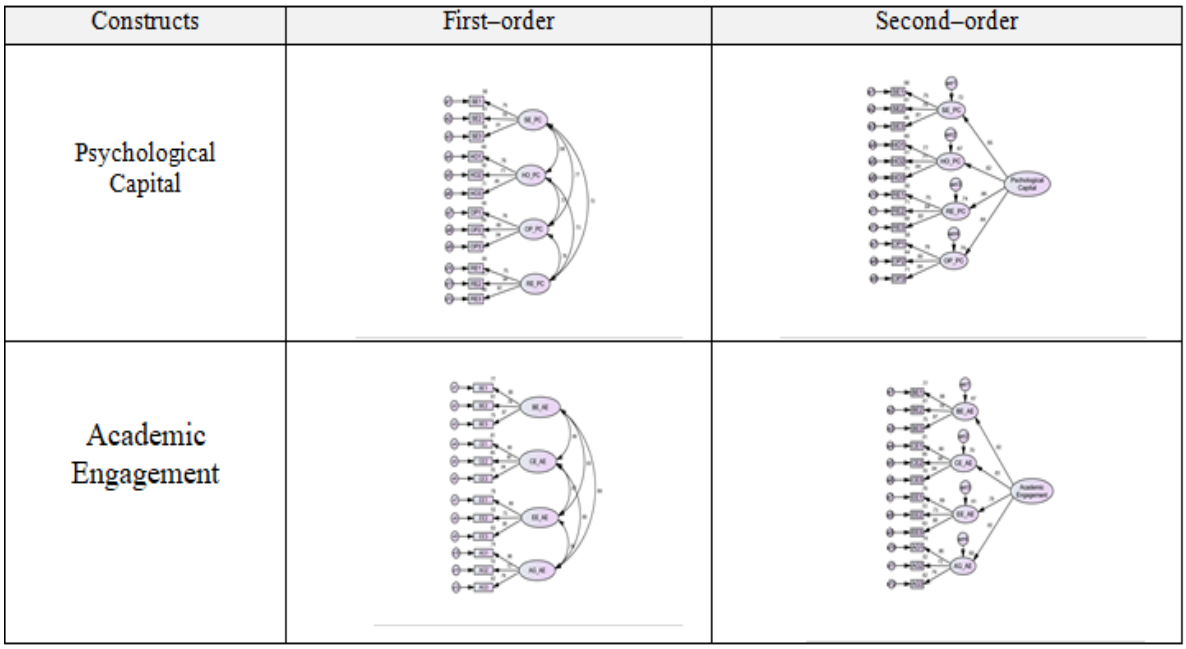
Goodness-of-Fit Statistics of Measurement Models (N = 321)

Constructs	Models	X2/DF	TLI	CFI	RMSEA	SRMR
Psychological	First-order	1.114	0.996	0.997	0.019	0.027
Capital	Second -order	1.105	0.997	0.997	0.018	0.027
Academic	First-order	1.433	0.988	0.991	0.037	0.031
Engagement	Second -order	1.509	0.986	0.89	0.040	0.035

Note. χ 2/df = Normed Chi-square; TLI = Tucker-Lewis index; CFI = Comparative fit index; TLI; RMSEA = Root Mean Square Error of Approximation; SRMR Standardized Root Mean Square Residual.

Figure 1

Measurement Models (Standardized regression weights)



Reliability and Validity Tests

As shown in Table 5, the Alpha values of first-order constructs ranged between 0.82 and 0.88, and the composite reliability values were between 0.74 and 0.85. The factor loadings of first-order constructs (0.71- 0.90) and second-order constructs (0.82-0.89) were above the cutoff value of 0.70 (Nunnally & Bernstein, 1994), indicating the measurement scales had acceptable reliability. Furthermore, the average variance extracted (AVE) values of the first-order constructs (0.60-0.72) and second-order constructs, 0.73 (PsyCap) and 0.66 (AE), were above the threshold value of 0.50 (Collier, 2020), suggesting adequate convergent validity. Also, the squared root values of AVE for PsyCap (0.85) and academic engagement (0.82) were greater than the cross-bonding correlation coefficients (Fornell & Larcker, 1981), and the heterotrait-monotrait (HTMT) ratio (0.74) was below the threshold value of 0.85 (Henseler et al., 2015; Kline, 2011), suggesting discriminant validity was established (see Table 6).

Table 5

Reliability and Convergence Validity Results of First and Second-Order Constructs

1st order - constructs	2nd order-constructs	No. Items and Indicators	SFL	α	CR	AVE
SE		3	0.75-0.81	0.82	0.75	0.60
HO		3	0.71-0.85	0.82	0.81	0.61
RE		3	0.75-0.84	0.84	0.85	0.64
OP		3	0.76-0.84	0.84	0.84	0.65
BE		3	0.78-0.88	0.87	0.75	0.71
CE		3	0.80-0.90	0.88	0.74	0.72
EE		3	0.73-0.89	0.84	0.75	0.66
AG		3	0.72-0.86	0.82	0.76	0.63
	Psychological Capital	SE	0.85			
		HO	0.82	0. 92	0.89	0.73
		RE	0.86			
		OP	0.89			
	Academic engagement	BE	0.82			
		CE	0.83	0.92	0.88	0.66
		EE	0.78			
		AG	0.82			

Note: SFL= Standardized Factor Loadings; α = Cronbach alpha; CR= Composite Reliability; AVE= Average Variance Extracted.

Table 6

Discriminant Validity

Constructs	Fornell & Larker Criterion		HTMT Ratio	
	1	2	1	2
1. Psychological Capital (PsyCap)	**0.85**			-
2. Academic Engagement (AE)	.57**	**0.82**	0.74	-

Note. **Bold** numbers are the square roots of AVE; ** p <. 01 (2-tailed). The HTMT cut-off value is < 0.85.

Structural Model

The structural model was used to test the proposed model and the hypothesized relationships (direct and indirect effects). The results of the structural model analysis are

presented based on the research hypothesis. First, the goodness-of-fit of the overall model was assessed. The obtained fit indices indicated that the structural model had a good model fit, with CMIN /DF = 1.079, TLI = 0.995, CFI = 0.996, RMSEA = 0.016, and SRMR = 0.039.

Direct Effect of PsyCap on Academic Achievement

The first hypothesis (H1) of this study was that PsyCap has a significant positive direct impact on the academic achievement of undergraduate students. The find supports the proposed hypothesis. The direct path coefficient from PsyCap to academic achievement was positive and significant (β = 0.34, p <. 001). In addition, the path coefficient from PsyCap to academic engagement (β = 0.70, p < .001) and from academic engagement to academic achievement (β = 0.45, p < .001) were positive and significant (see Figure 3).

Mediating Effect of Academic Engagement

It was proposed that academic engagement mediates the relationship between PsyCap and academic achievement (H2). The mediation analysis indicates that the indirect effect of PsyCap on academic achievement via academic engagement was significant (β = 0.32, p < 0.01), justifying that academic engagement mediates the relationship between PsyCap and academic achievement. The 95% confidence interval (lower and upper limits) excluded zero ($CI_{.95}$ = 0.257, 0.368), confirming that the indirect effect of PsyCap on academic achievement through academic engagement was significant. Thus, the proposed hypothesis (H2) was supported. Furthermore, the direct effect of PsyCap on academic achievement with the inclusion of a mediator (academic engagement) was significant (β= 0.34, p < .001), indicating academic engagement partially mediated the relationship between PsyCap and academic achievement (see Figure 3 and Table 7). In the proposed model, PsyCap without a mediator accounted for 20% (SMC = 0.20) of the variance in academic achievement (not displayed in the paper). The mediation model explained 53% (SMC = 0.53) of the variance in academic achievement (see Figure 2).

Table 7

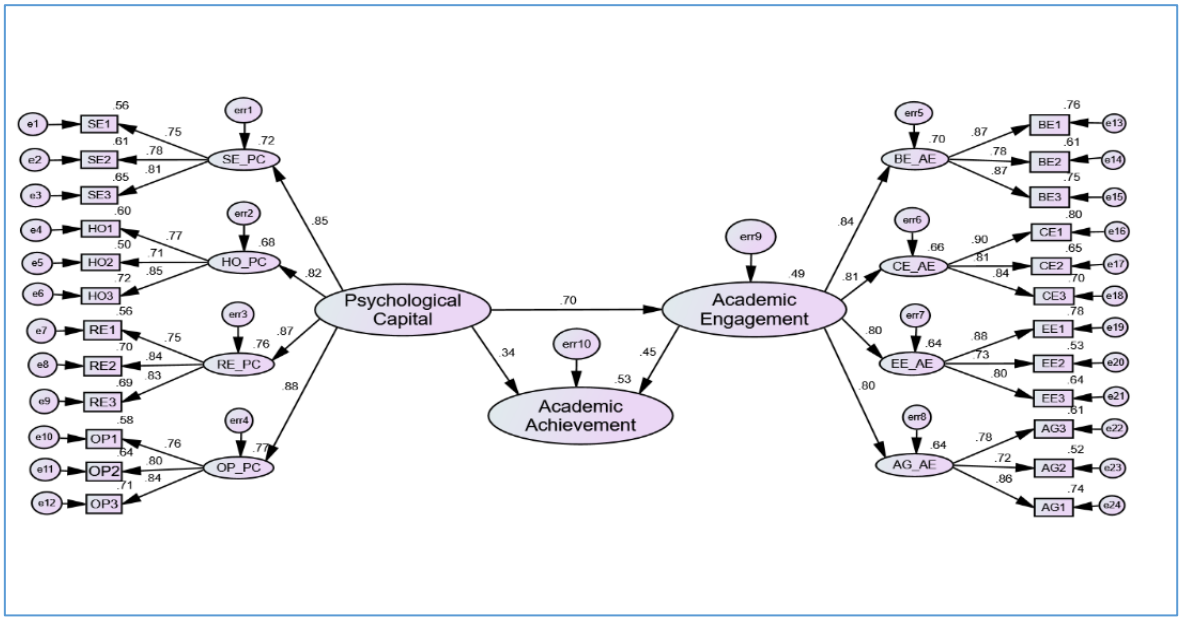
Bootstrap Analysis of the Direct, Indirect, and Total Effects

Effect	Estimate	SE	95% Confidence Interval		P-value
			Lower Limit	Upper Limit	
Direct effect					
PsyCap →AA	0.34	0.019	0.299	0.377	***
PsyCap→AE	0.70	0.053	0.585	0.792	***
AE → AA	0,45	0.022	0.403	0.488	***
Indirect effect					
PsyCap → AE →AA	0.32	0.028	0.257	0.368	***
Total effect					
PsyCap → AA	0.66	0.027	0.599	0.704	***

***p < 0.001

Figure 2

Structural Model (Standardized regression weights)



Discussion

The main purpose of this study was to examine the impact of PsyCap on university students' academic achievement mediated through academic achievement, with a particular focus on engineering undergraduates. The discussion is based on the research objectives and hypothesis.

Levels of PsyCap and Academic Engagement

A one-sample *t*-test confirmed that the observed mean scores of PsyCap and academic engagement were statistically different from the expected mean. Also, the participants' CGPA was significantly below the expected mean. The possible reason might be the focus of engineering education on technical skills and little attention to soft skills and psychological resources (Lye, 2023).

Low PsyCap in students can negatively impact academic engagement and well-being, leading to increased stress, burnout, and potentially poorer academic outcomes, while also reducing resilience and optimism. Low psychological capital can lead to a lack of motivation and engagement in learning, as students may feel less hopeful, optimistic, or resilient in the face of academic challenges (Martínez et al., 2019). A low level of engagement is also associated with poor academic performance (Duffy & Elwood, 2013). Lower levels of engagement hinder students' ability to develop critical thinking skills, improve their learning strategies, and build strong relationships with teachers/instructors and peers. A lack of engagement can lead to feelings of disinterest and disconnection from the university environment, increasing the likelihood of students dropping out (Acosta-Gonzaga, 2023).

Relationship among Variables

Pearson's correlation coefficient indicated that correlations among the independent latent variables, the mediator latent variables, and the dependent latent variable were significant and positive ($p < .01$). These findings are consistent with previous studies, which have demonstrated a significant positive association between PsyCap and academic achievement (e.g., Luthans et al. 2007; Luthans et al., 2012) and PsyCap and academic engagement (e.g., Gong et al., 2018; Jafri, 2017; Kang et al., 2021; Luthans et al., 2016), and academic engagement and academic achievement (e.g., Delfino, 2019; Reeve & Tseng, 2011; Schaufeli et al., 2002).

Direct Effect of Psychological Capital on Academic Achievement

The present study proposed that PsyCap has a significant positive direct effect on academic achievement (H1). The finding supports the proposed hypothesis. The standardized path coefficient from PsyCap to academic achievement was positive and significant. This result is along with previous studies, which demonstrate that PsyCap has a positive and direct impact on academic achievement and is a significant predictor of academic achievement (e.g., Carmona-Halty et al., 2019; Onivehu, 2020).

It is suggested that students with high PsyCap will perform better academically than students with low levels of PsyCap (Luthans et al., 2012). This is because PsyCap is useful in regulating students' thoughts and behaviors, giving them vitality that increases their intrinsic motivation, energizing them to pursue educational endeavors, and empowering them to accomplish their academic goals (Luthans & Youssef-Morgan, 2017). Research reveals that students who are high in PsyCap can capitalize on better meaning–focused strategies directly contributing to students' academic achievement as measured by CGPA (Ortega-Maldonado & Salanova, 2017).

This finding supports the COR theory (Hobfoll, 2002), which states that students who accumulate personal resources (e.g., hope, efficacy, resilience, and optimism) are more likely to achieve academic success (Hobfoll et al., 2018). In university settings, PsyCap may support students in meeting their study demands and provides them with positive agentic resources, facilitating their striving for achievement (Sweetman & Luthans, 2010). This indicates that PsyCap is a key personal resource to promote university students' academic achievement.

The present study also found that PsyCap has a significant positive impact on the academic engagement of undergraduate students. This result is consistent with previous studies (e.g., Gebregergis et al., 2024). PsyCap as a set of psychological resources can assist students more engaged in their academic tasks, especially in challenging times (Hobfoll, 2002; Hobfoll & Ford, 2007). In addition, the current study found a significant positive effect of academic engagement on academic achievement, which agrees with previous studies (e.g., Meseret & Rao, 2018). Egbert (2020) pointed out that success in learning happens if students are eagerly involved in the learning process. University students who are actively engaged in the learning process have higher levels of self-esteem and socially appropriate behaviors (Bowden et al., 2021), show high interest in coursework, accomplish academic tasks (Schaufeli et al., 2002), have productive study habits and time management skills, learn more

and perform better academically, and thus accomplish their university studies (Appleton et al., 2008; Kim & Kim, 2021; Schaufeli et al., 2002). Research has confirmed that academically engaged students have better academic achievement in terms of higher GPAs compared to disengaged students (Ketonen et al., 2016).

Mediating Effect of Academic Engagement

The current study supposed that academic engagement mediates the relationship between PsyCap and academic achievement (H_2). As proposed, academic engagement partially mediated the relationship between PsyCap and academic achievement. In other words, PsyCap could have an indirect effect on academic achievement through academic engagement. The bootstrap result confirmed that the indirect effect of PsyCap on academic achievement via academic engagement was statistically significant. Since the direct effect of PsyCap on academic achievement, with the inclusion of a mediator (academic engagement), is significant, academic engagement partially mediates the relationship between PsyCap and academic achievement. This finding is consistent with previous studies (e.g., Gebregergis et al., 2024; Vîrgă et al., 2022; Wang et al., 2019). A study by Vîrgă et al. (2022) conducted with university students found that academic engagement played a partial mediating role in the PsyCap and academic performance relationship and suggested that students who possess psychological resources (self-efficacy, hope, resilience, and optimism) will have a high level of engagement, which in turn leads to higher academic performance (e.g., Vîrgă et al., 2022). The study supports the assumption of the COR theory, that PsyCap is an important personal resource that plays a vital role in facilitating engagement that leads to better performance (Martínez et al, 2019).

Conclusion and Implications

The present study examined how and to what extent PsyCap contributes to university students' academic achievement, directly and indirectly mediated through the mediating mechanism of academic engagement. It was found that PsyCap has a significant positive impact on academic achievement and academic engagement, and academic engagement played a partial mediating role in the relationship between PsyCap and academic achievement, indicating both direct and indirect effects. The study suggests that academic engagement is an important underlying mechanism in the PsyCap and academic achievement relationship. The findings underscore that PsyCap and academic engagement are crucial for students' positive outcomes (academic achievement) in higher education.

This study contributes to the existing literature by adding more knowledge about the beneficial role of PsyCap and academic engagement in students' learning and achievement because little has been done in the African context, including Ethiopia. The findings of this study may also extend previous research findings by providing more empirical evidence regarding the interplay between PsyCap, academic engagement, and academic achievement.

Practically, this study is useful for academic institutions to develop evidence-based interventions to build psychological resources among undergraduate students to improve their academic achievement. Unlike personality and intelligence quotient (IQ), which are relatively

stable, PsyCap is a malleable psychological resource; open to improvement and development (Luthans et al., 2007). It can be developed through micro-interventions (Luthans et al., 2006) and short training sessions of 2-3 hours (Ngo et al., 2021). The interventions/training objective should focus on how to enhance each of the four dimensions of PsyCap and how the intervention or training is effective in improving students' levels of psychological resources, which in turn can improve their academic performance.

Luthans' psychological capital theory and intervention, the four-level model (Luthans et al., 2006) could be an important theoretical basis for designing the interventions: (1) develop hope by planning goals and ways to achieve them, (2) accept limitations to strengthen belief and accumulate experience, developing optimism, (3) develop self-efficacy by inspiring students to experience success, and (4) take advantage of effective resources and interpersonal relations to develop resilience (Liang et al., 2018). Evidence has shown that educational intervention on PsyCap promotes university students' levels of PsyCap, leading to improved academic performance (da Costa et al., 2021).

The findings of the present study could also help curriculum experts integrate the concepts of PsyCap into the curricula. Counseling practitioners also can use the findings of this study to design and provide counseling services for students at risk due to poor academic performance and psychological problems caused by stressful learning environments. It is suggested that providing group counseling via a multimedia system could enhance the PsyCap of university students (Zeng et al., 2024).

Academic engagement could be improved by enhancing students' PsyCap. However, since university students are from different backgrounds (e.g., personalities, abilities, needs, interests, and learning styles), additional mechanisms such as differentiated instruction are needed to increase their level of engagement.

Differentiated instruction is a pedagogical approach that can be grouped into two approaches: divergent, where goals and teaching methods are highly specified to meet the needs of individuals or homogeneous groups, and convergent, where all students work on common tasks to achieve common goals (de Graaf et al. 2019; Deunk et al. 2015). In differentiated instruction, teachers/instructors are expected to proactively modify the lessons, teaching and assessment methods, resources, and learning activities to address the needs of individual students and small groups of students to maximize the learning opportunity for each student in the classroom (Hillier, 2011).

Even though the application of the principles of differentiated teaching in higher education is challenging compared to elementary and high school because of large class sizes, academic diversity, teaching style, physical layout, and time constraints (Chamberlin & Powers 2010), using differentiated instruction in higher education is necessary for the benefits of university students.

Research suggests that the successful adoption of differentiated instruction depends on the willingness, commitment, readiness, and support of instructors (e.g., Solomon, 2019). Therefore, university instructors are expected to prepare themselves and take the lion's share to effectively implement this useful pedagogical approach in the teaching-learning process to enhance students' academic engagement, thereby improving their academic performance. Creating a supportive and engaging learning environment is another strategy to increase students' engagement.

Limitations and Future Research Directions

The present study has some limitations. The cross-sectional design might limit the analysis of the causal relationship between the variables under investigation. To address this gap, future research should focus on longitudinal and experimental studies to better understand the relationships between these constructs. The study was conducted at a single university, and the samples were engineering students. This might limit the generalization of findings. Therefore, future studies should involve more academic institutions and diverse disciplines.

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Conflict of Interests

The authors declare that no conflict of interest.

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References

Acosta-Gonzaga, E. (2023). The effects of self-esteem and academic engagement on university students' performance. *Behavioral Sciences*, *13*(4), 348. https://doi.org/10.3390/bs13040348

Adil, A., Ameer, S., & Ghayas, S. (2020). Impact of academic psychological capital on academic achievement among university undergraduates: Roles of flow and self-handicapping behavior. *Psych Journal*, *9*(1), 56-66. https://doi.org/10.1002/pchj.318

Al-Tameemi, R. A. N., Johnson, C., Gitay, R., Abdel-Salam, A. S. G., Al Hazaa, K., BenSaid,

A., & Romanowski, M. H. (2023). Determinants of poor academic performance among undergraduate students—A systematic literature review. *International Journal of Educational Research Open*, *4*, 100232. https://doi.org/10.1016/j.ijedro.2023.100232

Anderson, J. C., & Gerbing, D. W. (1984). The effect of sampling error on convergence improper solutions, and goodness of fit indices for Maximum likelihood conformity factor analysis. *Psychometrika*, *49*, 155 – 173. https://doi.org/10.1007/BF02294170

Appleton, J. J., Christenson, S. L., & Furlong, M. J. (2008). Student engagement with school: Critical conceptual and methodological issues of the construct. *Psychology in the Schools*, *45*, 369-386. https://doi.org/10.1002/pits.20303

Bowden, J. L. H., Tickle, L., & Naumann, K. (2021). The four pillars of tertiary student engagement and success: a holistic measurement approach. *Studies in Higher Education*, *46*(6), 1207-1224. https://doi.org/10.1080/03075079.2019.1672647

Bentler, P. M. (2006). *EQS 6 structural equations program manual*. Encino, CA: Multivariate Software.

Brown, T. A. (2015). *Confirmatory Factor Analysis for Applied Research*. Guilford Publications.

Bujang MA. (2021). A step-by-step process on sample size determination for medical research. *Malays J Med Sci.* 2021;*28*(2):15-27. https://doi.org/10.21315/mjms2021.28.2.2

Byrne, B.M. (2010). *Structural equation modeling with AMOS: Basic concepts, applications, and programming* (2nd ed.). Routledge Taylor and Francis Group, LLC.

Cao, C., Shang, L., & Meng, Q. (2020). Applying the job demands-resources model to exploring predictors of innovative teaching among university teachers. *Teaching and Teacher Education, 89,* 103009. https://doi.org/10.1016/j.tate.2019.103009

Chamberlin, M., & Powers, R. (2010). The promise of differentiated instruction for enhancing the mathematical understanding of college students. *Teaching Mathematics and Its Applications, 29*(3), 113-139. https://doi.org/10.1093/teamat/hrq006

Carmona-Halty, M., Salanova, M., Liorens, S., & Schaufeli, W.B. (2019). How psychological capital mediates between study-related positive emotions and academic performance, *Journal of Happiness Studies*, *20*(2), 605-617. https://doi.org/10.1007/s10902-018-9963-5

Collier, J. (2020*). Applied structural equation modeling using AMOS: Basic to advanced techniques. Routledge.*

Creswell, J. W., & Creswell, J. D. (2017). *Research design: Qualitative, quantitative, and mixed methods approaches.* Sage Publications.

da Costa, M. G., Pinto, L. H., Martins, H., & Vieira, D. A. (2021). Developing psychological capital and emotional intelligence in higher education: A field experiment with economics and management students. *The International Journal of Management Education, 19*(3), https://doi.org/10.1016/j.ijme.2021.100516

de Graaf, A., H., Westbroek, J.F. (2019). A practical approach to differentiated instruction: How biology teachers redesigned their genetics and ecology lessons. *Journal of Science Teacher Education 30*(1), 6-23. https://doi.org/10.1080/1046560X.2018.1523646

da Costa, M. G., Pinto, L. H., Martins, H., & Vieira, D. A. (2021). Developing psychological capital and emotional intelligence in higher education: A field experiment with economics and management students. *The International Journal of Management Education, 19*(3), https://doi.org/10.1016/j.ijme.2021.100516

Delfino, A.P. (2019). Student Engagement and academic performance of students of Partido State University. *Asian Journal of University Education, 15*(1), 1-16.

Deunk, M., S. Doolaard, A. Smale-Jacobse and R. Bosker. (2015), *Differentiation within and across Classrooms: A Systematic Review of Studies into the Cognitive Effects of Differentiation Practices* (Groningen: GION, University of Groningen).

Duffy, G., & Elwood, J. (2013). The perspectives of disengaged students in the 14–19 phase on motivations and barriers to learning within the contexts of institutions and classrooms. *London Review of Education*, *11*(2), 112-126, http://dx.doi.org/10.1080/14748460.2013.799808

Egbert, J. (2020). Engagement, technology, and language tasks: optimizing student learning. *Int. J. TESOL Stud. 2*, 110-118. https://doi.org/10.46451/ijts.2020.12.10

Fornell, C., & Larcker, D. F. (1981). Evaluating structural equation models with unobservable variables and measurement error. *Journal of Marketing Research*, *18*(1), 39-50. https://doi.org/10.1177/002224378101800104

Gebregergis, W. T., Kovács, K. E., & Csukonyi, Cs. (2024). The Effect of psychological capital on academic success of college students mediated through student engagement. *Central European journal of educational research*, *6*(1), 64–80. https://doi.org/10.37441/cejer/2024/6/7/14187

Gong, Z., Liu, Q., Jiao, X., & Tao, M. (2018). The influence of college students' psychological capital on study engagement. *Psychology*, *9*, 2782-2793. https://doi.org/10.4236/psych.2018.913160

Hair, J. (2009). *Multivariate data analysis*. *Exploratory factor analysis*.

Hair, J. F., Jr., Black, W. C., Babin, B. J., & Andersen, R. E., (2010). *Multivariate data analysis* (7th ed.). Upper Saddle River, NJ: Pearson Prentice Hall.

Hair, J., Hult, G.T.M., Ringle, C., & Sarstedt, M. (2014). *A Primer on Partial Least Squares Structural Equation Modeling (PLS-SEM).* Los Angeles: SAGE Publications.

Henseler, J., Ringle, C.M., & Sarstedt, M. (2015). A new criterion for assessing discriminant validity in variance-based structural equation modeling. *Journal of the Academy of Marketing Science, 43*(1), 115-135. https://doi.org/10.1007/s11747-014-0403-8

Hillier, E. (2011). Demystifying differentiation for the elementary music classroom. *Music Educators Journal, 97*(4), 49-54.

Hobfoll, S. E. (2002). Social and psychological resources and adaptation. *Review of General Psychology*, *6*(4), 307-324. https://doi.org/10.1037/1089-2680.6.4.307

Hobfoll, S. E., & Ford, J. S. (2007). Conservation of resources theory in Encyclopedia of stressed. G. Fink. 2nd ed. (Elsevier: Academic Press), 562-567. https://doi.org/10.1016/B978-012373947-6.00093-3

Hobfoll, S. E., Halbesleben, J., Neveu, J. P., & Westman, M. (2018). Conservation of resources in the organizational context: The reality of resources and their consequences. *Annual Review of Organizational Psychology and Organizational Behaviou*r, 5(10), 103-128. https://doi.org/10.1146/annurev-orgpsych-032117-104640

Jafri, H. (2017). Understanding the influence of psychological capital on student engagement and academic motivation. *Pacific Business Review International*, 10(6), 16-22.

Kang, X., Wu, Y., & Li, L. (2021). Validation and prediction of the school psychological capital among Chinese college students. *Frontiers in Psychology, 12*, 697703. https://doi.org/10.3389/fpsyg.2021.697703

Kahu, E. R. (2013). Framing student engagement in higher education. *Studies in Higher Education*,38(5), 758-773. https://doi.org/10.1080/03075079.2011.598505

Keith, T. Z. (2019). *Multiple regression and structural equation modeling (3rd ed.): An introduction to multiple regression and structural equation modeling*. Routledge.

Ketonen, E. E., Haarala-Muhonen, A., Hirsto, L., Hänninen, J. J., Wähälä, K., & Lonka, K. (2016). Am I in the right place? Academic engagement and study success during the first years at university. *Learning and Individual Differences*, *51*, 141-148. https://doi.org/10.1016/j.lindif.2016.08.017

Kim, S., & Kim, D. J. (2021). Structural relationship of key factors for student satisfaction and achievement in asynchronous online learning. *Sustainability*, *13*(12), 6734. https://doi.org/10.3390/su13126734

Kline, R. B. (2011). *Principles and practice of structural equation modeling* (3rd ed.). Guilford.

Kuh, G. D., Cruce, T. M., Shoup, R., Kinzie, J., & Gonyea, R. M. (2008). Unmasking the effects of student engagement on first-year college grades and persistence. *Journal of Higher Education*, *79*(5), 540-563. https://doi.org/10.1080/00221546.2008.11772116

Lesley, W., Julie, C., & Sally, J. (2011). Beyond the first-year experiences: The impact of attrition of student experience throughout undergraduate degree studies in six diverse universities. *Studies in Higher Education*, *36*(3), 331–352. https://doi.org/10.1080/03075070903581533

Liang, L., Xiao, Q., & Yang, Y. (2018). The psychological capital of left-behind university students: a description and intervention study from China. *Frontiers in Psychology*, *9*, 2438. https://doi.org/10.3389/fpsyg.2018.02438

Li, R., Che Hassan, N., & Saharuddin, N. (2023). Psychological capital related to academic outcomes among university students: A systematic literature review. *Psychology research and behavior management*, 3739-3763. https://doi.org/10.2147/PRBM.S421549

Luthans, F., Avey, J., Avolio, B., Norman, S., & Combs, G. (2006). Psychological capital development: Toward a micro-intervention. *Journal of Organizational Behavior*, *27*, 387-393. https://doi.org/10.1002/job.373

Luthans, F., & Youssef, C. M. (2007). Emerging positive organizational behavior. *Journal of management*, *33*(3), 321-349. https://doi.org/10.1177/0149206307300814

Luthans, B. C., Luthans, K. W., & Jensen, S. (2012). The impact of business school students' psychological capital on academic performance. *Journal of Education for Business*, *87*, 253-259. https://doi.org/10.1080/08832323.2011.609844

Luthans, F., Youssef-Morgan, C. M., & Avolio, B. J. (2015). *Psychological Capital and Beyond.* Oxford University Press.

Luthans, K. W., Luthans, B. C., & Palmer, N. F. (2016). A positive approach to management education: The relationship between academic psychological capital and student engagement. *Journal of Management Development*, *35*(9), 1-22. https://doi.org/10.1108/JMD-06-2015-0091

Luthans, F., & Youssef-Morgan, C.M. (2017). Psychological Capital: An evidence-based positive approach. *Annual Review of Organizational Psychology and Organizational Behavior*, 4(17), 1–17. https://doi.org/10.1146/annurev-orgpsych-032516-113324

Luthans, K. W., Luthans, B. C., & Chaffin, T. D. (2019). Refining grit in academic performance: The meditational role of psychological capital. *Journal of Management Education*, *43*(1), 35-61. https://doi.org/10.1177/1052562918804282

Lye, A. J., Liew, P. Y., Mohd Fadzil, H., & Foong, C. C. (2023). Effect of emotional intelligence and demographic characteristics on psychological capital among chemical engineering students. *Journal of Chemical Education*, *100* (2), 479-488. https://doi.org/10.1021/acs.jchemed.2c00105

Maroco, J., Maroco, A. L., Campos, J. A. D. B., & Fredricks, J. A. (2016). University student's engagement: development of the University Student Engagement Inventory (USEI). *Psicologia: Reflexão e Crítica*, *29*. https://doi.org/10.1186/s41155-016-0042-8

Martínez, I. M., Youssef-Morgan, C. M., Chambel, M. J., & Marques-Pinto, A. (2019).Antecedents of academic performance of university students: Academic engagement and psychological capital resources. *Educational Psychology*, *39* (8), 1047-1067.

Martínez, I. M., Meneghel, I., Carmona-Halty, M., & Youssef-Morgan, C. M. (2021) Adaptation and validation to Spanish of the Psychological Capital Questionnaire–12 (PCQ–12) in academic contexts. *Current Psychology*, *40*, 3409-3416. https://doi.org/10.1007/s12144-019-00276-z

Matos, F. R., & De Andrade, A. L. (2021). Psychometric Properties of the Psychologica Capital Scale in the Student Context (PsyCap-S). *Paidéia (Ribeirão Preto)*, *31*, 1-9. https://doi.org/10.1590/1982-4327e3123

McCormick, N. J., Clark, L. M., & Raines, J. M. (2015). Engaging students in critical thinking and problem solving: A brief review of the literature. *Journal of Studies in Education*, *5*(4), 100-113.

Menard S. (2002). *Applied logistic regression analysis* (2nd ed.). Series: Quantitative Applications in the Social Sciences, No. 106. SAGE Publications.

Meseret, G, & Rao.A. (2018). University students' engagement and academic achievement in Ethiopian public universities. *Journal of Advances and Scholarly Researches in Allied Education, 15*(12), 115-122.

Moges, E. Y. (2017). Determinant of academic performance of undergraduate students: In the case of Arba Minch University Chamo Campus. *Journal of Education and Practice*, 8, (10), 155-166.

Ngo, T. T., Vu, H. T., & Huynh, L. T. (2021). Positive academic emotions and academic achievement: the role of academic psychological capital. *Hong Kong Journal of Social Sciences*, 58, 176-184.

Nunnally, J.C., & Bernstein, I. H. (1994). *Psychological theory.* MacGraw.Onivehu, A. O. (2020). The relationship between psychological capital and academic performance of social work students. *Sociální pedagogika| Social Education*, *8*(1), 53-67.

Ortega-Maldonado, A., & Salanova, S. (2018). Psychological capital and performance among undergraduate students: The role of meaning-focused coping and satisfaction. *Teaching in Higher Education*, *23*(3), 390-402. https://doi.org/10.1080/13562517.2017.1391199

Onivehu, A. O. (2020). The relationship between psychological capital and academic performance of social work students. *Sociální pedagogika| Social Education*, *8*(1), 53-67. https://doi.org/10.7441/soced.2020.08.01.03

Öz, Y., & Boyacı, A. (2021). The role of student engagement in student outcomes in higher education: Implications from a developing country. *International Journal of Educational Research*, 110, 101880. https://doi.org/10.1016/j.ijer.2021.101880

Podsakoff, P. M., MacKenzie, S. B., Lee, J., & Podsakoff, N. P. (2003). Common method biases in behavioral research: a critical review of the literature and recommended

remedies. *Journal of Applied Psychology*, *88*, 879–903. https://doi.org/10.1037/0021-9010.88.5.879

Reeve, J., & Tseng, C.M. (2011). Agency as a fourth aspect of students' engagement during learning activities. *Contemporary Educational Psychology*, *36*, 257–267. https://doi.org/10.1016/j.cedpsych.2011.05.002

Reeve, J. (2012). A self-determination theory perspective on student engagement. In *Handbook of Research on Student Engagement* (pp. 149-172). Springer US.

Reeve, J. (2013). How students create motivationally supportive learning environments for themselves: The concept of agentic engagement. *Journal of Educational Psychology*, *105*, 579-595. https://doi.org/10.1037/a0032690

Saman, A., & Wirawan, H. (2021). Examining the impact of psychological capital on academic achievement and work performance: The roles of procrastination and conscientiousness. *Cogent Psychology*, *8*(1), 1938853. https://doi.org/10.1080/23311908.2021.1938853

Sameer, Y. M. (2018). Innovative behavior and psychological capital: Does positivity make any difference? *Journal of Economics and Management*, (32), 75-101. https://doi.org/10.22367/jem.2018.32.06

Schaufeli, W. B., Salanova, M., González-Romá, V., & Bakker, A. B. (2002). The measurement of engagement and burnout: A twosample confirmatory factor analytic approach. *Journal of Happiness Studies*, *3*, 71-92.

Schreiner, L. A. (2015). Positive psychology and higher education. In J. C. Wader, L. I. Marks, & R. D. Hetzel (Eds.), *Positive psychology on the college campus* (pp. 1-25). Oxford University.

Schumacker, R. E., & Lomax, R. G. (2016). *A beginner's guide to structural equation modeling* (4th ed.). Routledge.

Schmidt, N.A. and Brown, J.M. (2019). *Evidence-Based Practice for Nurses: Appraisal and Application of Research (*4th ed.). Jones & Bartlett Learning.

Slåtten, T., Lien, G., Narli Evenstad, S-B., & Onshus, J. (2021). Supportive study climate and academic performance among university students: the role of psychological capital, positive emotions, and study engagement. *International Journal of Quality and Service Sciences*, *13*(4), 585-600. https://doi.10.1108/IJQSS-03-2020-0045

Solomon, M. (2019). Instructors' knowledge, attitude and practice of differentiated instruction: The case of college of education and behavioral sciences, Bahir Dar University, Amhara region, Ethiopia. *Cogent Education, 6(1),* 1642294. https://doi.org/10.1080/2331186X.2019.1642294

Sweetman, D., & Luthans, F. (2010). The power of positive psychology: Psychological capital and work engagement. In A. B. Bakker & M. P. Leiter (Eds.), Work engagement: *A handbook of essential theory and research* (pp. 54–68). Psychology Press.

Vanno, V., Kaemkate, W., & Wongwanich, S. (2014). Relationships between academic performance, perceived group psychological capital, and positive psychological capital of Thai undergraduate students. *Procedia-Social and Behavioral Sciences*, 116, 3226-3230. https://doi.org/10.1016/j.sbspro.2014.01.739

Vîrgă D., Pattusamy, M., Kumar, D. P. (2020). How psychological capital is related to academic performance, burnout, and boredom? The mediating role of study engagement. *Current Psychology*,41, 6731-6743. https://doi.10.1007/s12144-022-03339-w

Wang, M. T., Chow, A., Hofkens, T., & Salmela-Aro, K. (2015). The trajectories of student emotional engagement and school burnout with academic and psychological development: Findings from Finnish adolescents. *Learning and Instruction*, *36*, 57-65. https://doi.org/10.1016/j.learninstruc.2014.11.004

Wondwosen, T. (2021). The indelible challenges of student retention in higher education: imperatives for a closer scrutiny. *Widening Participation and Lifelong Learning*, *24*(1), 1-12. https://doi.org/10.21203/rs.3.rs-162412/v1

Yamane, T. (1967). *Statistics: An introductory* analysis (2nd ed.). Harper and Row. https://doi.org/10.1002/berj.3472

Zeng, J., Chen, Y., & Zheng, Y. (2024). Designing the multimedia system for improving promotion of college students' psychological capital. *Heliyon*, *10*(3). https://doi.org/10.1016/j.heliyon.2024.e25362

Zhao, J., Wei, G., Chen, K. H., & Yien, J. M. (2020). Psychological capital and university students' entrepreneurial intention in China: mediation effect of entrepreneurial capitals. *Frontiers in Psychology*, *10*, 2984. https://doi.org/10.3389/fpsyg.2019.02984