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A path analysis model examining self-concept and motivation pertinent to undergraduate academic performance: A case of Kenyan public universities

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The academic performance of undergraduates is as a result of several factors involving student- and school-level characteristics. Understanding the effect of these factors is beneficial to both students and the entire institution. The current study examines the relationship between the independent variable (self-concept) and dependent variable (student academic performance) through a proposed mediator (motivation). Correlation design, multiple regression and mediation analysis were employed as the procedures of analyzing our data. The study sample comprises 365 final-year students drawn from arts and science faculties in selected universities based in Kenya. Correlation output revealed that academic performance positively correlated with motivation ($r=0.333$, $P<0.01$). Further composite regression analysis revealed a significant influence of motivation ($\beta = 0.97$, $P<0.001$) on academic performance. Mediation analysis identified indirect-only mediation ($a \times b= 0.049$, $P < 0.01$). Both Sobel z-test and bootstrap results indicated a significant indirect effect $a \times b$ while the direct effect C is not significant, thus signaling the presence of indirect-only mediation. Generally, motivation has a mediating role ($\beta = 0.311$, $r = 0.333$) in relation to self-confidence and academic performance. These results imply that students' levels of motivation and self-concept are vital to enhance academic performance.

Key words: Academic performance, mediation, path analysis, self-concept, motivation.

INTRODUCTION

Higher education plays a significant role in building a robust society, ending poverty and enhancing economic prosperity. It imparts knowledge and skills to the graduates who will soon become sources of the labor force to drive economic growth. Economics research provides evidence that there is a positive relationship between education and a country's economics (Barro,

2013; Hanushek and Woessmann, 2008, 2012). Although the existing literature points out that it is quite challenging to identify the direct contribution of higher education in growth, this research shows that countries with tremendous graduates have experienced increased labor productivity and easily adjust to technological changes and innovation (Bloom et al., 2014). Performance in

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learning activities is commonly evaluated by multiple scores a student receives at various educational levels. Every institution and the individual learner must recognize factors that contribute positively to their academic performance to improve it. Student's academic performance is influenced by factors such as socioeconomic background, student attitude and interest in learning. In line with this, in-class behavior, self-concept and motivation stand out to be the most substantial factors contributing to academic performance in primary and high school (Yeung et al., 2011; Green et al., 2012; Vogl and Preckel, 2014; Méndez-Giménez et al., 2017). Students desiring for higher achievement are expected to have positive classroom setting behaviour, a higher degree of self-concept and motivation. Therefore, this study was conducted to investigate if a similar pattern can be observed in Kenyan universities.

Self-concept is a widely studied component that affects performance in the workplace and academia. It is the individual cognition, beliefs and view of oneself to instructional activities (Tang, 2011). Academic self-concept heightens with consistent academic success or failures over a specific span, especially at the initial stages of life. Higher performance at the early stages results in a higher degree of self-concept and eventually improved performance. On the one hand, low performance at the childhood stage increases the occurrence of low performance damaging self-concept and decreasing self-confidence (Marsh and Craven, 2006), which requires attention to change. Yara (2010) investigated the effect of self-concept on some high school students' mathematics achievement in southwestern Nigeria and found that students with positive self-concept excel in mathematics. Some studies obtained no significant relationship between self-concept and academic performance (Yahaya and Ramli, 2009; Naderi et al., 2009) while other studies revealed a meaningful relationship between self-concept and academic performance (Hau et al., 2000; Peralta-Sánchez and Sánchez-Roda, 2003; Valentine et al., 2004; Marsh et al., 2005; Nuthana and Yenagi, 2009; Aryana, 2010).

Self-efficacy is one of the psychological components related to self-concept. Perceived self-efficacy refers to people's beliefs in their capabilities to produce given achievements. As by Kolbe and Bruske (2017) study, individuals with high self-efficacy effectively strategize on completing a given task. From the literature, self-efficacy has a higher predictability value of performance outcomes in various subjects. Students with positive self-efficacy are eager to understand a lesson, provide a solution to learning challenges and stick to challenging courses (Manzano et al., 2018). Compared to students with low self-efficacy, students with better self-efficacy study complex subjects later, work on challenging tasks, remain focused, spend more effort learning and record superior academic performance (Azar, 2010).

Motivation is another critical component in learning, which refers to an individual's desire and incentive to engage in a specific task (Loewen and Reinders, 2011). According to Bukari and Abra (2017), motivation means students' effort towards improving their performance. It drives peoples towards their wishes to reach their needs. It empowers one to learn. Unmotivated individuals do not act accordingly and thus experience trouble in achieving their desired goal (Demir and Budak, 2016). Students' disengagement during lectures leads to social problems and imprecise work. Moreover, less motivated students are disengaged in learning, get bored and lose determination. A study by Arbabisarjou et al. (2016) involving medical students observed a significant relationship between achievement motivation and academic performance. Liu and Hou (2017) conducted a longitudinal survey and their result indicated that intrinsic motivation significantly contributed to academic performance. Various studies have also uncovered that achievement motivation is positively related to academic performance (Awan et al., 2011; Amrai et al., 2011; Izuchi and Onyekuru, 2017).

Although studies have evidenced that these related academic factors play a primary role in academic performance, their relations vary according to the type of learning institution, subjects/courses, students' characteristics, family background, or even country-level factors. Composite multiple regression has been suggested to determine the multivariate relationships (Kusurkar et al., 2013; Keith, 2014). Structural equation modelling (SEM) provides an extension to multiple regressions, particularly when involving many variables to produce path analysis. Various relationships that could be either direct or indirect can be shown in a path diagram and their causal effect will be indicated by the regression weight, β (Hair et al., 2006). A single-headed arrow highlights the cause for independent, intervening and dependent variables while a bidirectional hand signals the covariance between the two variables. An intervening variable can justify an extant relationship between the explanatory and dependent variables.

Kenya's higher education landscape has changed significantly from independence (1963) to date, resulting in an increased number of universities and graduates to drive the country's economic competitiveness. However, higher education in Kenya is faced with numerous critical issues including, access, quality, and affordability (Kagondou, 2015; Malechwanzu et al., 2016), lack of relevant instructional materials, equipment, and teaching force (Kagondou, 2015), inadequate funding, and under-representation of girls in science and mathematics where boys dominate (Wasanga et al., 2011). The Kenyan government has tried to boost higher education financing and attain gender equality in terms of enrollment by initiating programs such as Free Primary Education (FPE). Despite reforms to expand university education in Kenya, a lot is needed to improve student teaching

and learning. Limited higher education studies have investigated variation in individual skills and education achievement originating from students' and schools' characteristics. As a result, this research intends to evaluate factors impacting academic performance to address gender gaps in Kenya's higher educational attainment. The researcher hypothesized that self-concept affects students' academic performance, mediated by motivation. The study research objectives are as follows:

- (1) To determine the influence of self-concept and motivation on academic performance.
- (2) To determine motivation mediation effect of self-concept on academic performance.

METHODOLOGY

The study adopted a descriptive survey research design where quantitative methods explain the relationship between academic performance factors. The sample mainly comprised final fourth-year undergraduate students who are in the school of arts and science. The participants also involved third-year students for Diploma programs and fifth-year students for engineering programs. These participants involved undergraduate students of Egerton University, University of Kabanga, Laikipia University and Chuka University drawn from main campuses in Kenya. The respondents for the study were mainly selected from Arts and Science faculties. At the first stage, one or more undergraduate programs were selected from each faculty member in all selected universities to form arts and science strata. Consequently, from the willing students studying Bachelor of Science and Bachelor of Arts, 100 volunteers' final-year students were randomly selected in each university comprising 50 from Bachelor of Science and 50 from Bachelor of Arts. The sample size of 100 students from each of the four universities participated in the study, making up 400 respondents. The questionnaire was chosen as an instrument for collecting data on factors influencing undergraduate students' academic performance. Section A of the questionnaire covered demographic characteristics, while section B consisted of educational elements rated on a Likert scale ranging from 1 ("strongly disagree") to 5 ("strongly agree"). Both primary and secondary data were important in explaining the findings of our study.

The reliability of the research instrument was mainly achieved through Cronbach's Alpha method. To determine the research instrument's reliability and attain the study objectives, a pilot study was conducted in the Department of Agriculture, Egerton University, where 100 participants were drawn considering gender balance. Responses from the selected participants were ranked to determine their relationships. The Cronbach Alpha reliability coefficient for the questionnaire was found to be 0.817, which according to Gamble (2018), was above the threshold of 0.7. Hence, it is considered excellent and that the research instrument was a reliable measure for this study. A letter of introduction from the School of Economics and Management, Nanjing Agricultural University was issued after that permission was sought from National Council for Science and Technology, Kenya. Authorization was inquired from the deputy vice-chancellors of academic affairs before conducting the main study. Consent was sought from the respondents before administering the questionnaires and assured that their responses were confidential. The questionnaires were distributed during one of the lectures and assembled within an interval of two weeks, specifically during one of the course session. Participation was voluntary and none of the incentives or any other form of reinforcement was offered to the respondents which motivated

them to contribute to the study. Independent variables consisted of self-concept and motivation and the dependent variable is academic performance. The relationship between independent variables and dependent variables via intermediate variables is illustrated in Figure 1. Data were analyzed through inferential statistics and PROCESS macro in SPSS version 26, which allows the analysis of the mediating role of the variables. Analyses were performed through bootstrapping with 5000 samples at a 95% confidence level. Mediation results were further confirmed via the Sobel z-test in the following.

Mediation analysis

The predictive effect of self-confidence on academic performance was analyzed by a mediational analysis. Figure 1 is a simple model showing path a, b, and c, where self-concept is hypothesized to affect performance, mediated by student's motivation. The following equations guided paths a, b and c in the aforementioned model.

$$M = i_1 + aX + e_1. \quad (1)$$

$$Y = i_2 + c'X + e_2. \quad (2)$$

$$Y = i_3 + cX + bM + e_3. \quad (3)$$

A mediation analysis was employed to test for the mediating effect of motivation in relation to self-concept and academic performance. Baron and Kenny (1986) recommended step by step procedure of performing mediation analysis. Mediation is only possible if these conditions are followed through regression analysis. The first condition needs a demonstration that independent variable influenced mediator (Equation 1). The second condition must satisfy that the independent variable affects the dependent variable (equation two) and finally, the mediator must have an impact on the dependent variable demonstrated in Equation 3. Mediation is firmly supported when the relationship between the mediator and dependent variable is altered after accounting for the effect of the mediator variable on the dependent variable. Further, they argued that there is a need to establish a significant zero-order effect of the independent variable X on the dependent variable Y in mediation. Still, their perception was somehow incorrect since establishing mediation does not necessarily require a significant zero-order effect of X on Y. This is because the Zero-order effect of X on Y is equal to the total effect of X on Y or the sum of the indirect path $a \times b$ and direct path c as follows:

$$c' = (a \times b) + c$$

To test for the indirect path $a \times b$, Barron and Kenny suggested the Sobelz-test as illustrated in Equation 4:

$$z = \frac{a \times b}{\sqrt{b^2 s_a^2 + a^2 s_b^2}} \quad (4)$$

Later Zhao et al. (2010) disputed the three conditions stated earlier, appealing that, firstly, the strongest mediation is highly evident when there is an indirect effect but without any direct effect. However, the strength of the mediation is determined by the level of indirect effect and not by the absence of the direct effect. The presence of direct effect means that other mediators are hypothesized. Secondly, to establish mediation, indirect effect $a \times b$ should be significant, and lastly, the Sobel z-test is perceived less

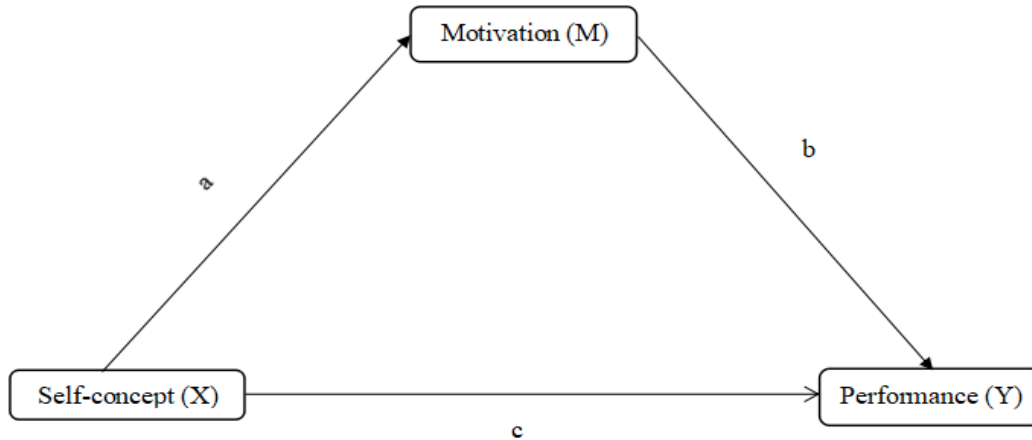


Figure 1. Simple Model showing path a, b and c.

Table 1. Pearson correlation of factors influencing student academic performance.

Correlation	Self-concept	Motivation	Academic performance
Self-concept	1	0.181**	0.093
Motivation		1	0.333**
Academic performance			1

, *, denote significant at the 0.01 and 0.001, respectively.

Table 2. Model summary.

Model	R	R ²	Adjusted R ²	Std. Error of the estimate
1	0.335	0.112	0.107	0.35166

superior than the bootstrap test introduced by Preacher and Hayes (2004). Hence, both the Sobel z-test and bootstrap test were performed to confirm the mediating effect.

RESULTS

Table 1 shows that academic performance significantly correlated only with motivation variable ($r = 0.333$, $P < 0.01$), meanwhile self-concept correlated with motivation ($r = 0.181$, $P = 0.01$).

The regression output examines how much of the total variance in students' academic performance will be explained by the path model's study variables. The output indicates that the independent variables and dependent variables' relationship was 0.335, while the coefficient of determination (R^2) was 0.112. According to regression analysis, 11.2% of the variation in student's academic performance is accounted for by self-concept and motivation (Table 2).

Composite regression analysis indicated highly significant positive influence of motivation on student's

academic performance ($\beta = 0.197$, $P < 0.001$; Table 3). Self-concept had no significant relationship with academic performance, while motivation contributed directly to academic performance.

Next, the mediation effect was examined. Figure 2 illustrates the standardized coefficients and their respective standard errors as well as the significance level of each variable regarding self-concept, motivation and academic performance.

Mediation was first verified by evaluating the three regression equation, as stated earlier. Mediation is classified into competitive, complementary, and indirect-only mediation (Zhao et al., 2010). The present model identified indirect-only mediation, which overlaps with full mediation by Baron and Kenny. Both Sobel z-test and bootstrap results indicated a significant indirect effect ($a \times b = 0.049$, $P < 0.01$) while the direct effect C is not significant, thus signaling the presence of indirect-only mediation. Motivation ($\beta = 0.197$, $P < 0.001$) mediated the effect of self-concept on academic performance. In summary, the present model provides evidence for the

Table 3. Multiple regression of self-concept and motivation.

Variable	Unstandardized coefficients		Standardized coefficients	T
	B	Std. error	Beta	
Constant	1.740	.160		10.866
Self-concept	0.028	0.041	0.034	0.687
Motivation	0.197***	0.030	0.327	6.593

Dependent variable: academic performance, ***significant at 0.001.

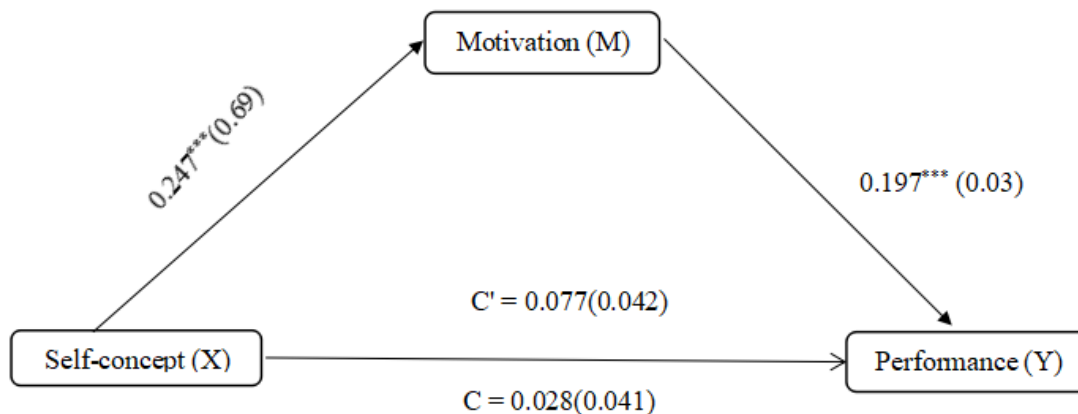


Figure 2. Final path analysis of three factors model showing path coefficients (p) and standard errors (in brackets). C' represents the total effect.

presence of both hypothesized and the unlikelihood of an omitted mediator. This implies that the mediator was identified and is consistent with the hypothesized theoretical framework.

DISCUSSION

This study aimed to analyze the relationship between the independent variable (self-concept) and dependent variable (academic performance) by assessing the possible mediating role of the motivation factor. The results of this study showed that academic performance is positively correlated to motivation ($r = 0.333$, $P < 0.01$), meanwhile self-concept correlated with motivation ($r = 0.181$, $P < 0.01$) (Table 1). Moreover, regression output shows strong significant positive influence of motivation on student's academic performance ($\beta = 0.97$, $P < 0.001$) (Table 3). The aforementioned data revealed that motivation, as a factor, strongly contributed to students' academic performance. A mediation analysis was further conducted to test the relationship between independent and dependent variables through the mediator. Both the Sobelz-test and a newly recommended bootstrap test method presented by Preacher and Hayes (2004) were employed. Using the two approaches, the present model

revealed similar result leading to a significant indirect-only mediation ($a \times b = 0.049$, $P < 0.01$), meanwhile, both the direct effect C (0.028) and total effect C' (0.077) were not significant.

Based on Baron and Kenny's opinions, the first step before conducting mediation analysis is establishing a significant zero-order effect of the independent variable on a dependent variable. According to Zhao et al. (2010), their idea was incorrect because the zero-order effect is equal to the total effect. Baron and Kenny (1986) proposed three conditions to be considered in establishing mediation; first, the independent variable must affect the mediator. Second, the independent variable must affect the dependent variable and, lastly, the mediator is required to bear an effect on the dependent variable. This is contrary to Zhao et al. (2010), who argued that mediation is only established when there is a significant indirect effect but without direct effect. Findings of the present study met two of Baron and Kenny's (1986) conditions; self-concept directly affects motivation, and motivation influenced performance. Importantly, there was a significant indirect effect suggested by Zhao et al. (2010), thus signifying the mediating role of motivation.

Baron and Kenny (1986) classified mediation into three types full, partial and no mediation, which was later

reviewed by Zhao and categorized as indirect only mediation, complementary, competitive, and non-mediation. Where the direct effect C is significant and the product $a \times b \times c$ is positive, there is evidence of complementary mediation. However, when the direct effect C is significant but the result of the product of $a \times b \times c$ is not positive, we have a competitive type of mediation. In both cases, the data supports a hypothesized mediation and the significant direct effect C shows the possibility of some omitted mediator. This suggests that a mediator is identified, which corresponds to the hypothesized theoretical framework considering the likelihood of an omitted mediator in the direct effect. Our findings show the significant indirect effect $a \times b$ while the direct effect C is not significant, thus signaling the presence of indirect-only mediation, and it is unlikely that the mediator has been omitted.

The study findings show that self-concept positively influences motivation and that academic performance is also positively predicted indirectly by self-concept through motivation. These results fall in line with studies of Awan et al. (2011), reporting that positive self-concept contributes to academic performance by increasing motivation to achieve. Further, the present finding agrees with other study findings that noted a significant and positive relationship between academic self-concept and performance (Yara, 2010; Liu, 2010; Tang, 2011; Lawrence and Vimala, 2013; Sikhwari, 2014; Izuchi and Onyekuru, 2017). This could be due to the perception that academic motivation results in an excellent performance, which instills self-confidence among students to achieve success in learning. While several studies obtained a significant positive relationship between self-concept, motivation and academic performance, other studies have reported differing results; some have reported a negative or moderate correlation among these variables (Naderi et al., 2009; Yahaya and Ramli, 2009; Othman and Leng, 2011). Current findings reinforced that self-concept and motivation predict students' achievement in universities.

Students' constant success results in a higher degree of self-confidence that increases motivation for a better performance later. Kim and Sax (2014) claimed that academic self-concept is a highly valued college student outcome because of its perceived effect on academic performance. This variable is influenced by a host of demographic factors such as gender, age and race (Cokley, 2000; Prince and Nurius, 2014). Various studies have shown that self-concept has either a direct or indirect effect on a wide range of learning outcomes (Liu et al., 2009; Marsh and O'Mara, 2008; Valentine et al., 2004; Wouters et al., 2011). Several scholars consent to the idea that self-concept is a critical subject that determines relationships, performances, and achievements either positively or negatively. Individual success or failure likely depends on personal knowledge about oneself measured by mental capacity. It may be

influenced by comparing ourselves with the individuals surrounding us and others' judgment towards us. Individuals with favourable self-concept quickly develop internal motivation, which improves their performance.

It is clear from the present finding that motivation played a mediating role between self-confidence and academic performance. This result corresponds to those of Areepattamannil (2012) and Guay et al. (2010), who established that intrinsic motivation mediated the relationship between academic self-concept and academic performance. Furthermore, Liu and Hou (2017) hold that motivation is significantly associated with academic performance. Several other studies done by various scholars have also reported similar findings (Awan et al., 2011; Arbabisarjou et al., 2016; Amrai et al., 2011). Korantwi-Barimah et al. (2017) also obtained a significant positive correlation between self-concept, motivation and academic performance. It is believed that students who consider themselves academically able to earn good grades because their self-concept drives them more to academic excellence. Motivation has also been essential in contributing to a broad range of academic factors indirectly linked to academic performance. For instance, students who highly valued school, including the low achievers, recorded a higher degree of motivation and were actively engaged in a classroom setting at the final stage of their tenth grade (Crumpton and Gregory, 2011). Among students in various educational levels, motivation not only contributes to their academic success but more interest in learning and a solution to their multiple obstacles (Bui, 2002; Cavazos et al., 2010). Students who are internally stirred display positive behaviors such as being attentive, concentrating, and participating in class activities. They also avoid misconduct, such as absenteeism, early dropout, and disengagement, which usually diminishes their academic excellence chances. Among the freshers nursing students, a higher degree of motivation greatly influenced the importance attached to their courses related to their future goals and their general development (Simons et al., 2004; Trevino and DeFreitas, 2014). These students are quickly adapted to cognitive approaches, improved study habits and persisted throughout their studies strongly related to intrinsic motivation.

Motivation drives and directs people into actions; hence there is a powerful association between learning and motivation. Highly motivated individuals are willing to engage in their learning activities towards their future goals, strive to take more challenging tasks, have a better mastery of the concept, and develop learning strategies that contribute to their greater performance, as indicated in present findings.

CONCLUSION AND IMPLICATIONS

Regarding these study finding, it was concluded that,

first, academic performance is positively correlated with motivation. Second, motivation mediated the effect of self-concept on academic performance. Therefore, it is essential for the university and educators to cultivate a free and supportive learning atmosphere that promotes the formation and development of self-motivation that boost learning engagement, enhance self-concept, lessen attrition, and eventually improve students' performance. All these factors should be reinforced in schools, homes and society, in general, to improve academic excellence in universities and contribute to the country's economic growth. Despite the significance made by this study, there were few limitations. First, the study sample involved only final year students at their undergraduate level; subsequent studies should consider representatives from other educational levels. Second, the study was mainly conducted in major public universities in Kenya; hence future research should consider private universities to determine whether similar results will be replicated.

CONFLICT OF INTERESTS

The authors have not declared any conflict of interests.

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