Research article

Influence of economics students' self-esteem on their academic engagement: The moderating role of gender

Mumuni Baba Yidana [*], Francis Arthur

Department of Business and Social Sciences Education, Faculty of Humanities and Social Sciences Education, University of Cape Coast, Cape Coast, Ghana

A B S T R A C T

This study investigated the moderating role of gender in the influence of Economics students' self-esteem on their academic engagement. This quantitative research used a descriptive cross-sectional survey design with a sample of 422 senior high school Economics students. The Academic Engagement and Self-Esteem Scales served as the instruments for data collection in this study. The data were analysed using partial least squares structural equation modelling (PLS-SEM). The study revealed that there was a statistically significant positive influence of Economics students' self-esteem on their academic engagement. Specifically, it was found out that self-esteem had a significant positive influence on academic affective, behavioural and cognitive engagement. Also, it was discovered that gender did not moderate the influence of students' self-esteem on their academic affective, behavioural and cognitive engagement. Therefore, it was recommended that parents, guardians and Economics teachers should guide students to improve upon their self-esteem since high self-esteem will lead to high academic engagement.

1. Introduction

The global focus on human strengths and positive psychological attributes has been brought about by the emergence of positive psychology [1]. Within this field, researchers have expanded the notion of engagement to encompass academic engagement, which pertains to the extent to which students are involved in educational activities during their formal education, including coursework and learning tasks related to school [2]. Hu and Kuh [3] provide a definition of student engagement as "the level of dedication students invest in purposeful educational activities that directly contribute to desired outcomes." Nevertheless, academic engagement goes beyond mere participation and involvement, as stated by Speight et al. [4]. Engagement is a multidimensional construct that includes emotional/affective, behavioural, and cognitive aspects. Prominent scholars such as Coates [5], Fredricks et al. [6], Smith et al. [7], Tinio [8], and Trowler [9] have extensively discussed these dimensions. The term "affective engagement" pertains to the degree of students' interest, enthusiasm, and optimism towards an academic endeavour. According to Kuh [10], "behavioural engagement" refers to the level of students' active participation, as indicated by the quality of time, effort, and concentration they invest in a particular task. Conversely, "cognitive engagement" elucidates students' comprehension of the significance and relevance of the assigned activity, as emphasised by Mebert et al. [11].

Self-esteem encompasses the personal evaluation and perception of one's own capabilities and worth, as articulated by Rosenberg (cited in Ref. [1]). Within the realm of psychological principles, self-esteem holds a pivotal position and can significantly influence

---

* Corresponding author.
  E-mail addresses: myidana@ucc.edu.gh (M.B. Yidana), a.francis1608@gmail.com (F. Arthur).

academic engagement [12]. Drawing upon expectancy-value theory (EVT), a positive self-assessment by students can serve as a predictive factor for academic outcomes, including the extent of their academic engagement [13]. Furthermore, Filippello et al. [14] conducted empirical research demonstrating that self-esteem possesses the capacity to anticipate an individual's level of involvement and dedication to academic pursuits.

Several studies [15–17] have investigated the relationship between self-esteem and academic engagement. For example, Pellas' [16] research uncovered a positive correlation between self-esteem and cognitive and emotional engagement as well as a negative correlation with behavioural engagement in online learning programmes. Additionally, Ayenew and Gebremeskal [15] revealed a significant positive relationship between self-esteem and academic engagement.

Also, other studies have found a positive relationship between academic engagement and self-esteem. For instance, Sirin and Rogers-Sirin [17] and Virtanen et al. [18] conducted separate investigations that revealed a positive correlation between the two variables. Karababa [19] discovered a reciprocal relationship between these two variables. Zhao et al. [1] and Martin et al. [20] also provided further support for the view that self-esteem has a positive influence on academic engagement. Although there is limited research on this topic in Sub-Saharan Africa, particularly in Ghana, it is an important area for future study, as it could help bridge the gap in the current literature.

Previous investigations of the moderating role of gender in the connection between students' self-esteem and academic engagement have been scant. Despite this, a substantial body of empirical research has explored disparities in self-esteem and engagement based on gender [e.g., [21–26]]. For example, Zuckerman et al. [26] revealed that male students have higher self-esteem than female students. Additionally [24], found that male students studying Economics exhibit higher levels of self-esteem than their female counterparts. With regards to differences in students' academic engagement, some studies have found out that female students had higher level of academic engagement as compared to males [21,23]. The foregoing studies suggest that students' gender might have an impact on the nexus between self-esteem and academic engagement. Consequently, this study aimed to investigate the moderating effect of gender on the connection between students' self-esteem and academic engagement.

Theoretical Framework: Expectancy-Value Theory.

Eccles and Wigfield [27] proposed expectancy-value theory (EVT) as a theoretical framework for motivation that emphasises the role of an individual's expectancy for success and value for tasks in determining future decisions, engagement, continuity, and achievement. The theory asserts that an individual's choices, persistence, and performance are influenced by their beliefs about their capacity to perform well on a task (expectancy) and the worth of the task (value) [27]. In addition, according to this theory, expectations influence value and if we expect that we would do well at something, we tend to value it higher. Likewise, peoples' positive evaluation of themselves will generally think that they are good at tasks and they will go for it. On other hand, a negative evaluation of oneself will make the person think that he is not good at tasks. Recent researches on learning persistence have concentrated mainly on EVT which is applied to forecast students' decision-making, academic engagement and learning outcomes [27,28]. This theory underpins the current study because students' self-esteem will tend to influence their academic engagement level in the instructional process. According to Fang [13], EVT posits that students' self-evaluation, which is characterised by positivity, can anticipate academic outcomes, including academic engagement. The EVT is a suitable framework for this study because it helps to elucidate how students' self-evaluation can influence their academic engagement, with the added dimension of gender moderation. In this context, the theory posits that learners are more likely to engage actively in their academic tasks when they hold positive expectations about their abilities. This theory aligns with the study's focus on students' self-esteem and its role in predicting academic engagement. Therefore, from this theory, it is being hypothesised that Economics students' self-esteem will influence their academic engagement.

2. Purpose of the study

The thrust of the study was to examine the influence of Economics students' self-esteem on their academic engagement in learning Economics. Specifically, this descriptive cross-sectional study sought to:

1. Determine the influence of Economics students' self-esteem on their academic engagement.
2. Examine the moderating role of gender in the influence of Economics students' self-esteem on their academic engagement.
Research Hypotheses

The following hypotheses were formulated for the study:

1. H_0: There is no statistically significant influence of Economics students' self-esteem on their academic engagement.
2. H_0: Gender does not moderate the influence of Economics students' self-esteem on their academic engagement.

3. Materials and methods

3.1. Research design, population and sampling

This study utilised a descriptive cross-sectional survey design to explore the levels of self-esteem and academic engagement among Economics students in senior high school. This methodology allows a comprehensive examination of the prevailing circumstances surrounding the phenomenon being studied [29,30]. By using a cross-sectional survey, data were collected simultaneously from a diverse group of individuals within a specific timeframe [31]. Brewer's [32] assertion influenced the selection of this approach, as it

involves studying and collecting data from individuals in their natural environments without manipulating the variables. This design enabled researchers to observe students' self-esteem and academic engagement, as they naturally occur within their educational environments. The descriptive cross-sectional survey methodology provided extensive data on the self-esteem and academic engagement of senior high school Economics students, offering a comprehensive understanding of the phenomenon. This approach allows for the investigation of patterns, trends, and correlations between variables at a specific point in time without imposing experimental manipulations or interventions [33,34].

The participants in the study consisted of all Economics students enrolled in senior high schools situated within the Kumasi Metropolis of Ghana. This metropolitan region boasts of a diverse range of senior high schools, including both single-sex and mixed institutions, which increases the generalisability of the study's findings. There were 9500 Economics students in the Metropolis [35], and the researchers randomly selected a sample of 10 out of the 67 schools in the region using a simple random sampling technique. Additionally, we employed a proportionate sampling method to choose 500 students, according to Krejcie and Morgan's sample size determination table [36]. In conclusion, the study's sample size was determined using a scientific method that ensured a representative and unbiased selection of participants.

3.2. Data collection instrument

The researchers used the Student Engagement in Mathematics Classroom Scale (SEMS), initially developed by Kong et al. [37], to gather data. The SEMS scale was modified and comprised 52 items divided into three subscales: academic affective engagement (22 items), behavioural engagement (12 items), and cognitive engagement (18 items). Participants rated each item on a five-point Likert scale, ranging from Strongly Disagree (1) to Strongly Agree (5). The researchers reported Cronbach's alpha (α) values of 0.853, 0.835, and 0.849 for the academic affective, behavioural, and cognitive engagement subscales, respectively [37]. DeVellis [38] and Fink [39] suggest that an instrument with a "α" value of 0.70 or higher is considered suitable for data collection. To measure the self-esteem of Economics students, the researchers adapted the Rosenberg Self-Esteem Scale [40], which has demonstrated reliability and validity across various settings [41–46]. This scale contains ten items and asks respondents to indicate their level of agreement on a scale ranging from Strongly Disagree to Strongly Agree.

3.3. Procedure for data collection

The researchers enlisted the support of five dedicated research assistants who were extensively trained on the research instrument and thoroughly briefed on the research ethics principles. These assistants administered the questionnaire to a sample of Economics students at two different institutions, allowing them a 25–35 min time frame to complete it. Upon submission, the research assistants meticulously reviewed each completed questionnaire, ultimately collecting a total of 422 out of the 500 distributed questionnaires, yielding an 84.4% return rate. The study adhered to ethical standards, and approval was obtained from the Institutional Review Board (IRB) of the University of Cape Coast, Ghana (Ethical Clearance, ID: UCCIRB/CES/2020/19).

3.4. Data processing and analysis

The screening process involved the removal of incomplete or invalid questionnaires from the dataset. The remaining data were then coded and analysed using Statistical Product for Service Solution (SPSS) version 28. The results were exported as a Microsoft Excel comma-separated values (CSV) file and analysed using Smart-PLS 3. Research hypotheses one and two were analysed using partial least squares structural equation modelling (PLS-SEM) and multi-group analysis (MGA), respectively.

4. Results

This segment presents the findings of the study pertaining to the previously outlined research hypotheses. Initially, the researchers investigated the effect of self-esteem on the academic engagement of Economics students. In addition, we examined the moderating role of gender in the relationship between self-esteem and academic engagement among Economics students.

Influence of economics students' self-esteem on their academic engagement.

The first research objective sought to examine the influence of Economics students' self-esteem on their academic engagement. The structural model was presented after the measurement model had been assessed.

4.1. Assessment of measurement model

The current study utilised PLS-SEM to analyse the data acquired. The examination involved the use of two separate models: the measurement model and structural model. The measurement model assessed various statistical parameters for individual items such as factor loading (FL), α, composite reliability (CR), convergent validity, and discriminant validity. On the other hand, the structural model examined the significance of path coefficients to explore the magnitude and direction of the relationships between the latent variables. The FL of all items were calculated following the recommendations of Duarte and Raposo [47] and Hair et al. [48], to ensure the reliability of each item within their respective constructs. The results, including the FL, α, rho_A, CR, and average variance extracted (AVE), are presented in Table 1.

The results indicate that items with FL between 0.40 and 0.70 are generally considered suitable for retention [48]. However, if

removing an item increases the CR and AVE values, it must be deleted. Items that did not load well were eliminated from the constructs. By employing this process, all factor loadings surpassed the minimum threshold of 0.5 [49–51], except for items I4 and DS6, which were approximately 0.5 and were retained in the present study. Again, Chin [52] recommended a cut-off of 0.707, and where scales are adapted from other settings, a loading of 0.5 may be used as a cutoff point.

In addition, the AVEs of the constructs were quite lower than the 0.5 AVE criterion [52–54]. However, AVE represents a more cautious metric than CR; as a result, it is reasonable for researchers to infer that the convergent validity of the construct is acceptable based solely on the CR results [55]. Hence, convergent validity has been achieved. The CR for the constructs are above the threshold of 0.7 [56,57], except for CE, which is approximately 0.6. According to accepted standards, values of CR/α between 0.60 and 0.70 are typically deemed satisfactory [58]. Despite the AVE being less than 0.5, the CR was greater than 0.6, indicating acceptable convergent validity of the construct [59]. Consequently, the instrument (AES) was deemed fit for purpose.

4.2. Discriminant validity

The study conducted both the Fornell-Larcker and Heterotrait-Monotrait Ratio (HTMT) criteria for assessing discriminant validity. Table 2 presents the Fornell-Larcker and HTMT ratio criteria for evaluating the discriminant validity of the measurement model.

The values presented in Table 2, including 0.615, 0.638, 0.566, and 0.609, correspond to the $\sqrt{AVE}$ for the latent variables. These values represent the maximum scores achieved in any row or column and are diagonal elements [59]. Although the AVE of the constructs' square root in Table 2 is less than its correlation, Henseler et al. [60] suggest that the HTMT criterion may be a more suitable method for assessing discriminant validity than the Fornell-Larcker criterion. Consequently, the HTMT ratio criterion is employed to confirm or refute this result.

The results in Table 2 indicate that the HTMT ratio for all constructs was below 0.85, which falls short of the threshold of 0.90 for conceptually distinct constructs [61]. To assess the discriminant validity, the lower and upper limit confidence interval (LLCI and ULCI) values were calculated, and it was found that all the values were less than one [61,62]. These results confirm that the HTMT criterion was successful in demonstrating discriminant validity. Subsequently, the Consistent PLS (PLSc) algorithm was applied to examine the impact of Economics students' self-esteem on their academic engagement. Figs. 1 and 2 show the path coefficients and t-values of the structural models, respectively.

4.3. Structural equation modelling results from Smart-PLS

Upon verifying the dependability and trustworthiness of the measurement model, the research examined the hypothesis pertaining to the non-existence of a statistically significant impact of self-esteem on academic engagement among Economics students. To calculate parameters such as path coefficient, *p*-value, t-value and R-square, the bootstrap re-sampling feature in SmartPLS was

Table 1
Construct validity and reliability.

Constructs	Items	FL	A	rho_A	CR	AVE
AE	AO1	0.685	0.835	0.833	0.828	0.378
	AO5	0.653				
	I1	0.630				
	I2	0.651				
	I3	0.659				
	I4	0.456				
	I5	0.550				
	I6	0.603				
BE	AT3	0.625	0.861	0.862	0.860	0.407
	AT4	0.629				
	AT5	0.622				
	AT6	0.718				
	D1	0.657				
	D2	0.648				
	D4	0.665				
	D5	0.587				
	D6	0.577				
CE	DS2	0.626	0.593	0.590	0.584	0.321
	DS6	0.493				
	DS7	0.572				
SES	SES3	0.538	0.804	0.808	0.804	0.371
	SES4	0.582				
	SES6	0.588				
	SES7	0.683				
	SES8	0.672				
	SES9	0.619				
	SES10	0.568				

Note: AE = Affective Engagement; BE = Behavioural Engagement; CE = Cognitive Engagement; SES = Self-Esteem of Students.

Table 2
Discriminant validity between self-esteem and dimensions of academic Engagement.

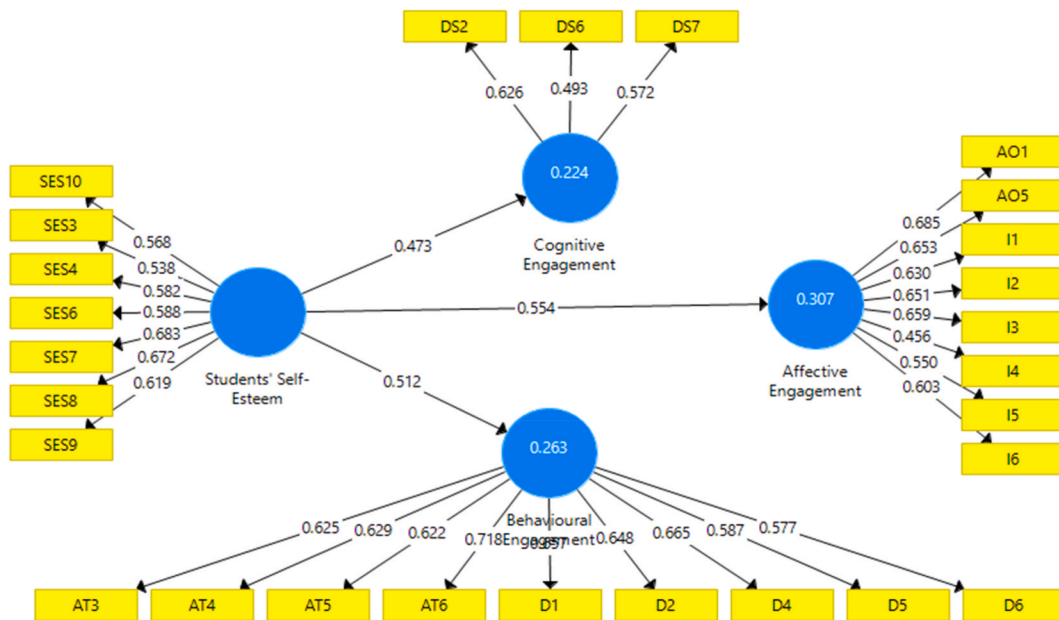| | Fornell-Larcker Criteria | | | | Heterotrait-Monotrait Ratio (HTMT) Criteria | | | |
	AE	BE	CE	SES		AE	BE	CE	SES
AE	**0.615**				AE				
BE	0.655	**0.638**			BE	0.647 (.539; .740)			
CE	0.823	0.747	**0.566**		CE	0.821 (.714; .919)	0.743 (.638; .862)		
SES	0.554	0.512	0.473	**0.609**	SES	0.543 (.453; .626)	0.512 (.374; .630)	0.462 (.296; .600)	

Fig. 1. Factor Loadings and Path coefficients of the Effect of SES on AE, BE and CE.

utilised. The investigation concentrated on the direction and intensity of the path coefficient, p-values derived from 5000 bootstrap samples, the coefficient of determination (R^2), and the effect size (f^2) ascertained by Smart-PLS. The path coefficient results are presented in Table 3.

In Table 3, the findings reveal a significant positive path coefficient ($\beta = 0.554$, t = 12.896, $p < 0.001$) between SES and AE, indicating that SES has a positive influence on AE. This suggests that a 1% increase in the standard deviation of self-esteem is expected to result in a 55.4% increase in the standard deviation of affective engagement. Moreover, self-esteem accounts for approximately 30.7% ($R^2 = 0.307$) of the variability observed in affective engagement. Consequently, around 69.3% of the variation in affective engagement is attributable to other factors that are not captured within the current model. The analysis of effect size revealed a substantial influence of self-esteem on affective engagement, with a substantial effect size ($f^2 = 0.443$), indicating a significant impact according to Cohen's guidelines [63]. The substantial effect size of this study underscores the importance of self-esteem in affective engagement. Furthermore, the predictive relevance of the structural equation model was assessed using the cross-validated redundancy algorithm, and the results showed a small predictive relevance ($Q^2 = 0.088$), as per Hair et al. [61]. Predictive relevance is present when Q^2 exceeds zero ($Q^2 > 0$), and in this case, the Q^2 value of 0.088 indicates a small predictive relevance of the PLS-path model.

The results from Table 3 demonstrate a considerable positive correlation between self-esteem and behavioural engagement ($\beta = 0.512$, t = 8.315, $p < 0.001$), which accounted for approximately 26.3% ($R^2 = 0.263$) of the observed variance in behavioural engagement. This study suggests that approximately 73.7% of the variability in behavioural engagement is influenced by other factors not captured in the current model. The effect size analysis revealed a substantial impact ($f^2 = 0.356$) of self-esteem on behavioural engagement, which is considered a large effect, according to Cohen's established guidelines [63]. The limited predictive relevance ($Q^2 = 0.083$) of the model highlights its limited ability to predict behavioural engagement beyond what is captured by the variables in the model.
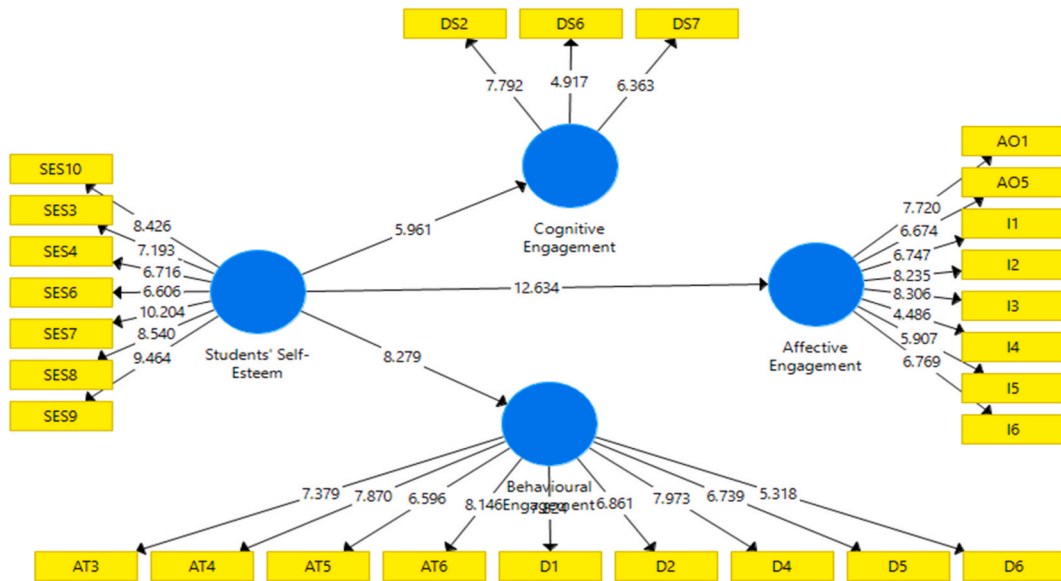
Fig. 2. T-values of the effect of SES on AE, BE and CE

Table 3
Path coefficient of self-esteem on academic engagement.

Variable	Original Sample (β)	Sample Mean	SD	T-values	P	R^2	f^2	Q^2	2.5% LLCI	97.5% ULCI
SES - > AE	0.554	0.564	0.043	12.896	<0.001	0.307	0.443	0.088	0.477	0.647
SES - > BE	0.512	0.525	0.062	8.315	<0.001	0.263	0.356	0.083	0.394	0.634
SES - > CE	0.473	0.480	0.082	5.802	<0.001	0.224	0.289	0.051	0.319	0.635

***$p < 0.001$.

As shown in Table 3, there was a substantial positive relationship between SES and CE, with a significant effect size (β = 0.473, t = 5.802, $p < 0.001$). This finding suggests that self-esteem has a positive influence on cognitive engagement, indicating that a 1% increase in the standard deviation of self-esteem is expected to lead to a 47.3% increase in cognitive engagement. Furthermore, the results indicated that self-esteem accounted for approximately 22.4% of the observed variation in cognitive engagement, as indicated

Table 4
PLSpredict assessment of manifest variables (original model).

Item	PLS-SEM		LM	PLS-SEM – LM [RMSE]
	RMSE	$Q^2_{predict}$	RMSE	$RMSE_{PLS-SEM} - RMSE_{LM}$
AO5	0.880	0.088	0.892	−0.012
I3	1.060	0.102	1.074	−0.014
I2	1.042	0.100	1.061	−0.019
I4	1.083	0.038	1.099	−0.016
I5	1.018	0.068	1.019	−0.001
AO1	0.922	0.108	0.939	−0.017
I6	0.952	0.082	0.958	−0.006
I1	1.072	0.095	1.089	−0.017
D4	1.037	0.088	1.055	−0.018
D6	1.025	0.065	1.039	−0.014
D2	1.029	0.081	1.041	−0.012
AT3	0.883	0.078	0.898	−0.015
D1	1.020	0.083	1.035	−0.015
AT6	1.062	0.102	1.078	−0.016
D5	0.913	0.065	0.920	−0.007
AT5	0.932	0.076	0.944	−0.012
AT4	0.963	0.078	0.979	−0.006
DS6	1.042	0.032	1.063	−0.021
DS2	0.961	0.060	0.981	−0.020
DS7	0.944	0.049	0.949	−0.005

Note: RMSE = Root Mean Square Error, LM = Linear Regression Model.

by $R^2 = 0.224$. The effect size analysis also revealed a medium effect ($f^2 = 0.289$) of self-esteem on cognitive engagement. This study's findings demonstrate that self-esteem has a significant impact on various dimensions of academic engagement, including affective, behavioural, and cognitive engagement. Consequently, the null hypothesis, which suggests no statistically significant influence of Economics students' self-esteem on their academic engagement, is not supported.

In addition, to check the out-of-sample predictive power, we used PLS$_{predict}$ with ten folds and ten repetitions to imitate how the PLS model will eventually be used to predict a new observation. Table 4 shows the PLS$_{predict}$ assessment of the manifest variables.

Table 4 unequivocally demonstrates that the discrepancies between PLS-SEM RMSE and LM RMSE ($\text{RMSE}_{\text{PLS–SEM}} - \text{RMSE}_{\text{LM}}$) are negative. This result implies that all indicators in the PLS-SEM analysis have lower RMSE values than that of the LM values. Shmueli et al. [64] posited that if the RMSE (or MAE) values for all indicators in a PLS-SEM analysis are lower than those in a naive LM benchmark, the model demonstrates strong predictive capability. Consequently, it can be inferred that the PLS-SEM model possesses a significant degree of predictive power.

4.4. Moderating role of gender in the influence of self-esteem on academic engagement

The purpose of the second hypothesis was to examine the moderating effect of gender on the nexus between Economics students' self-esteem and academic engagement. To investigate this, a PLS Multi-Group Analysis (PLS-MGA) was performed. It was crucial to assess the Measurement Invariance of Composite models using the MICOM method, as suggested by Henseler et al. [65], prior to conducting PLS-MGA. MICOM is the most appropriate approach for composite models such as PLS-SEM and involves a three-step process to determine configural invariance, compositional invariance, and equal mean and variance values.

In this study, MICOM was employed to ensure that any observed differences between the two student groups were solely attributed to gender as the grouping criterion, rather than potential variations in the measurement models. The MICOM analysis unveiled the presence of partial measurement invariance in both the male and female groups, which is pivotal for interpreting subsequent disparities at the PLS-MGA level in the PLS-SEM outcomes [65]. The MICOM results, including permutation and Scalar invariance (SI) [equality of composite means and variances (ECMV)], are presented in Tables 5 and 6, respectively, demonstrating the measurement invariance testing.

Table 5 shows that both configural and compositional invariances have been met ($p > 0.05$). Table 6 indicates the equal mean and equal variances assessment results.

In Table 6, the original average and variance difference values should fall within the confidence of interval and should not be significant ($p < 0.05$) for scalar invariance to be met. The result reveals that the variance difference value (-0.373, $p < 0.05$) for CE falls outside the confidence interval. If one of the conditions is met, then there is partial measurement invariance and multi-group analysis can be examined [65]. To determine the influence of gender on the connection between students' self-esteem and academic engagement, MGA [66] and a permutation-based procedure [67], both of which are dependable and cautious methods of PLS-SEM, were utilised. The results, illustrated in Tables 7 and 8, were derived from these non-parametric tests. The MGA and the permutation-based procedures are also recommended by Hair et al. [68].

As shown in Table 7, self-esteem appears to exert a substantial influence on students' AE, BE, and CE for both male and female Economics students. More specifically, the influence of SES on AE and BE was significant for both genders ($\beta = 0.403$ for females, $\beta = 0.495$ for males, and $p < 0.001$ for both), as was its impact on cognitive engagement ($\beta = 0.269$ for females, $\beta = 0.353$ for males, $p = 0.001$ for both). To further explore whether gender moderates the influence of SES on the three domains of engagement (AE, BE and CE), an additional analysis was conducted. Table 8 shows the Henseler's-MGA based on gender.

The result presented in Table 8 demonstrates that students' self-esteem exerts diverse effects on their affective, behavioural, and cognitive engagement. Specifically, the path coefficient difference [(β)-diff] indicated a disparate impact of self-esteem on affective [(β)-diff = 0.092, $p = 0.117$], behavioural [(β)-diff = 0.009, $p = 0.469$], and cognitive engagement [(β)-diff = 0.084, $p = 0.213$]. However, these distinctions were not statistically significant ($p > 0.05$), implying that gender did not substantially influence the connection between self-esteem and academic engagement. Consequently, the null hypothesis that gender does not affect the influence of self-esteem on academic engagement among economics students remains unchallenged.

5. Discussion

The present study aimed to examine the influence of Economics students' self-esteem on their academic engagement. The findings demonstrate a statistically significant positive association between Economics students' self-esteem and their academic engagement. This outcome aligns with the assertion that self-esteem predicts an individual's level of academic engagement [14]. The findings indicated that students' self-esteem had a substantial and positive impact on their levels of engagement in academic activities,

Table 5
Configural and Compositional Invariances Measurement Testing using Permutation.

Constructs	Configural Invariance	Original Correlation	Correlation Permutation Mean	5.0%	Permutation p-Values	Compositional Invariance
AE	Yes	0.988	0.990	0.973	0.278	Yes
BE	Yes	0.996	0.994	0.987	0.660	Yes
CE	Yes	0.992	0.980	0.937	0.668	Yes
SES	Yes	0.999	0.993	0.984	0.992	Yes

Table 6
Scalar invariance assessment (equality of composite means and variances).

	Equal Mean Assessment				Equal	Equal Variance Assessment				Equal
	Mean - Original Difference [F - M]	2.5%	97.5%	Permutation p-Values		Variance - Original Difference [F - M]	2.5%	97.5%	Permutation p-Values	
AE	−0.004	−0.188	0.197	0.966	Yes	−0.004	−0.293	0.301	0.980	Yes
BE	0.081	−0.198	0.198	0.411	Yes	0.072	−0.396	0.386	0.712	Yes
CE	0.091	−0.199	0.190	0.352	Yes	−0.373	−0.350	0.354	0.036	No
SES	0.139	−0.198	0.198	0.164	Yes	−0.211	−0.371	0.354	0.262	Yes

Note: F = Female; M = Male.

Table 7
Multi-group permutation test path coefficient results.

	Path Coefficients (β)						T-Statistic		p-Value	
	(β) Original [F]	(β) Original [M]	(β) Mean [F]	(β) Mean [M]	SD [F]	SD [M]	t-Value [F]	t-Value [M]	p-Value [F]	p-Value [M]
SES -> AE	0.403	0.495	0.430	0.512	0.064	0.043	6.291	11.467	<0.001	<0.001
SES -> BE	0.430	0.438	0.459	0.455	0.071	0.063	6.069	6.935	<0.001	<0.001
SES -> CE	0.269	0.353	0.304	0.366	0.083	0.067	3.232	5.261	0.001	<0.001

***p < 0.001.

Table 8
PLS MGA based on Gender.

	Path Coefficient Difference	p-Value Difference (One-tailed)		CI (2.5%, 97.5%)		Decision
	(β)-diff [M − F]	Henseler's-MGA Permutation Test		F [2.5%, 97.5%]	M [2.5%, 97.5%]	
SES -> AE	0.092	0.117	0.234	[0.230, 0.504]	[0.386, 0.561]	Not Significant
SES -> BE	0.009	0.469	0.937	[0.255, 0.534]	[0.290, 0.538]	Not Significant
SES -> CE	0.084	0.213	0.425	[0.108, 0.402]	[0.171, 0.451]	Not Significant

encompassing emotional, behavioural, and cognitive aspects. The current study's results suggest that Economics students with higher levels of self-esteem are more likely to exhibit heightened levels of affective, behavioural, and cognitive engagement in their academic pursuits. Additionally, the findings imply that positive self-evaluation among Economics students may play a favourable role in influencing their academic engagement.

This finding supports the implications derived from the expectancy-value theory, which posits that students' positive self-esteem can predict their level of academic engagement [13]. The expectancy-value theory is a psychological framework that emphasises the role of an individual's beliefs and perceptions in shaping their motivation and engagement in academic activities. In this context, the theory posits that Economics students are more likely to engage actively in their academic tasks when they hold positive expectations about their abilities and when they find value and relevance in what they are learning. First, positive self-esteem, which refers to an individual's overall self-worth and self-perception, plays a fundamental role in shaping these positive expectations. Economics students with high self-esteem tend to believe in their own competence and capabilities, leading them to expect success in their academic endeavours. This positive self-belief can serve as a powerful motivational force, encouraging learners to actively participate in their learning, take on challenges, and persevere through difficulties. In contrast, Economics students with low self-esteem may doubt their abilities, which can undermine their motivation and engagement in the learning process. In addition, the expectancy-value theory highlights the significance of value and relevance in academic engagement. When Economics students perceive that the content and activities in their academic work have personal relevance and are meaningful to their goals and interests, they are more likely to engage with enthusiasm and dedication. Positive self-esteem can contribute to this perception of value by enhancing students' belief in their capacity to achieve success and by promoting a sense of personal investment in their academic pursuits.

In summary, the finding that self-esteem predicts academic engagement provides empirical support for the expectancy-value theory, as it underscores the critical role of students' self-belief in shaping their active involvement in the learning process. Understanding and nurturing students' self-esteem and creating a learning environment that emphasises the relevance of educational experiences can be pivotal in promoting academic engagement and ultimately enhancing learning outcomes.

According to previous studies [18–20], the findings of this study are consistent with their results. Virtanen et al. [18] demonstrated that students' self-esteem had a positive relationship with their cognitive and affective engagement. Similarly, Karababa [19] discovered a significant positive reciprocal relationship between self-esteem and academic engagement. Zhao et al. [1] observed that self-esteem positively predicted students' academic engagement. Martin et al. [20] also revealed a positive correlation between academic engagement and self-esteem. Furthermore, previous research [e.g., 15, 17] has demonstrated a substantial positive relationship

between self-esteem and academic engagement. Collectively, these findings, along with the present study, provide further confirmation of a positive relationship between students' self-esteem and their affective, behavioural, and cognitive engagement in an academic context.

Furthermore, the second research hypothesis aimed to investigate whether gender plays a moderating role in the relationship between students' self-esteem and their academic engagement. Prior studies have paid limited attention to examining the moderating influence of gender in this context. Notably, this study unveils a novel and significant finding, indicating that gender does not moderate the influence of students' self-esteem on their affective, behavioural, and cognitive engagement. Thus, regardless of whether the Economics students were male or female, their self-esteem exerted a substantial influence on their academic affective, behavioural, and cognitive engagement. In other words, this finding indicates that the relationship between self-esteem and engagement, encompassing emotional, behavioural, and cognitive dimensions, remains consistent irrespective of the student's gender. This finding is consistent with that of Karababa [69] found that the relationship between school engagement and self-esteem was not influenced by gender. This is contrary to the findings that male students had higher self-esteem than females [26], and female students had higher level of academic engagement as compared to males [21,23]. One might assume that, given the susceptibility of students' self-esteem and academic engagement to their gender in these studies [21,23,26], gender would play a role in the nexus between these two variables (self-esteem and academic engagement). However, the current study refutes this assumption.

The finding indicates that both male and female students with high self-esteem are likely to experience similar emotional engagement in their learning. They may share positive emotional experiences such as enjoyment, interest, and enthusiasm for their academic activities. This suggests that educational interventions aimed at boosting affective engagement can be gender-inclusive and should focus on enhancing self-esteem regardless of gender. In terms of behavioural engagement, which includes participation, effort, and perseverance, the finding implies that self-esteem has a comparable impact on both male and female students. This is significant because it highlights that interventions to promote active involvement in learning, such as classroom participation or completing assignments, can be applied uniformly to students of all genders by addressing their self-esteem. Cognitive engagement, which relates to students' active mental involvement in their learning, also appears to be influenced similarly by self-esteem in both genders. Economics students with higher self-esteem, whether male or female, are more likely to exhibit characteristics of deep thinking, problem-solving, and critical analysis. This suggests that strategies to enhance cognitive engagement can be gender-neutral by focusing on self-esteem as a common factor.

6. Conclusions

The study revealed that Economics students' self-esteem had a statistically significant influence on their academic engagement. The current study contributes to academic engagement studies, specifically, the effect of self-esteem on academic engagement. It can be established from this study that one of the factors that influences Economics students' academic affective, behavioural and cognitive engagement is their self-esteem. It underscores the importance of self-esteem as a potential factor affecting students' academic engagement, highlighting that students' beliefs about their own abilities and worth play a role in their educational experiences. In addition, high self-esteem leading to increased academic engagement suggests a potential link between students' emotional well-being and their educational success, emphasising the need to address students' self-esteem for holistic development. Furthermore, it can be inferred that the influence of Economics students' self-esteem on their academic engagement is not moderated by gender. This suggests that the relationship between academic engagement and self-esteem remains consistent irrespective of the student's gender.

6.1. Recommendations

Further research should be conducted to explore the association between academic self-efficacy, emotional intelligence, and engagement in academics among students specialising in Economics. Future studies should investigate the mediating role of academic self-efficacy in the relationship between self-esteem and academic engagement. Additionally, head teachers, teachers, parents, and guardians are urged to prioritise promoting students' self-esteem. Furthermore, school counsellors should organise seminars to inspire students to have a positive self-evaluation of themselves. Lastly, in the organisation of seminars for students on how to enhance students' self-esteem, no special attention should be given to their gender.

6.2. Implications of the study

This finding carries important implications for educators (Teachers and headmasters), policymakers (Ghana Education Service [GES] and Ministry of Education [MoE]), and researchers. Firstly, the implication of the finding is that interventions and support programs aimed at enhancing Economics students' academic engagement should consider the promotion of self-esteem as a key factor. By fostering a positive self-perception and self-confidence among students, educational institutions can potentially contribute to increased affective, behavioural, and cognitive engagement. Encouraging learners to develop a strong sense of self-worth and belief in their capabilities may lead to improved motivation, active participation, and better cognitive processing, ultimately enhancing their academic performance and overall educational experience.

Also, teachers, counsellors, and policymakers can consider implementing strategies that promote self-esteem in the classroom environment. This might involve creating chances for students to establish and accomplish significant objectives, acknowledging and commemorating their successes, providing constructive feedback and support, and fostering a positive and inclusive learning environment. By addressing students' self-esteem needs, educational stakeholders can contribute to the holistic development of Economics

students and promote their engagement, well-being, and academic success.

Moreover, it suggests that interventions and strategies aimed at enhancing students' self-esteem to improve academic engagement can be implemented universally, without the need for tailoring them based on gender differences. Teachers can focus on fostering self-esteem in all students, recognising its significance in promoting engagement across various domains. Additionally, this finding challenges gender-based stereotypes and assumptions that may suggest differential effects of self-esteem on academic engagement between male and female students. By debunking such assumptions, it highlights the importance of considering individual characteristics and contexts when examining the factors influencing academic engagement, rather than solely relying on gender as a differentiating factor.

6.3. Contributions of the study

This current study had made substantial contributions in informing practice, knowledge and theory. Firstly, the research discovered that self-esteem is key in influencing academic engagement and for that matter, GES, Heads of Institutions and teachers should try and enhance students' self-esteem. Also, this study provides clear evidence that students' self-esteem has positive influence on their academic affective, behavioural and cognitive engagements. Again, the study augments the body of literature on self-esteem and academic engagement by establishing that gender does not moderate the effect of self-esteem on academic engagement. Moreover, the study confirms the expectancy-value theory that individuals' positive evaluation affects his/her engagement level.

6.4. Limitations of the study

The current study utilised a quantitative approach to explore the influence of gender on the nexus between Economics students' self-esteem and academic engagement at ten senior high schools in Kumasi Metropolis. However, the findings of this study may not apply to other regions or countries. Furthermore, the study did not consider external factors, such as family support, teacher-student interactions, or extracurricular activities, which may have impacted the results. Therefore, the researchers suggest that future studies should focus on a more diverse sample and consider additional factors that may influence the nexus between students' self-esteem and engagement in academic activities.

Data availability statement

Data will be made available after receiving a formal request.

Funding statement

CRediT authorship contribution statement

Mumuni Baba Yidana: Writing – review & editing, Writing – original draft, Supervision, Resources, Project administration, Methodology, Investigation, Data curation, Conceptualization. **Francis Arthur:** Writing – review & editing, Writing – original draft, Visualization, Validation, Supervision, Software, Project administration, Methodology, Investigation, Formal analysis, Data curation, Conceptualization.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Acknowledgements

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.heliyon.2024.e26237.

References

[1] Y. Zhao, Z. Zheng, C. Pan, L. Zhou, Self-esteem and academic engagement among adolescents: a moderated mediation model, Front. Psychol. 12 (690828) (2021), https://doi.org/10.3389/fpsyg.2021.690828.

[2] D.K. George, What student affairs professionals need to know about student engagement, J. Coll. Student Dev. 50 (2009) 683–706, https://doi.org/10.1353/csd.0.0099.

[3] S. Hu, G.D. Kuh, Being (dis)engaged in educationally purposeful activities: the influences of student and institutional characteristics, in: Paper Presented at the American Educational Research Association Annual Conference, 2001. Seattle.

[4] L. Speight, K. Crawford, S. Haddelsey, Towards measures of longitudinal learning gain in UK higher education: the challenge of meaningful engagement, Higher Educat. Pedagogies 3 (1) (2018) 196–218.

[5] H. Coates, Student Engagement in Campus-Based and Online Education, Routledge, 2006.

[6] J.A. Fredricks, P.C. Blumenfeld, A.H. Paris, School engagement: potential of the concept, state of the evidence, Rev. Educ. Res. 74 (1) (2004) 59–109.

[7] K.A. Smith, S.D. Sheppard, D.W. Johnson, R.T. Johnson, Pedagogies of engagement: classroom-based practices, J. Eng. Educ. 94 (1) (2005) 87–101.

[8] M. Tinio, Academic engagement scale for grade school students, Assessment Handbook 2 (1) (2009) 64–75.

[9] V. Trowler, Student Engagement Literature Review, The Higher Education Academy, 2010.

[10] G.D. Kuh, What we're learning about student engagement from NSSE, Change 35 (2) (2003) 35–44.

[11] L. Mebert, R. Barnes, J. Dalley, L. Gawarecki, F. Ghazi-Nezami, G. Shafer, J. Slater, E. Yezbick, Fostering student engagement through a real-world, collaborative project across disciplines and institutions, Higher Educat. Pedagogies 5 (1) (2020) 30–51.

[12] Y. Lim, O. Lee, Relationships between parental maltreatment and adolescents' school adjustment: mediating roles of self-esteem and peer attachment, J. Child Fam. Stud. 26 (2) (2017) 393–404.

[13] L. Fang, Educational aspirations of Chinese migrant children: the role of self-esteem contextual and individual influences, Learn. Indiv Differ 50 (2016) 195–202.

[14] P. Filippello, C. Buzzai, L. Sorrenti, S. Costa, A. Abramo, K.T. Wang, Italian version of the Family Almost Perfect Scale: psychometric characteristics and relationships with academic engagement, self-esteem, and personal perfectionism, Appl. Dev. Sci. 25 (4) (2019) 351–363.

[15] B.M. Ayenew, T.G. Gebremeskal, Sexual harassment, self-esteem and academic engagement as predictors of academic success of female secondary school students, Sci. Technol. Arts Res. J. 3 (2) (2014) 229–236.

[16] N. Pellas, The influence of computer self-efficacy, metacognitive self-regulation and self-esteem on student engagement in online learning programs: evidence from the virtual world of Second Life, Comput. Hum. Behav. 35 (2014) 157–170.

[17] S.R. Sirin, L. Rogers-Sirin, Exploring school engagement of middle-class African American adolescents, Youth Soc. 35 (3) (2015) 323–340.

[18] T.E. Virtanen, N. Kiuru, M.K. Lerkkanen, A.M. Poikkeus, M. Kuorelahti, Assessment of student engagement among junior high school students and associations with self-esteem, burnout, and academic achievement, J. Educat. Res. Online 8 (2) (2016) 136–157.

[19] A. Karababa, The reciprocal relationships between school engagement and self-esteem among Turkish early adolescents: a three-wave cross-lagged model, Child. Youth Serv. Rev. 116 (2020) 105–114.

[20] A.B.B. Martin, M.C. Perez-Fuentes, M.M.M. Jurado, A.M. Martinez, M.M.S. Marquez, M. Sisto, J.J.G. Linares, Emotional intelligence and academic engagement in adolescents: the mediating role of self-esteem, Psychol. Res. Behav. Manag. 14 (2021) 307–316.

[21] F.P. Hartono, N. Umamah, R.P.N. Puji, The level of student engagement based on gender and grade on history subject of senior high school students in Jember Regency, Int. J. Scient. Technol. Res. 8 (8) (2019) 21–26.

[22] K.S. Cooper, Eliciting engagement in the high school classroom: a mixed-methods examination of teaching practices, Am. Educ. Res. J. 51 (2) (2014) 363–402.

[23] S. Lietaert, D. Roorda, F. Laevers, K. Verschueren, B. De Fraine, The gender gap in student engagement: the role of teachers' autonomy support, structure, and involvement, Br. J. Educ. Psychol. 85 (4) (2015) 498–518.

[24] P.A. Partey, M.B. Yidana, Self-esteem and academic achievement of Economics students in selected senior high schools in the Ashanti Region, Ghana, J. Innovat. Educat. Africa 2 (1) (2018) 40–50.

[25] V. Zeigler-Hill, E.M. Myers, A review of gender differences in self-esteem, in: S.P. McGeown (Ed.), Psychology of Gender Differences, Nova Science Publishers, 2012, pp. 131–143.

[26] M. Zuckerman, C. Li, J.A. Hall, When men and women differ in self-esteem and when they don't: a meta-analysis, J. Res. Pers. 64 (2016) 34–51.

[27] C. Chen, G. Sonnert, P.M. Sadler, D.J. Malan, Foreseeing the endgame: who are the students who take the final exam at the beginning of a MOOC? Behav. Inf. Technol. 40 (6) (2021) 565–577.

[28] L.M. Romero-Rodríguez, M.S. Ramírez-Montoya, J.R.V. González, Correlation analysis between expectancy-value and achievement goals in MOOCs on energy sustainability: profiles with higher engagement, Interact. Technol. Smart Educ. 17 (2020) 417–434.

[29] P. Leavy, Research Design: Quantitative, Qualitative, Mixed Methods, Arts-Based, and Community-Based Participatory Research Approaches, Guilford Publications, 2017.

[30] W.L. Neuman, Social Research Methods: Qualitative and Quantitative Approaches, seventh ed., Pearson, 2014.

[31] J.W. Creswell, A Concise Introduction to Mix Methods Research, Sage Publications, 2014.

[32] E.W. Brewer, Conducting survey research in education, in: In Handbook of Research on E-Learning Applications for Career and Technical Education: Technologies for Vocational Training, IGI Global, 2009, pp. 519–533.

[33] M.B. Yidana, F. Arthur, Exploring economics teachers' efficacy beliefs in the teaching of Economics, Cogent Education (2023) 1–21, https://doi.org/10.1080/2331186X.2023.2222652.

[34] M.B. Yidana, F. Arthur, B.T. Ababio, Teachers' application of multiple intelligences approach in teaching economics, Educ. Res. Int. 2022 (2875555) (2022), https://doi.org/10.1155/2022/2875555.

[35] Ghana Education Service, Senior High School Selection Register, Accra, Ghana, 2022.

[36] R.V. Krejcie, D.W. Morgan, Determining sample size for research activities, Educ. Psychol. Meas. 30 (3) (1970) 607–610.

[37] Q.P. Kong, N.Y. Wong, C.C. Lam, Student engagement in mathematics: development of instrument and validation of construct, Math. Educ. Res. J. 15 (1) (2003) 4–21.

[38] R.F. DeVellis, Scale Development: Theory and Applications, fourth ed., Sage Publications, 2016.

[39] A. Fink, How to Conduct Surveys. A Step by Step Guide, sixth ed., Sage Publications, 2017.

[40] M. Rosenberg, Society and the Adolescent Self-Image, Princeton University Press, 1965.

[41] C.R. Martin, D.R. Thompson, D.S. Chan, An examination of the psychometric properties of the Rosenberg Self-Esteem Scale (RSES) in Chinese acute coronary syndrome (ACS) patients, Psychol. Health Med. 11 (4) (2006) 507–521.

[42] J. Martín-Albo, J.L. Núñez, J.G. Navarro, F. Grijalvo, The Rosenberg self-esteem scale: translation and validation in university students, Spanish J. Psychol. 10 (2) (2007) 458–467.

[43] C. Mimura, P. Griffiths, A Japanese version of the Rosenberg self-esteem scale: translation and equivalence assessment, J. Psychosom. Res. 62 (5) (2007) 589–594.

[44] S.J. Sinclair, M.A. Blais, D.A. Gansler, E. Sandberg, K. Bistis, A. LoCicero, Psychometric properties of the Rosenberg self-esteem scale: overall and across demographic groups living within the United States, Eval. Health Prof. 33 (1) (2010) 56–80.

[45] M. Vermillion, R.A. Dodder, An examination of the Rosenberg Self-Esteem Scale using collegiate wheelchair basketball student athletes, Percept. Mot. Skills 104 (2) (2008) 416–418.

[46] C.H. Wu, An examination of the wording effect in the Rosenberg Self-Esteem Scale among culturally Chinese people, J. Soc. Psychol. 148 (5) (2008) 535–552.

[47] P.A.O. Duarte, M.L.B. Raposo, A PLS model to study brand preference: an application to the mobile phone market, in: Handbook of Partial Least Squares, Springer, 2010, pp. 449–485.

[48] J.F. Hair Jr., G.T.M. Hult, C. Ringle, M. Sarstedt, A Primer on Partial Least Squares Structural Equation Modeling (PLS-SEM), Sage publications, 2016.

[49] I. Apostolakis, M.A. Stamouli, Validity and reliability assessment of quantitative research questionnaires in health units: the case of a questionnaire concerning the evaluation of a nursing services management information system of a hospital, Statist. Rev. 2 (1) (2006) 3–25.

[50] J.F. Hair Jr., M. Sarstedt, L. Hopkins, V.G. Kuppelwieser, Partial least squares structural equation modeling (PLS-SEM): an emerging tool in business research, Eur. Bus. Rev. 26 (2) (2014) 106–121.

[51] J. Hulland, Use of partial least squares (PLS) in strategic management research: a review of four resent studies, Strat. Manag. J. 20 (2) (1999) 195–204.

[52] W.W. Chin, The partial least squares approach for structural equation modeling, in: G.A. Marcoulides (Ed.), Modern Methods for Business Research, Lawrence Erlbaum Associates, 1998, pp. 295–336.

[53] M. Höck, C.M. Ringle, Strategic Networks in the Software Industry: an Empirical Analysis of the Value Continuum, IFSAM VIIIth World Congress, Berlin, 2006, 2006. Retrieved 2/22/2009 from, http://www.ibl-unihh.de/IFSAM06.pdf.

[54] V.M. Story, N. Boso, J.W. Cadogan, The form of relationship between firm-level product innovativeness and new product performance in developed and emerging markets, J. Prod. Innovat. Manag. 32 (1) (2014) 45–64.

[55] N.K. Malhotra, S. Dash, Marketing Research an Applied Orientation, Pearson Publishing, 2011.

[56] S.W. Huck, Reading Statistics and Research, sixth ed., Allyn & Bacon, 2012.

[57] J.C. Nunnally, Psychometric Theory, McGraw-Hill, 1978.

[58] M.R. Hamid, W. Sami, M.M. Sidek, Discriminant validity assessment: use of Fornell & Larcker criterion versus HTMT criterion, in: Journal of Physics: Conference Series, vol. 890, IOP Publishing, 2017 012163. No. 1.

[59] C. Fornell, D.F. Larcker, Evaluating structural equation models with unobservable variables and measurement error, J. Market. Res. 18 (1) (1981) 39–50.

[60] J. Henseler, C.M. Ringle, M. Sarstedt, A new criterion for assessing discriminant validity in variance-based structural equation modeling, J. Acad. Market. Sci. 43 (1) (2015) 115–135.

[61] J.F. Hair, J.J. Risher, M. Sarstedt, C.M. Ringle, When to use and how to report the results of PLS-SEM, Eur. Bus. Rev. 31 (1) (2019) 2–24.

[62] K.K. Wong, Mastering partial least squares structural equation modeling (PLS-SEM) with SmartPLS in 38 hours, iUniverse (2019).

[63] J. Cohen, Statistical Power Analysis for the Behavioural Sciences, Erlbaum, Hillsdale, NJ, 1988.

[64] G. Shmueli, M. Sarstedt, J.F. Hair, J.H. Cheah, H. Ting, S. Vaithilingam, C.M. Ringle, Predictive model assessment in PLS-SEM: guidelines for using PLSpredict, Eur. J. Market. (2019), https://doi.org/10.1108/EJM-02-2019-0189.

[65] J. Henseler, C.M. Ringle, M. Sarstedt, Testing measurement invariance of composites using partial least squares, Int. Market. Rev. 33 (3) (2016) 405–431.

[66] J. Henseler, C.M. Ringle, R.R. Sinkovics, The use of partial least squares path modeling in international marketing, in: New Challenges to International Marketing, Emerald Group Publishing Limited, 2009, pp. 277–319.

[67] W.W. Chin, J. Dibbern, An introduction to a permutation based procedure for multi-group PLS analysis: results of tests of differences on simulated data and a cross cultural analysis of the sourcing of information system services between Germany and the USA, in: Handbook of Partial Least Squares, Springer, 2010, pp. 171–193.

[68] J.F. Hair, M. Sarstedt, C.M. Ringle, S.P. Gudergan, Advanced Issues in Partial Least Squares Structural Equation Modeling (PLS-SEM), [second ed.], Sage Publications, Inc, 2017.

[69] A. Karababa, School engagement and self-esteem among Turkish secondary school students: a moderated-mediation model for academic achievement and gender, Psychol. Sch. 59 (6) (2022) 1088–1104.