Development and validation of propensity to cheat measure in the Ethiopian public universities

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Abstract

The major objective of this research is to develop a comprehensive and psychometrically sound scale assessing students' perceived propensity to cheat employing the theory of planned behavior. An exploratory sequential mixed design method was used to qualitatively explore the forms of intention to cheat and their indicators, followed by a quantitative method to examine the psychometric qualities of the scale based on a random sample of 500 (male = 367 [73.4%]; female = 133 [26.6%]) university students. Structured interviews and questionnaires were used to collect data. The propensity to cheat scale (PCS) is a valid and reliable tool for use in research, according to explanatory factor analysis and reliability evaluations. The PCS, therefore, measures what it promises to measure.

ARTICLE HISTORY
Received: 23 April, 2024
Accepted: 11 December, 2024

KEYWORDS
Propensity to cheat; reliability; validity; university Students; Ethiopia

Introduction

Evidences highlighting academic misconduct, such as cheating and plagiarism are increasing, posing a significant challenge across global education systems, affecting both developing and industrialized nations. In Ethiopia, cheating has escalated from individual actions to widespread group involvement among students, teachers, administrators, and even government officials since the early 2000s. This trend has led to decreased motivation to learn diligently among students. Political unrest, particularly against the TPLF-led EPRDF government, exacerbated the issue by leaking national exams to undermine the credibility of the regime, creating a legacy of misconduct that persists under new leadership. As cheating becomes more normalized, both immediate administrative and long-term preventive measures are required. Understanding the factors behind students' engagement in cheating through the theory of planned behavior (TBP) can help address this issue in Ethiopian higher education. The broader consequences of academic misconduct undermine educational quality and the integrity of credentials, impacting cultural, social, and economic development. Effective

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DOI: https://dx.doi.org/10.4314/bdje.v25i1.4

examination systems are essential for evaluating student performance and improving educational quality, requiring authenticity, reliability, and adherence to ethical academic standards.

Research on undergraduates indicates a propensity to engage in dishonest behaviors to achieve unfair advantages in exams. Cheating propensity is characterized by the motivation to use fraudulent means for academic success (Offor, 2009). Understanding students' beliefs and assessments regarding cheating can shed light on this propensity, as highlighted by various studies (Bolin, 2004; Jensen et al., 2002; Jordan, 2001; Kidwell et al., 2003; Rakovski& Levy, 2007; Vandehey et al., 2007).

Prevalence of Academic Dishonesty

Research indicates that academic dishonesty is prevalent in universities worldwide, regardless of academic discipline. Nilson (2010), highlights that cheating has become ingrained in American college culture since the late 1980s. This study involving 1,500 undergraduate students across 23 U.S. institutions found that 80% admitted cheating. Similar findings have been reported in various countries, including Australia (Brimble & Stevenson-Clarke, 2005), Canada (Hughes & McCabe, 2006), China (Ma et al., 2013), Iran (Ahmadi, 2012), New Zealand (De Lambert et al., 2006), and Taiwan (Lin & Wen, 2007), confirming the global nature of academic misconduct.

Academic dishonesty is prevalent across Africa. In Zimbabwe, Warinda (2016) found that freshmen were aware of cheating practices and admitted to be involved before starting university. In Kenya, Siringi (2009) reported that over 60% of students admitted to cheating on exams. In Nigeria, academic dishonesty includes various forms of misconduct, such as copying, impersonation, and bribery for grades, which has created significant issues in the educational system (Nwaopara et al., 2008; Gesinde et al., 2011). Sule (2009) emphasized that such examination misconduct has led to a severe crisis and stress within Nigerian education.

Academic dishonesty is a pervasive issue in Ethiopian universities with studies indicating that up to 96.4%, 82.1%, and 82% of students engage in cheating related to assignments, research, and exams, respectively (Tefera & Kinde, 2009, 2010). Other researches report a prevalence range of 53% to 96% in Ethiopian institutions (Mebratu, 2016; Mengistu, 2019; Wubalem et al., 2020, as cited in Wondifraw, 2021).Tefera and Kinde (2009, 2010) further reported that 84% of universities experience this issue. Comparatively, global rates are lower 72% in Australia (Brimble & Stevenson-Clarke, 2006) and 76.5% in Nigeria (Olasehinde-Williams et al., 2003). A meta-analysis indicates an average rate of 70.4% across 107 studies (Whitley, 1998).

Theoretical Frameworks

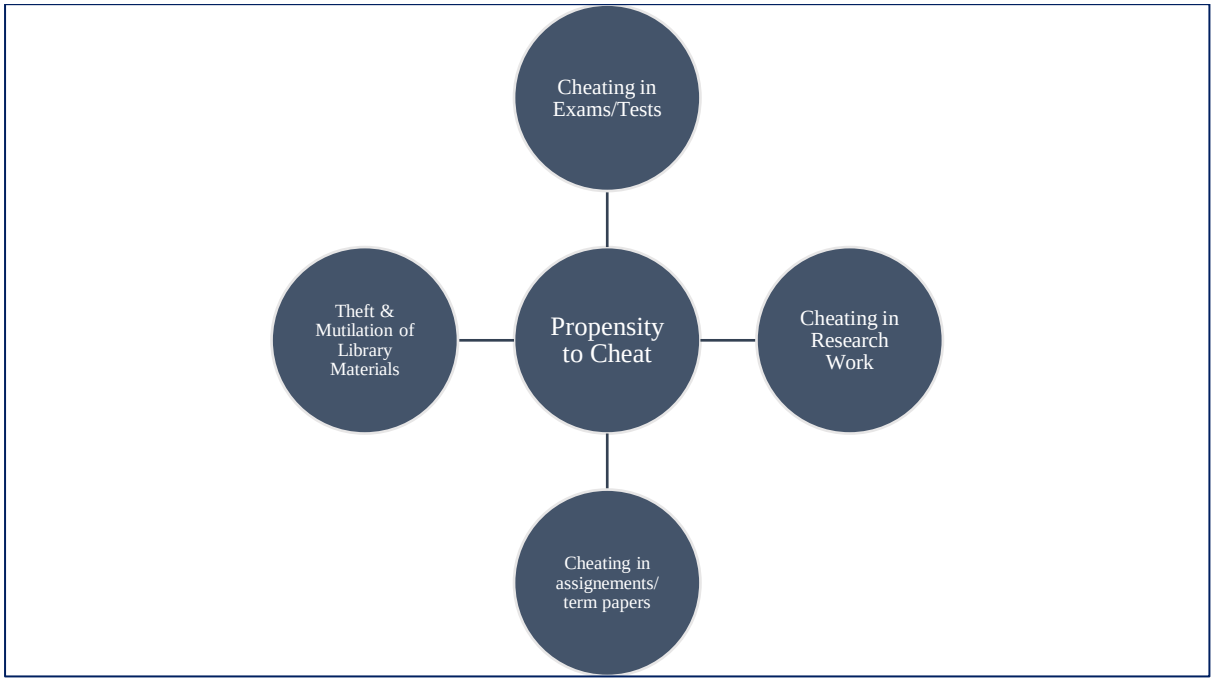
Several theoretical frameworks have been employed to understand and address academic fraud in higher education, including goal orientation theory (Miller et al., 2011), reasoned action (Simkin & McLeod, 2010), the theory of planned behavior (TPB) (Stone et al., 2010), and ethical perspectives such as egoism and utilitarianism (Lau et al., 2011). The TPB is particularly relevant for analyzing university students' cheating intentions, as it posits

that behavior is influenced by attitudes, subjective norms, and perceived behavioral control. While intentions may not always directly correlate with actual behavior, they can serve as useful indicators of what individuals are likely to do (Alanazi et al., 2017). The TPB's strengths lie in its comprehensive integration of social and individual influences, extensive empirical support, adaptability to include other relevant variables, and systematic measurement approach. Consequently, TPB serves as the preferred framework for developing and validating a Propensity to Cheat (PTC) measure of cheating behavior.

A conceptual framework for the propensity for academic misconduct has been developed based on a review of theories and definitions. This framework illustrates the interconnections among various factors influencing academic cheating. Four key indicators of PTC are utilized in a multidimensional approach to assess the likelihood of misconduct among university students. Figure 1 visually represents this conceptual framework, highlighting its theoretical basis.

Figure.1

Model for Dimensions of PTC



Source: own design

Statement of the Problem

Cheating among undergraduate Science and Engineering students poses a significant challenge for educators and employers, compromising examination integrity and educational quality. Studies indicate a high prevalence of examination misconduct. Starovoytova & Namango (2016) reported that 81% of engineering students engage in cheating, and McCabe & Trevino (1997) increased the figure to 82%, particularly in engineering compared to other disciplines. This trend is further exacerbated in Ethiopia, where poor assessment methods, as identified by Bachore (2014) and Nelson et al (2012), contribute to this issue. The impact of

academic dishonesty is evident, leading to a decline in educational quality (Solomon, 2017) and underscoring the need for universities to promote academic integrity.

To address these concerns, various scales have been developed to assess academic dishonesty, such as the widely recognized McCabe and Trevino scale. Other researchers have proposed multidimensional scales, including a three-dimensional construct by Adesile et al. (2016) and a seven-dimensional scale by Yang et al. (2013), highlighting numerous forms of academic misconduct. However, existing measures often lack robust psychometric properties and cultural relevance, particularly in the Ethiopian context (Imran & Nordin, 2013).

Exploratory and confirmatory component analysis has limited information available, primarily discussing the reliability coefficient (Iyer & Eastman, 2006; Adesile et al., 2016). Imran and Nordin (2013) highlighted that many measures lack robust psychometric properties, and their dimensionalities remain inadequately explored. Although claims of assessing discriminant and convergent validity using a Multi-Method Multi-Traits (MMMT) approach were made, there is insufficient evidence to support these assertions.

Researchers have developed various measures to assess academic dishonesty across different cultures (McCabe et al., 2001) and Diekhoff et al. (1999), but a validated instrument to evaluate students' propensity for cheating (PTC) in Ethiopia remains largely unexplored. Existing tools from other regions may not accurately capture the unique cultural, religious, and social contexts of Ethiopia, raising questions about their validity and reliability. This concern is compounded by the fact that these measures often fail to reflect the complex nature of PTC (Imran & Nordin, 2013).

As a result, a culturally reliable and valid PCS is required. There is a need to develop, determine its dimensionality, and validate an instrument measuring the PTC constructs. Validation and evaluation of instruments are critical in this regard to ensure that psychological and behavioral construct(s) are appropriately specified and measured (Hair et al., 2010).

Researchers, teaching at a public university in Ethiopia, have observed incidents of academic misconduct, including cheating and plagiarism, among students over the past six years. Some students have protested against the increasing practice of submitting copied term papers and cheating during exams. To address this issue, there is a need for a reliable instrument to measure the PTC (Perceived Tolerance for Cheating) among university students.

Thus, this study is meant to answer the following basic research questions: (1) what are the various factors that contribute to the PTC construct? 2) How well do the newly developed items in the PTC instrument maintain their psychometric properties?

Methods

The study aimed to develop and validate a self-report measure of cheating propensity among university students in Ethiopia, using a seven-step process outlined by (Dussault et al., 2007) and recommended by DeVellis (2017). The process includes: 1) Selecting the topic to be studied; 2) figuring out the completion context; 3) generating an item pool; 4) deciding on the response scale format; 5) having professionals evaluate the first item pool; 6) conducting a pretest to obtain preliminary validity evidence; and 7) carrying out the data collection to

obtain validity evidence in the development and validation process. The development model involved phases such as specifying and defining the PTC construct, item generation, scaling format determination, content validity evaluation, scale purification, validity assessment, and norm development. The first three phases were approached subjectively, while the last four were examined quantitatively, addressing the study's initial research questions.

The study employed an exploratory sequential mixed-methods design. This approach entails, first, collecting qualitative data to examine the forms of PTC and its indicators, followed by quantitative data collection to assess the psychometric properties of the developed scale. Creswell (2012) notes that this design is particularly useful when existing measures are inadequate, allowing researchers to identify themes, create an instrument, and then validate it quantitatively.

Participants of the study were fourth-year science and engineering students from Hawassa, Wolkite, and Ambo Universities in the 2022-2023 academic years. Out of approximately 1,377 enrolled students, which included 334 females, 550 were selected to complete a questionnaire using Yamane's formula from 1967. Ultimately, 500 students submitted valid responses, consisting of 367 males and 133 females. The participants were drawn from Natural and Computational Science, and Engineering/Institute of Technology.

The study employed probability sampling, specifically the lottery method, to select fourth-year students from the College of Science and Engineering at Hawassa University, Ambo University, and Wolkite University. The research focused on this college due to the shift in curriculum, reflecting the 70:30 graduate mix policy which emphasized the importance of science and technology in driving social change and economic growth (Teferra et al., 2018). To assess the validity and reliability of the instrument, data from these students were analyzed using inter-factor correlation coefficients, scale reliabilities, and exploratory factor analyses. Demographic characteristics of these respondents are detailed in Table 1.

Table 1

Name of universities, respective colleges, and number of undergraduate fourth year students included in the study

University Name	College/Institute	Gender		
		Male	Female	Total
Ambo University	College of natural and computational science	60	26	86
	Engineering	51	26	77
	Total	111	52	163
Wolkite University	College of natural and computational science	35	16	51
	Engineering	61	14	75
	Total	96	30	126
Hawassa University	College of natural and computational science	64	36	100
	Engineering	96	15	111
	Total	160	51	211
Total	College of natural and computational science	159	78	237
	Engineering	208	55	263
	Total	367	133	500

The quality of research instruments and data collection techniques is crucial for the overall quality of a study. This study focused on measuring students' PTC in tests or examinations, which hereafter called the PCS.

The Development of Propensity to Cheat Scale (PCS)

The study aims to develop and validate a self-report questionnaire, the PTC measure. The scale was developed in three phases:

1. Item Generation: A comprehensive literature review informs the development of a wide range of items addressing various aspects of cheating behavior. Expert interviews help refine themes for semi-structured questions.
2. Item Selection: Subject-matter experts evaluated an initial set of 70 items for relevance, clarity, and comprehensiveness, using a five-point Likert scale.
3. Item Refinement and Validation: A pilot study followed to refine items based on feedback and statistical analysis. Screening procedures and exploratory factor analysis (EFA) assess the scale's psychometric properties, including validity and reliability, ensuring that the final PCS accurately reflects the construct of PTC and is effective for the target population.

Validity of PCS

The evaluation of the scale's face validity focuses on readability, feasibility, format, understanding, style, and clarity (DeVon et al., 2007; Haladyna, 1999; Trochim, 2001). For this study, four subject matter experts in Measurement and Evaluation, Educational Psychology, and Special Needs provided insights into the psychological factors behind dishonest behavior, while three language professionals checked language clarity and grammatical accuracy of the survey items and did the translation of the English version into Amharic.

The content validity test determines whether the content covers a broad range of the attributes under consideration, and it is normally performed by at least seven experts (DeVon et al., 2007; Pilot & Hunger, 1999). In this study, four subject matter experts and three teachers from Wolkite University evaluated the content qualitatively after item generation and format determination.

Reliability refers to the consistency of an instrument's results over repeated uses (Babbie, 1990) and is further defined by Wiersma (2000) as its ability to consistently measure what it is intended to measure. To test reliability, the Cronbach alpha coefficient was applied to data from participants across four subscales related to tendencies toward academic mis-conduct, with each subscale achieving a reliability coefficient of .85 or higher, confirming the instrument's validity for the research.

The study involved collecting data from students at Hawassa University, Ambo University, and Wolkite University between November and January 2022. Researchers obtained consent from university deans and administered a self-reported questionnaire, after explaining the study's objectives, processes, and confidentiality to students to ensure voluntary participation and anonymity, ensuring ethical concerns and minimizing response bias. To enhance validity, qualitative interviews were conducted to explore the forms and

indicators of the PTC, which were then evaluated for content validity by expert judges. Based on their feedback, relevant items were selected for quantitative analysis, including inter-factor correlation analysis, exploratory factor analysis (EFA), and reliability analysis.

The data analysis involved several key steps: First, Lawshe's (1975) Content Validity Ratio (CVR) was applied to assess content validity. Item analysis was conducted using metrics such as item mean, inter-item correlation, corrected item-total correlations, and the alpha if an item was deleted. To explore underlying factors, maximum likelihood analysis was performed. Reliability was assessed using Cronbach's alpha. SPSS 25.0 was utilized for item analysis, EFA, and reliability analysis, incorporating the Kaiser-Meyer-Olkin (KMO) test and Bartlett's test of sphericity to ensure sample size adequacy for EFA. Detailed information on each analytical phase is provided below.

Results

This section summarizes the study's findings in light of the proposed model for developing and validating the students' perceived PCS.

Specifying the Construct (Students' Perceived PTC)

In the initial phase of the study about scale development and validation, the concept of PTC in higher education was defined. This helped to identify four main types of cheating: test and exam cheating, assignment cheating, plagiarism in research, and the theft or damage of library materials. After identifying these categories, participants were asked to provide clear definitions for each type of cheating.

Item Generation

The item generation process, as per the PTC definition, aimed to create a representative sample of items relevant to the target construct, following the methodology outlined by Clark and Watson (1995). A total of 70 items were initially generated through interviews, categorized as follows: 24 items were related to cheating on tests or examinations, 20 on assignments, 18 onplagiarism, and 8 on mutilation of library materials.

Content Validity Assessment

This study involved seven professional judges evaluating 70 draft items designed to measure the propensity to cheat (PTC). Each judge classified the items as irrelevant, inadequate, adequate, or highly acceptable, and a CVR was computed based on their feedback using Lawshe's method.

Out of the 70 items, 61 received a CVR of .70 or higher, while 9 items scored below .40 and were removed to enhance validity and reliability. Additionally, 29 items were discarded due to factor loading issues: 9 incorrectly loaded on wrong factors, 9 had high cross-loadings, and 5 had low overall loadings. Ultimately, 30 items were retained from the original 61, ensuring both content and construct validity for the PTC measurement instrument.

Table 2

CVR Computation Results

CVR value	Number of Items	Cumulative Number of Items
1	25	25
.70	36	61
.40	5	66
.14	3	69
-.14	1	70

Scale Purification

After conducting a content validity analysis, the researchers administered the instrument to a large, representative sample of the target population. They assessed the scale's psychometric properties using exploratory factor analysis (EFA), reliability analysis, and CFA (Hinkin, 1998). To ensure data accuracy, they reviewed frequency distributions and the minimum and maximum scores for each question prior to analysis with nono missing data. The scores, ranging from one to five, aligned with the scale's design, ensuring the integrity of the data set.

Item Analysis

Before conducting Exploratory Factor Analysis (EFA) on the PTC measure, an item analysis was performed, using evaluation of item means, inter-item correlations, corrected item-total correlations, and alpha if an item was eliminated. The PTC measure included four subscales: plagiarism in research, cheating in tests, cheating in assignments, and theft and mutilation of library materials. Inter-item correlations varied across subscales, with ranges of 0.01 to 0.65 for plagiarism, 0.07 to 0.67 for cheating in tests, 0.11 to 0.71 for cheating in assignments, and 0.48 to 0.77 for library theft. Item-total correlation scores were satisfactory, falling between 0.34 to 0.61 for cheating in tests, 0.39 to 0.67 for assignments, 0.37 to 0.79 for plagiarism, and 0.68 to 0.82 for library theft.

Items with inter-item correlations above 0.30, item-total correlations greater than 0.50, and mean values center were selected for EFA, following guidelines from Field (2009). The determinant of the correlation matrix was above 0.0001, indicating no multicollinearity. An inter-correlation matrix showed sufficient relationship among certain items, and Pearson's correlation coefficients were also calculated between factors.

To prepare for EFA, the data's adherence to both univariate and multivariate normality was assessed using skewness and kurtosis values. All measurements were within acceptable thresholds (skewness below 3.0 and kurtosis below 10.0), indicating normal distribution (Harrington, 2009; Kline, 2005). In this study, all skewness and kurtosis values fell below these thresholds, indicating a normal distribution. The sample consisted of randomly selected participants, and the Likert-scale data was treated as interval-level, consistent with prior studies (Floyd &Widaman, 1995). Thus, the data fulfilled the EFA assumptions and deemed suitable for analysis.

Exploratory Factor Analysis

Principal Components Analysis (PCA), Principal Axis Factoring (PAF), and Alpha Factoring were methods for extracting factors. The Maximum Likelihood (ML) method, used in this research, was optimal for estimating parameters and assessing model fit, statistical significance, and confidence intervals (Fabrigar et al., 1999). Oblique rotation, which allowed for correlated factors, was employed to extract factors, yielding more accurate results in human behavior research (Williams et al., 2010; Costello & Osborne, 2005). The analysis showed moderate, significant, and positive correlations between the factors, ranging from .52 to .74.

Table 3

Factor Correlation between Propensity to Cheat Subscales (n=500)

Factor	Mutilation on Library Material	Cheating on Test	Cheating on Research	Cheating on Assignment
Mutilation on library Material	1			
Cheating on test	.678**	1		
Cheating on research	.741**	.586**	1	
Cheating on assignment	.520**	.571**	.578**	1

**. Correlation is significant at the 0.01 level (2-tailed).
* *p*<.05; Kaiser-Meyer-Olkin (KMO) Measure of Sampling Adequacy = .953; Bartlett's Test of Sphericity: Chi- square = 11212.1; *df*= 435; p < .0001

To verify the suitability of data for EFA, several preliminary tests were conducted: Kaiser-Meyer-Olkin (KMO) Measure was .95, which is above the recommended threshold of .50, indicating adequate sampling. Additionally, Bartlett's Test of Sphericity was significant (χ^2 (df = 406, n = 500) = 10976.45, p < .05). These results indicate that the data were suitable for EFA (Bartlett's, 1954).

Extraction of Factors

There are a variety of methods for determining the number of factors, including prior determination, eigenvalues, and scree plots, as well as extracting the cumulative %age of variance. The researchers determined the number of factors to extract for this study based on previous literature and expert opinions about the forms of PTC construct. Using Maximum Likelihood analysis with Oblimin and Kaiser Normalisation rotation, a four-factor solution was identified. The factors had eigenvalues greater than one: Factor one (13.42) accounted for 46.28% of the variation; Factor two (2.17) accounted for 7.46%; Factor three (2.02) contributed 6.98%; and Factor four (1.22) explained 4.20%. Together, these four factors explain an average of 64.92% of the total variance.

Table 4

Total Variance Explained of Eigenvalues and Cumulative %age of Variance Accounted for by the Four Factors of the Propensity toward Academic Cheating Items (n=500)

Factor	Total	Variance Initial Eigen Values % of Variance	Cumulative %
1	13.422	46.282	46.282
2	2.165	7.464	53.746
3	2.024	6.980	60.726
4	1.217	4.197	64.923

Table 5 presents the final rotation of the retained PTC factors and their extracted communalities following an oblique rotation approach. A Confirmatory Factor Analysis (CFA) identified twenty-six items across four factors. Factor one included seven items (MOL55-MOL61) with loadings between .58 and .93 and communalities from .72 to .87. Factor two included six items (COT5-COT11) with loadings of .61 to .81 and communalities ranging from .60 to .73. Factor three comprised seven items (COR45-COR52) with loadings from .51 to .71 and communalities between .41 and .69. Finally, factor four contained six items (COA22-COA30) with loadings of .52 to .66 and communalities from .37 to .53. All measured variables demonstrated sufficient standardized factor loadings exceeding .50 on their respective factors, and all loadings were statistically significant ($p < .05$).

The item analysis and factor analysis revealed that the PCS had a four-factor structure, which was validated by the EFA of the sample data. These findings confirmed the ongoing establishment of construct validity for the newly developed scale.

Table 5

Rotated Pattern Matrix, Communality and Cronbach's Alpha if Item Deleted of the four-Factor Solution of PTC Items (n=500)

Code	Items	Factors					Cronbach's Alpha if Item Deleted
		1	2	3	4	h^2	
COT5	I rely on bribes with an instructor to get test information.		.732			.733	.955
COT6	I copy answers from a classmate's test paper during an exam while the instructor is not looking.		.763			.722	.956
COT8	I use "signals" to ask my classmates for answers during a test.		.772			.689	.956
COT9	I utilize "signal' to share answers to classmates during an examination.		.811			.602	.957
COT10	I cheat by writing the answers to questions on a soft or handkerchief and pretending to cough while using the soft.		.799			.705	.956
COT11	I personally exchange test papers with someone during a test.		.608			.668	.955
COA22	I would cheat on an assignment if I can get an opportunity				.661	.430	.958
COA23	I am likely to cheat on an assignments in the future.				.614	.399	.957
COA26	I submit the project/assignment/paper in my name after getting it prepared by my friends.				.663	.499	.957
COA27	I am resubmitting an assignment from a previous subject in a new subject.				.660	.529	.956
COA29	I provide false justifications to get an extension of a deadline for submitting an assignment.				.518	.365	.957
COA30	I copy a homework assignment from a different portion of the class.				.557	.437	.957

Code	Items	Factors					Cronbach's Alpha if Item Deleted
		1	2	3	4	h^2	
COR45	I copy and modify a few phrases or sentences from a published work for inclusion in a written research paper without providing acknowledgment to the author.			.585		.467	.956
COR46	I create or falsifying research data, using a secondary source as a primary source.			.710		.603	.957
COR47	I fabricate or falsifying a bibliography.			.545		.524	.955
COR48	I am working on a research paper for another student.			.689		.691	.956
COR49	I pay for a research paper to be written for me.			.569		.610	.955
COR50	I submit a research paper prepared by someone else as my own work, in part or in whole.			.618		.413	.956
COR52	I present a study paper that I got from a "Web site, or online sources," as my own work.			.512		.607	.956
MOL55	I take out library books so that my classmates do not get required content.	.578				.718	.955
MOL56	I take material from the library without first checking them out.	.695				.808	.955
MOL57	I cut pages out of journals or books in the university library.	.798				.840	.955
MOL58	I eliminate a reference from the library shelf to prevent other students from gaining access to the information.	.915				.871	.955
MOL59	I hide library material in my pocket, handbag, and exercise book.	.926				.822	.955
MOL60	Confusing/diverting the attention of people at the circulation desk.	.817				.726	.955
MOL61	Smuggling it out of the library with the help of library workers.	.694				.733	.955

Notes: Extraction Method: Maximum Likelihood. Rotation Method: Oblimin with Kaiser Normalization; Rotation converged in 13 iterations; h^2 - denotes communality; Factor 1 = theft and mutilation of library material; Factor 2 = cheating on tests; Factor 3= cheating on research work and Factor 4= cheating on assignments. The table does not display loading values less than 0.50.

Reliability Analysis

In this study, Cronbach's Alpha was employed to assess the internal consistency reliability of four subscales measuring propensity toward academic misconduct: cheating on examinations, cheating on assignments, cheating on research, and theft/mutilation of library materials. All subscales demonstrated reliability coefficients exceeding the recommended threshold of 0.7, with values of .93, .85, .90, .85, and .96 respectively, indicating strong internal consistency (Nunnally & Bernstein, 1994). Additionally, descriptive statistics revealed means and standard deviations for the subscales as follows: cheating on tests (M=2.69, SD=1.13), cheating on assignments (M=3.03, SD=.80), cheating on research (M=2.95, SD=.89), and mutilation of library materials (M=2.65, SD=1.20). Overall, the findings confirm that the subscales have good internal reliability (Cunha et al., 2016).

Table 6

Mean, Standard Deviation, and Cronbach's Alpha Results of PTC Subscales (n = 500)

Subscale	Items	No of Items	Mean	SD	Cronbach's alpha
Cheating on tests/ Examination	COT5, COT6, COT8, COT9, COT10, COT11	6	2.69	1.13	.926
Cheating on assignments	COA22, COA23, COA26, COA27, COA28, COA29, COA30, COA31	8	3.03	.80	.846
Cheating on research work	COR44, COR45, COR46, COR47, COR48, COR49, COR50, COR51,	9	2.95	.89	.897

Subscale	Items	No of Items	Mean	SD	Cronbach's alpha
Theft and Mutilation of library Material	COR52 MOL55, MOL56, MOL57, MOL58, MOL59, MOL60, MOL61	7	2.65	1.20	.958
Cronbach's alpha (computed with "30 items")					.957

Confirmatory Factor Analysis (CFA)

CFA is essential for advancing construct validity in social and behavioral sciences (Brown, 2015). Researchers can enhance their constructs by conducting pilot studies or adapting items from previous research, validating them with CFA (Alumran et al., 2012). Failure to use validated measurement techniques risks producing misleading results (Hewlett et al., 2007).

In this study, CFA was conducted using structural equation modeling in STATA to assess the validity and reliability of measures related to PTC. The standardized factor loading coefficients indicated that cheating on tests ranges from (0.75 - 0.86), assignment cheating range from 0.59 - 0.72), and research work plagiarism (0.60 - 0.85), while the coefficient for library theft/mutilation ranged from 0.77 to 0.92. The coefficient of determination (R^2) values were 0.74 for cheating on test (COT5) and 0.73 for research work (COR49), while the COR46 item had the lowest (.36), whereas assignment cheating (COA29) had a lower R^2 of 0.35. The CFA model explained significant variances: 64% for tests, 52% for assignments, and 79% for both research work and library theft. Overall, the CFA demonstrated a comprehensive R^2 of 0.91, indicating that the measures collectively explain 91% of the variance in PTC, highlighting library theft and exam cheating as the most influential factors.

Table 7

CFA Results for PTC (N = 500)

Latent Variable	Coding of Items	Observed and Unobserved Variables	Standardized Factor Loadings	Standard Errors	R^2 values
Cheating on tests	COT5	I rely on bribes with an instructor to get test information.	.86	.01	.74
	COT6	I copy answers from a classmate's test paper during an exam while the instructor is not looking.	.85	.01	.72
	COT8	I use "signals" to ask my classmates for answers during a test.	.82	.02	.67
	COT9	I utilize "signal' to share answers to classmates during an examination.	.75	.02	.56
	COT10	I cheat by writing the answers to questions on a soft or handkerchief and pretending to cough while using the soft.	.83	.02	.70
	COT11	I personally exchange test papers with someone during a test.	.82	.02	.67
Cheating on assignments	COA22	I would cheat on an assignment if I can get an opportunity	.65	.03	.42
	COA23	I am likely to cheat on an assignment in the future.	.63	.03	.40
	COA26	I submit the project/assignment/paper in my name after getting it prepared by my friends.	.72	.03	.52
	COA27	I am resubmitting an assignment from a previous subject in a new subject.	.72	.03	.52
	COA29	I provide false justifications to get an extension of a deadline for submitting an assignment.	.59	.03	.35
	COA30	I copy a homework assignment from a different portion of the class.	.65	.03	.42

Latent Variable	Coding of Items	Observed and Unobserved Variables	Standardized Factor Loadings	Standard Errors	R^2 values
Cheating on research work	COR45	I copy and modify a few phrases or sentences from a published work for inclusion in a written research paper without providing acknowledgment to the author.	.63	.03	.39
	COR46	I create or falsifying research data, using a secondary source as a primary source.	.60	.03	.36
	COR47	I fabricate or falsifying a bibliography.	.80	.02	.64
	COR48	I am working on a research paper for another student.	.72	.02	.52
	COR49	I pay for a research paper to be written for me.	.85	.02	.73
	COR50	I submit a research paper prepared by someone else as my own work, in part or in whole.	.78	.02	.60
	COR52	I present a study paper that I got from a "Web site, or online sources," as my own work.	.68	.03	.47
Theft and Mutilation of library Material	MOL55	I take out library books so that my classmates do not get required content.	.77	.02	.60
	MOL56	I take material from the library without first checking them out.	.85	.01	.72
	MOL57	I cut pages out of journals or books in the university library.	.90	.01	.81
	MOL58	I eliminate a reference from the library shelf to prevent other students from gaining access to the information.	.91	.01	.83
	MOL59	I hide library material in my pocket, handbag, and exercise book.	.92	.01	.85
	MOL60	Confusing/diverting the attention of people at the circulation desk.	.91	.01	.82
	MOL61	Smuggling it out of the library with the help of library workers.	.85	.01	.72
Propensity to cheat	COT	Cheating on tests	.89	.02	.64
	COA	Cheating on assignments	.72	.03	.52
	COR	Cheating on research work	.89	.02	.79
	MOL	Theft and mutilation of library material	.89	.02	.79

Discussion

The purpose of this study was to discuss the development and preliminary validation of a scale to assess the likelihood of cheating. This part provides a quick overview of the results of the analyses with respect to the phases of the suggested study model.

Specifying the Construct

In the initial step of scale development for the PTC Measure, a clear definition of the construct is essential (Churchill, 1979; Schwab, 1980; Spector, 1992; MacKenzie, 2003). Participants evaluated the relevance of each scale item, which helped address content validity through professional judges assessing the identified forms of PTC: cheating on tests or examinations, cheating on assignments, plagiarism in research work, and the theft or mutilation of library materials. The experts classified each of the 70 draft items related to these four types of cheating.

The interviews also intended to precisely describe each form of PTC. As a result, experts provided definitions for the four types: (1) cheating on tests/examinations indicates a tendency to engage in dishonest behaviors during assessments (e.g., copying answers); (2) Cheating on assignments included dishonest practices related to copying coursework, such as submitting the same work for multiple courses; (3) Plagiarism involves dishonest acts in research contexts, such as using another's words without proper citation; (4) Theft and

mutilation of library materials refers to actions that damage or obstruct access to library resources, such as stealing or hiding materials. Through these processes, the construct of PTC was clearly defined and validated.

Content Validity Assessment

Content validity is a crucial psychometric criterion in developing new measures, serving as the first step in constructs validation (Schriesheim et al., 1993). Lawshe (1975) introduced the CVR, indicating that for ten expert judges, a CVR of .62 is the minimum acceptable threshold.

Item Analysis

The item-level analysis was conducted to identify and eliminate poorly performing items in the scale-building process, following guidelines from Nunnally and Bernstein (1994). Key methods included: evaluating item means, inter-item correlations, corrected item-total correlations, and assessing alpha if an item was eliminated. Items with a correlation coefficient less than .30, a total correlation coefficient less than .50, or unusually low or high mean values were excluded (DeVellis, 1991), based on the criteria set by Flynn et al. (1994) and Hair et al. (2010). Finally, 30 items met the criteria and were advanced for EFA.

Exploratory Factor Analysis

The EFA employed maximum likelihood extraction with oblimin rotation to identify the underlying variables related to academic cheating behavior, with the final solution accounting for 64.92% of the total variance. This exceeded the 50% threshold recommended by researchers (Hair et al., 1995; Thompson, 2004). The analysis revealed four factors: the first accounted for 46.28% of the variance (mutilation of library resources), followed by the second (7.46%),while the remaining factors accounted for 6.98%, and 4.20%, with cheating on assignments contributing the least.

During refinement of the PCS, four items (COA28, COA31, COR44, COR51) were removed due to poor inter-item correlation and low loading values. No items were eliminated from the first or second factors, resulting in a revised scale of 26 items.

Reliability Analysis

Cronbach's alpha was employed to evaluate the reliability of the study instrument, specifically examining the internal consistency of the sub-scales and the overall PTC construct. Following guidelines from Cunha et al. (2016) and Fornell & Larcker (1981), reliability values between 0.8 and 1.0 are deemed extremely high, while a minimum of 0.70 is considered acceptable (Churchill, 1979; Tavakol & Dennick, 2011). The study found reliability estimates of .93, .85, .90, and .96 for cheating on exams, assignments, research work, and theft and mutilation of library materials, all surpassing the acceptable threshold. The overall PTC construct, comprising 26 items, achieved a Cronbach's alpha of .96, reflecting excellent internal consistency. Thus, the reliability ratings across the subscales and the overall PTC scale ranged from acceptable to very high (Cunha et al., 2016).

Confirmatory factor Analysis

The CFA model results indicated that the standardized factor loading coefficients for all items of the studied constructs ranged from .59 for the measurement item for cheating on assignments to .92 for the measurement item for theft and mutilation of library materials. The lowest loading was for the indicator related to cheating on assignments, while the highest was for theft and mutilation of library materials. This suggests that the indicators effectively capture their respective unobserved constructs, as supported by Collier (2020), who noted that standardized estimates facilitate comparisons among indicators.

The analysis of squared multiple correlation coefficients (R^2) revealed that indicators for cheating on tests explained 56% to 74% of the variance, demonstrating their effectiveness. In contrast, the indicators for cheating on assignments only accounted for 35% to 52% of the variance, indicating less effectiveness. For cheating on research work, seven indicators explained 46% to 73% of the variance, while the indicators related to theft and mutilation of library materials explained between 60% and 85% of the variance, highlighting their significance in understanding this construct.

Conclusion and Implications

The study aimed to develop a comprehensive and psychometrically validated measurement scale of the PCS for higher education students. The resulting instrument is shown to be both valid and reliable for assessing students' intentions regarding various forms of academic misconduct, enabling higher education institutions to effectively measure the likelihood of cheating among students.

The development and validation of the PCS study provide a reliable tool for assessing an individual's likelihood of cheating, enhancing the existing research on cheating behavior. This tool can help identify individuals at risk for cheating, allowing educators and employers to implement targeted interventions that promote academic and professional integrity. By validating the PCS, the study improves our understanding of cheating behavior, supports the establishment of policies that foster ethical conduct, and encourages proactive strategies in educational institutions and workplaces. Additionally, the study paves the way for further research into factors influencing cheating behavior, thus contributing valuable insights for prevention and intervention strategies in academic and professional contexts.

Limitations and Recommendations for Future Research

While the current study offers practical benefits for academics, practitioners, and students in the field of measurement and assessment, it has several limitations that should be considered for future research. The newly developed and validated tool was specifically designed to measure a student's perceived PTC in the context of tests or exams. However, the study did not account for certain demographic factors, such as socioeconomic status and family background, which may influence a student's PTC. To strengthen the evidence for the validity and reliability of this measure, future research should focus on exploring the psychometric properties of the PTC using a larger and more diverse sample.

References

Adesile, I., Nordin, M. S., Kazmi, Y., & Hussien, S. (2016). Validating academic integrity survey (AIS): An application of exploratory and confirmatory factor analytic procedures. *Journal of Academic Ethics*, 14, 149-167.

Ahmadi, A. (2012). Cheating on Exams in the Iranian EFL Context. *Journal of Academic Ethics*, 10(2): 151-170

Alanazi, N. H., Lee, J. W., Dos Santos, H., Job, J. S., & Bahjri, K. (2017). The use of planned behavior theory in predicting cigarette smoking among Waterpipe smokers.*Tobacco induced diseases*, *15*(1), 1-8.

Alumran, A., Hou, X. Y., & Hurst, C. (2012). Validity and reliability of instruments designed to measure factors influencing the overuse of antibiotics. *Journal of Infection and Public Health*, *5*(3), 221-232.

Babbie, E. (1990). *Survey research methods (2nd ed.).* Wadsworth Publishing Company.

Bachore, M. M. (2014). Academic dishonesty/corruption in the period of technology: Its implication for quality of education. *American Journal of Educational Research*, 2, 1060-1064.

Bolin, A. U. (2004). Self-control, perceived opportunity, and attitudes as predictors of academic dishonesty. *Journal of Psychology*, 138(2), 101–114.

Brimble, M., & Stevenson-Clarke, P. (2005). Perceptions of the prevalence and seriousness of academic dishonesty in Australian universities. *The Australian Educational Researcher*, *32*(3), 19-44.

Brimble, M., & Stevenson-Clarke, P. (2006). Managing academic dishonesty in Australian universities: Implications for teaching, learning and scholarship. *Accounting, Accountability & Performance*, 12(1), 32-63.

Brown, T. A. (2015). Confirmatory factor analysis for applied research (2nd ed.). Guilford Press.

Churchill Jr, G. A. (1979). A paradigm for developing better measures of marketing constructs. *Journal of marketing research*, *16*(1), 64-73.

Clark, L. A., & Watson, D., B .(1995). Constructing validity: Basic issues in objective scale development. *Psychological Assessment*, 7, 309–319.

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

Costello, A. B., Osborne, J. W. (2005). Best practices in exploratory factor analysis: four recommendations for getting the most from your analysis. *Practical Assessment, Research & Evaluation*, 10(7), 1-9.

Creswell, J.W. (2012). *Educational research: Planning, conducting, and evaluating quantitative and qualitative research (4th ed.).* Pearson.

Cunha, C. M., Almeida Neto, O. P., & Stackfleth, R. (2016). Main psychometric evaluation methods of measuring instruments reliability. *Rev AtençãoSaúde*, *14*(49), 98-103.

De Lambert, K., Ellen, N., & Taylor, L. (2006). Chalkfacechallenges: A study of academic dishonesty amongst studentsin New Zealand tertiary institutions. *Assessment & Evaluation in Higher Education*, *31*(5), 485-503.

DeVellis, R. F. (1991). *Scale development: Theory and applications.* Sage

DeVellis, R. F. (2017). *Scale development: Theory and applications* (4th ed.). SAGE.

DeVon, H. A., Block, M. E., Moyle-Wright, P., Ernst, D. M., Hayden, S. J., Lazzara, D. J., & Kostas-Polston, E. (2007). A psychometric toolbox for testing validity and reliability. *Journal of Nursing scholarship*, 39(2), 155-164.

Diekhoff, G. M., LaBeff, E. E., Shinohara, K., & Yasukawa, H. (1999). College cheating in Japan and the United States. *Research in Higher Education*, 40(3), 343-353.

Dussault, M., Valois, P., & Frenette, E. (2007).Validation de l'échelle de leadership transformatif du directeurd'école. *Psychologie du travail et des organisations*, 13(2), 37-52.

Fabrigar, L. R., Wegener, D. T., MacCallum, R. C., & Strahan, E. J. (1999). Evaluating the use of exploratory factor analysis in psychological research. *Psychological methods*, *4*(3), 272.

Field, A. (2009). *Discovering Statistics Using SPSS (3rd ed.).* Sage Publications.

Floyd, F. J., & Widaman, K. F. (1995). Factor analysis in the development and refinement of clinical assessment instruments. *Psychological assessment*, *7*(3), 286.

Flynn, B. B., Schroeder, R. G., & Sakakibara, S. (1994). A framework for quality management research and an associated measurement instrument. *Journal of Operations management*, *11*(4), 339-366.

Fornell, C., & Larcker, D. F. (1981). Evaluating structural equation models with unobservable variables and measurement error. *Journal of marketing research*, 18(1), 39-50

Gesinde, A., Adejumo, G., & Odusanya, T. (2011). Forms of academic cheating during examination among students with hearing impairment in Nigeria: Implication for counseling practice. *European Journal of Social Sciences*, *26*(2), 276-286.

Hair J, Anderson RE, Tatham RL, Black W.C. (1995). Multivariate data analysis (4th ed). Prentice-Hall Inc.

Hair, J. F., Black, W. C., Babin, B. J., Anderson, R. E., & Tatham, R. L. (2010). *Multivariate data analysis*. Pearson.

Haladyna, T. (1999). *Developing and Validating multiple-choice test items.* Lawrence Erlbaum.

Harrington, D. (2009). *Confirmatory factor analysis.* Oxford University Press.

Hewlett, S., Hehir, M., &Kirwan, J. R. (2007). Measuring fatigue in rheumatoid arthritis: A systematic review of scales in use. *Arthritis Care & Research*, *367*(3), 429-1339.

Hinkin, T.K. (1998). A brief tutorial on the development of measures for use in survey questionnaires. *Organizational Research Methods*, 1, 104-121.

Hughes, J. M. C., & McCabe, D. L. (2006). Academic misconduct within higher education in Canada. *Canadian Journal of Higher Education*, *36*(2), 1-21.

Imran, A. M., & Nordin, M. S. (2013). Predicting the underlying factors of academic dishonesty among undergraduates in public universities: a path analysis approach. *Journal of Academic Ethics*, 11(2), 103-120.

Iyer, R., & Eastman, J. K. (2006). Academic dishonesty: Are business students different from other college students? *Journal of Education for Business*, 82(2), 101-110.

Jensen, L. A., Arnett, J. J., Feldman, S. S., & Cauffman, E. (2002). It's wrong, but everybody does it: Academic dishonesty among high school and college students. *Contemporary educational psychology*, *27*(2), 209-228.

Jordan, A. (2001). College student cheating: The role of motivation, perceived norms, attitudes, and knowledge of institutional policy. *Ethics & Behavior*, 11(3), 233-247.

Kidwell, L. A., Wozniak, K., & Laurel, J. P. (2003).Student reports and faculty perceptions of academic dishonesty. *Teaching Business Ethics*, *7*(3), 205-214.

Kline, T. J. (2005). *Psychological testing: A practical approach to design and evaluation*. Sage publications.

Lau, L., Caracciolo, B., Roddenberry, S., & Scroggins, A. (2011). College students' perceptions of ethics. *Journal of Academic and Business Ethics*, 5, 1-13.

Lawshe, C. (1975). A quantitative approach to content validity. *Personnel Psychology*, 28(4), 563-575. http://dx.doi.org/10.1111/j.1744-6570. 1975.tb01393.x.

Lin, C. S. & Wen, L. M. (2007). Academic dishonesty in higher education: A nationwide study in Taiwan. *Higher Education*, 54(1): 85-97

Ma, Y., McCabe, D. L., & Liu, R. (2013). Students' academic cheating in Chinese universities: Prevalence, influencing factors, and proposed action. *Journal of Academic ethics*, *11*(3), 169-184.

MacKenzie, S. B. (2003). The dangers of poor construct conceptualization. *Journal of the Academy of Marketing Science*, 31, 3, 323-326.

McCabe, D. L., & Trevino, L. K. (1997). Individual and contextual influences on academic dishonesty: A multicampus investigation. *Research in higher education*, *38*, 379-396.

McCabe, D. L., Treviño, L. K., & Butterfield, K. D. (2001). Cheating in academic institutions: A decade of research. *Ethics &Behavior*, *11*(3), 219-232.

Mebratu, M. (2016). The Nature, causes and practices of academic dishonesty/cheating in higher education: The case of Hawassa University. *J Educ Pract* 7(19):14–20

Mengistu, A. (2019). Written exam cheating and prevention and detection: the case of DMU. *J Educ Pract* 10(7):60–70

Miller, A., Shoptaugh, C., & Wooldridge, J. (2011).Reasons not to cheat, academic-integrity responsibility, and frequency of cheating. *Journal of Experimental Education*, 79, 169-184.

Nelson, D., Devardhi, J., & Dino, A. (2012). Effects of cheating on accurate assessment. *Journal of Science, Technology and Arts Research*, 1(3), 68–74. https://journals.wgu.edu.et/index.php/star/article/view/32

Nilson, L. B. (2010). *Teaching at its best: A research-based resource for college instructors (3rd ed.).* Jossey-Bass

Nunnally, J. C., & Bernstein, I. H. (1994). *Psychometric theory*. McGraw-Hill.

Nwaopara, A., Ifebhor, A., & Ohiwerei, F. (2008). Proliferating illiteracy in the universities: A Nigerian perspective. *International Journal for Educational Integrity*, 4(1).

Offor, T. D., .(2009). *Psycho-social variables and test-taking behaviour of students in Nigeria universities* [Unpublished Ph.D dissertation]. University of Calabar, Nigeria.

Olasehinde-Williams, F. A. O., Abdullah, I. O. E., & Owolabi, H. O. (2003). The relationship between background variables and cheating tendencies among students of a federal university in Nigeria. *Nigerian Journal EducafionalFoundafions*, *6*(1), 68-79.

Pilot, D., & Hunger, B. (1999). *Nursing research: principals and methods.* Williams & Wilkins.

Rakovski, C. C. & Levy, E. S. (2007). Academic dishonesty: Perceptions of busi-Academic dishonesty: Perceptions of business students. *College Student Journa*l, 41(2), 466–81.

Schriesheim, C. A., Powers, K. J., Scandura, T. A., Gardiner, C. C., & Lankau, M. J. (1993). Improving construct measurement in management research: Comments and a quantitative approach for assessing the theoretical content adequacy of paper-and-pencil survey-type instruments. *Journal of Management*, 19(2), 385-417.

Schwab, D. P. (1980). Construct validity in organizational behavior. In B. M. Staw & L. L. Cummings (Eds.), *Research in organizational behavior.* JAIPress.

Simkin, M. G., & McLeod, A. (2010). Why do college students cheat? *Journal of Business Ethics*, 94, 441-453.

Siringi, S. (2009). Over 60% of college and university students admit to cheating in school examinations. *The Standard Newspapers*, *16*, 23-5.

Solomon, F .(2017). Academic dishonesty in Ethiopian higher education and its implication for corruption. *Beijing Law Rev* 8:10–20

Spector, P. E. (1992). *Summated rating scale construction: An introduction.* Sage Publication

Starovoytova, D., & Namango, S. (2016). Factors affecting cheating-behavior at undergraduate-engineering. *Journal of Education and Practice*, *7*(31), 66-82.

Stone, T. H., Jawahar, I. M., & Kisamore, J. L. (2010). Predicting academic misconduct intentions and behavior using the theory of planned behavior and personality. *Basic and Applied Social Psychology, 32(1),* 35-45.

Sule, S. (2009).Evils in Nigerian Education System. *Frontier Glory Publishers Limited*.

Tavakol, M., Dennick, R. (2011). Making sense of Cronbach's alpha. *Int. J. Med. Educ., 2,* 53–55.

Tefera, T., & Kinde, G. (2009). Faculties' perception and responses to academic dishonesty of undergraduate students in education, business and economics. *Ethiop. J. Educ. & Sc.*, 4, No. 2.

Tefera, T., & Kinde, G. (2010).An exploration of undergraduate students' self-reported academic dishonesty at Addis Ababa and Jimma Universities, *Ethiop. J. Educ. & Sc.*, 5, (2).

Teferra, T., Asgedom, A., Oumer, J., Dalelo, A., & Assefa, B. (2018). *Ethiopian education development roadmap (2018-30): An integrated Executive Summary.* Ministry of Education Strategy Center (ESC).

Thompson, B. (2004). *Exploratory and confirmatory factor analysis: Understanding concepts and applications.* American Psychological Association.

Trochim, W.M.K. (2001). *The research methods knowledge base.* Atomic Dog.

Vandehey, M. A., Diekhoff, G. M., &LaBeff, E. E. (2007). College cheating: A twenty-year follow-up and the addition of an honor code. *Journal of College Student Development*, 48(4), 468–480.

Warinda, T. (2016). Academic dishonesty: Prior perceptions and behavior on cheating of Bachelor of Accountancy Freshmen at a Zimbabwean university. *Journal of Economics and Behavioral Studies*, 8(6), 82-93.

Whitley, B. (1998). Factors associated with cheating among college students: *A review. Research in Higher Education*, 39(3), 235-274.

Wiersma, W. (2000). Research methods in education: An introduction (7th ed.). Allyn& Bacon

Williams, B., Brown, T, Onsman, A. (2010). Exploratory factor analysis: A five-step guide for novices. *Australian Journal of Paramedicine*.8(3). http://ro.ecu.edu.au/cgi/viewcontent.cgi?article=1373&context=jephc

Wondifraw Dejene. (2021). Perceived seriousness of academic cheating behaviors among undergraduate students: an Ethiopian experience, *International Journal for Educational Integrity*, 17(2).

Yang, S. C., Huang, C. L., & Chen, A. S. (2013). An investigation of college students' perceptions of academic dishonesty, reasons for dishonesty, achievement goals, and willingness to report dishonest behavior. *Ethics & Behavior*, 23(6), 501-522.