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Validating the revised plagiarism attitude scale among Malaysian medical sciences students: a psychometric study in multilingual contexts

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Abstract

Objective This study aims to validate the revised plagiarism attitude scale among Malaysian medical sciences students, particularly focusing on those for whom English is a second language (L2), to understand their perceptions and attitudes towards plagiarism.

Study design A cross-sectional study was conducted involving 549 participants enrolled in medical science programs across Malaysia.

Methods The research employed exploratory and confirmatory factor analyses to assess the psychometric properties of the revised plagiarism attitude scale. Key dimensions identified include plagiarism triggers, rationalizing plagiarism, and perceptions of plagiarism severity.

Results The scale exhibited high reliability and strong construct validity, with its item structure consistent with previous studies. The findings highlight the significant influence of linguistic and cultural factors on students' attitudes towards plagiarism.

Conclusions This research provides a reliable tool for assessing plagiarism behaviors in multilingual contexts and offers insights for developing targeted educational interventions aimed at enhancing linguistic competence and promoting academic integrity among future healthcare practitioners.

Keywords Plagiarism, Education, Medical, Ethics, Professional, Multilingualism, Students, Medical

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Introduction

Plagiarism poses a significant challenge to academic and professional integrity, particularly in fields such as medical sciences, where ethical standards are paramount [1]. Plagiarism, defined as the unacknowledged use of another's intellectual work, compromises the principles of honesty, accountability, and originality essential to academic and professional practice [1, 2]. For medical sciences students, academic misconduct during training raises concerns not only about the quality of education but also about future ethical behavior in clinical practice. Evidence suggests that 56% of U.S. medical students admitted to plagiarizing during their studies, while 88% of nursing students worldwide expressed permissive attitudes toward plagiarism [3, 4]). Furthermore, recent research has highlighted that over 70% of Malaysian university students have engaged in some form of academic dishonesty, including plagiarism [5]. Such alarming statistics emphasize the need for targeted efforts to address plagiarism in medical sciences education to safeguard both academic and professional standards.

For students who use English as a second language (L2), the challenges of avoiding plagiarism are magnified. Language barriers often result in unintentional plagiarism, as students struggle to paraphrase or properly cite sources [6, 7]. A study by Kayaoğlu et al. [8] revealed that L2 learners are more likely to engage in "patchwriting," where copied content is superficially altered due to limited linguistic proficiency. Additionally, many L2 students perceive citation rules as overly complex and unintuitive, further exacerbating their reliance on direct copying [9]. In Malaysia, where English serves as the medium of instruction in medical sciences programs, these challenges are intensified by rigorous academic demands and cultural differences in understanding academic integrity [10, 11]. Malaysian students often cite academic pressure, language limitations, and unfamiliarity with Western norms of academic integrity as primary reasons for engaging in plagiarism [12, 13]. These findings underscore the importance of examining plagiarism attitudes within the unique cultural and linguistic context of Malaysia.

Efforts to understand and address plagiarism attitudes have led to the development of psychometric tools, including the attitudes toward plagiarism questionnaire, initially developed by Mavrinac [14]. Grounded in Ajzen's theory of planned behavior [15, 16], the attitudes toward plagiarism questionnaire conceptualized plagiarism attitudes as predictors of intention and subsequent behavior. The original instrument included three dimensions: Positive Attitudes Toward Plagiarism (e.g., time-saving benefits), Negative Attitudes Toward Plagiarism (e.g., ethical concerns), and Subjective Norms (e.g., peer or institutional pressures) [14]. While validated in Croatia with good reliability and construct validity, subsequent studies identified cultural and linguistic biases that limited its applicability to non-Western populations [17, 18].

Recognizing these limitations, Howard et al. [19] revised the attitudes toward plagiarism questionnaire using Rasch analysis, enhancing its clarity and psychometric robustness. The revised version, named revised plagiarism attitude scale, refined the scale to include three key dimensions: Factors Exacerbating Plagiarism (e.g., pressures to meet deadlines), Justifications for Plagiarism (e.g., rationalizing plagiarism under specific circumstances), and Severity and Penalty (e.g., perceptions of the ethical weight of plagiarism and the appropriateness of penalties). By improving item clarity and aligning the scale with a unidimensional construct, the revised plagiarism attitude scale provided a robust tool for examining plagiarism attitudes across diverse educational contexts. For instance, Erguvan [18] applied the revised plagiarism attitude scale in the Middle East and highlighted how local cultural norms influenced plagiarism attitudes, while Loos and Radicke [20] demonstrated the instrument's utility in North America, where strict institutional policies were associated with lower plagiarism rates. These studies emphasized the revised plagiarism attitude scale's effectiveness but also highlighted the need for further validation in multilingual and multicultural settings like Malaysia.

The significance of this research lies in its potential to address critical gaps in the literature. While previous studies have explored plagiarism prevalence and attitudes in Malaysia, few have employed psychometrically validated instruments tailored to the country's unique educational and cultural context [9, 21]. This study aims to validate the revised plagiarism attitude scale among Malaysian medical sciences students, with a specific focus on those for whom English is a second language (L2). By employing exploratory and confirmatory factor analyses, this research assesses the scale's psychometric properties and establishes a reliable, culturally relevant tool for understanding plagiarism attitudes. The findings will contribute to the global discourse on academic integrity and offer actionable insights for institutional policies and educational interventions aimed at fostering ethical academic practices in medical sciences education. Furthermore, by addressing the challenges faced by L2 English students, this study supports the development of strategies that enhance linguistic competence alongside academic integrity, ensuring the professional readiness of future healthcare practitioners.

Methods

This methodological, cross-sectional study was conducted in July 2024, targeting students whose second language (L2) is English and who are enrolled in medical science programs at universities in Malaysia. Eligibility criteria included current enrolment in a medical sciences program at a Malaysian university and self-identification as an L2 English speaker. A convenience sampling strategy was employed, with participants recruited across three campuses through face-to-face interactions. Researchers approached students in classrooms, common areas, and other university settings, explained the study's objectives, and invited them to participate. Interested students received a link to an online questionnaire, which they were encouraged to complete at their convenience. Participation was voluntary and anonymous, and a total of 549 participants completed the survey. This sample size exceeded the recommended minimum of 200 participants for psychometric studies, as suggested by MacCallum et al. [22], ensuring sufficient statistical power and robustness for the study's analytical objectives.

Instrument

The Plagiarism Attitude Scale was originally developed by Mavrinac et al. [14] to measure students' attitudes toward plagiarism, grounded in Ajzen's theory of planned behavior. Howard et al. [19] revised this instrument to address limitations in its original design, including ambiguous phrasing and cultural biases, and to improve its psychometric robustness. The revised scale, validated through Rasch analysis, consists of 29 items grouped into three subscales: Factors Exacerbating Plagiarism (14 items), which examines contextual pressures like tight deadlines; Justifications for Plagiarism (6 items), which explores rationalizations such as reusing one's previous work without citation; and Severity and Penalty (9 items), which assesses perceptions of plagiarism's ethical implications and the appropriateness of penalties. Items were scored on a 5-point Likert scale (1=strongly disagree, 5 = strongly agree), with four reverse-scored items to ensure consistency. The revised scale demonstrated strong psychometric properties, including Cronbach's alpha values of 0.89, 0.72, and 0.79 across the subscales, and was confirmed to be unidimensional through exploratory and confirmatory factor analysis. The item numbers used in this study align with those in the Howard et al. [19] study, ensuring consistency in the interpretation and categorization of the questions across subscales.

Participants

The study included 549 participants from three universities in Malaysia, located in Kuala Lumpur and Selangor, offering medical and health sciences programs. The majority of participants were female (68.1%, n=374), while males accounted for 29.0% (n=159). Additionally, 16 participants (2.9%) either selected "Other" or preferred not to disclose their gender. The distribution of

participants by year of study showed that 2nd year students represented the largest group at 26.2% (n = 144), followed by 1st year students at 22.8% (n = 125), 3rd year students at 22.2% (n = 122), and 4th year students at 20.8% (n = 114). Postgraduate students made up the smallest proportion, accounting for 8.0% (n = 44).

In terms of specialization, General Medicine constituted the largest proportion of participants at 35% (n=193), followed by Nursing at 21% (n=116) and Pharmacy at 14% (n=77). Allied Health accounted for 9% (n=49), while Biomedical Sciences and Dentistry each contributed 5% (n=27). The "Others" category represented 6% (n=33), Medical Laboratory Sciences accounted for 3% (n=16), and Public Health comprised the smallest group at 2% (n=11).

Normal distribution, outliers, and missing data

Univariate data distribution was assessed using skewness (within ± 3) and kurtosis (within ± 7) to evaluate normality. Multivariate normality was examined through the Mardia coefficient of multivariate kurtosis, with values below 8 indicating acceptable multivariate distribution. The presence of multivariate outliers was identified using Mahalanobis distance (d-squared), with a significance threshold of p <.001 [23, 24]. Missing data were addressed using multiple imputation techniques, and the average response of participants was used to substitute missing values [25].

Data analysis

To examine the construct validity of the instrument, the dataset comprising 549 cases was randomly divided into two subsets. The first subset (n = 274) was subjected to exploratory factor analysis (EFA) using the maximum likelihood method with Kaiser normalization. The suitability of the data for factor analysis was confirmed by achieving a Kaiser-Meyer-Olkin (KMO) value greater than 0.8 and a statistically significant Bartlett's test of sphericity (p < .01). Factors were extracted based on the criteria of eigenvalues exceeding 1, communalities above 0.3, and factor loadings of at least 0.5 [26]. EFA was conducted using SPSS version 26.

The factor structure derived from EFA was then evaluated through confirmatory factor analysis (CFA) using the second subset (n = 275) with AMOS version 26. Model fit was assessed using several indices, including the Comparative Fit Index (CFI), Normed Fit Index (NFI), Goodness of Fit Index (GFI), Relative Fit Index (RFI), and Incremental Fit Index (IFI), where values exceeding 0.9 were considered indicative of a well-fitting model. Additionally, a Root Mean Square Error of Approximation (RMSEA) below 0.08 and a ratio of chisquare to degrees of freedom (CMIN/*df*) under 3 were used to confirm acceptable model fit [26, 27]. Convergent validity was assessed by calculating composite reliability (CR) and average variance extracted (AVE). For convergent validity to be established, CR had to exceed 0.7, and AVE needed to be greater than 0.5 for each construct [26, 27]. Internal consistency and construct reliability were evaluated using Cronbach's alpha (α), composite reliability (CR), and maximal reliability (MaxR). Reliability was considered acceptable for values exceeding 0.7 [26, 27].

Ethical approval

This study was approved by the Ethics Committee of Mazandaran University of Medical Sciences (Ethics Code: IR.MAZUMS.REC.1403.075). Participants were provided with a detailed explanation of the study's objectives and procedures, along with assurances that their participation was both voluntary and anonymous. Written informed consent was obtained from all participants prior to their involvement. After providing consent, participants were given the questionnaire to complete independently.

Results

The results of the maximum likelihood EFA with promax oblique rotation, conducted on the first random dataset (n = 274), are presented in Table 1. Three items were removed from the original version due to high crossloadings. The Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy was 0.884, and Bartlett's test of sphericity was significant ($\chi^2 = 2286.072, df = 171, p < .001$), confirming the appropriateness of the data for factor analysis. Based on the eigenvalue greater than one criterion and visual inspection of the scree plot, three factors were extracted, collectively explaining 52.784% of the total variance. The first factor, consisting of eight items, had a rotated eigenvalue of 4.272 and explained 22.861% of the variance. The second factor included five items, with a rotated eigenvalue of 2.940 and an explained variance of 15.622%, while the third factor comprised six items, with a rotated eigenvalue of 2.963 and explained 14.301% of the variance. These three factors were consistent with the subscales identified by Howard et al. [19], which were labelled exacerbating plagiarism, justification for plagiarism, and severity and penalty.

CFA was conducted on the second random dataset (n = 275) to validate the factor structure derived from the EFA. The results demonstrated that the initial measurement model provided an acceptable fit to the data (χ^2 (149) = 208.820, p < .001, $\chi^2/df = 1.401$, CFI = 0.970, NFI = 0.903, RFI = 0.888, IFI = 0.970, TLI = 0.965, SRMR = 0.048, RMSEA = 0.038 [90% CI: 0.025, 0.050]). However, the average variance extracted (AVE) for the first factor (0.498) and third factor (0.458) fell below the recommended threshold of.5 [26, 27].

To improve convergent validity, items Q16 and Q17 were removed from the model. Additionally, modification indices suggested freeing the covariance between three pairs of measurement errors: items 1 and 2, items 9 and 33, and items 28 and 33. Table 1 presents the results of the revised CFA model.

The revised model identified three factors with modified names—*plagiarism triggers, rationalising plagiarism,* and *perceptions of plagiarism severity*—to improve conceptual clarity and better align with the study's objectives and the thematic content of the items.

The revised model demonstrated an improved fit to the data (χ^2 (113) = 147.823, p < .001, χ^2/df = 1.308, CFI = 0.981, NFI = 0.923, RFI = 0.908, IFI = 0.981, TLI = 0.977, SRMR = 0.044, RMSEA = 0.034 [90% CI: 0.015, 0.048]). All item factor loadings were statistically significant (p < .001) and ranged from 0.562 to 0.818 (Fig. 1).

Composite reliability values for *plagiarism triggers* (0.889), *rationalising plagiarism* (0.831), and *perceptions of plagiarism severity* (0.811) exceeded the recommended threshold of.7, demonstrating strong construct reliability. Cronbach's alpha values (0.897, 0.866, and 0.821, respectively) and maximal reliability values (0.890,0.857, and.813, respectively) further supported the internal consistency of the constructs.

The AVE values for *plagiarism triggers* (0.500), *rationalising plagiarism* (0.503), and *perceptions of plagiarism severity* (0.518) were all above the threshold of.5, confirming convergent validity. Discriminant validity was established as the AVE for each factor was greater than its maximum shared variance with other factors.

The Heterotrait-Monotrait (HTMT) analysis further supported discriminant validity, with all HTMT values below the recommended threshold of.85. Specifically, the HTMT value between *plagiarism triggers* and *perceptions of plagiarism severity* was 0.059, between *plagiarism triggers* and *rationalising plagiarism* was 0.068, and between *perceptions of plagiarism severity* and *rationalising plagiarism* was 0.054. These results confirm that the constructs are distinct and demonstrate robust discriminant validity.

Discussion

This study validated the revised plagiarism attitude scale by Howard et al. [19] in a cohort of Malaysian medical sciences students, a population characterized by its linguistic diversity and unique academic pressures. The findings provide robust psychometric evidence supporting the scale's validity and reliability in this context, marking an important step in understanding plagiarism attitudes among L2 English learners in medical education. The revised factor structure—comprising three dimensions: plagiarism triggers, rationalizing plagiarism, and perceptions of plagiarism severity—exhibited strong

Table 1 Results of exploratory and confirmatory factor analyses of the revised plagiarism attitude scale

Factors and items	h ²	EFA	CFA	λ	%	Cron-	Com-	Maximal	Average
		factor loading	factor loading		Variance	bach's alpha	posite reliability	reliability	variance extracted
Plagiarism Triggers				4.272	22.861	0.897	0.889	0.890	0.500
Q33. I am tempted to plagiarise if I currently have more important obligations or tasks to do.	0.642	0.789	0.700						
Q9. Short deadlines or a heavy workload give me the right to plagiarise a bit.	0.575	0.762	0.732						
Q29. Sometimes, it is necessary to plagiarise.	0.574	0.757	0.727						
Q18. A plagiarised paper does no harm to the value of a university degree.	0.526	0.731	0.720						
Q36. I am tempted to plagiarise because, even if caught, the punishment will be light (the reward outweighs the risk).	0.498	0.703	0.705						
Q21. Those who say they have never plagiarised are lying.	0.466	0.686	0.629						
Q30. I am tempted to plagiarise if I have permission from a friend to copy his or her work.	0.467	0.679	0.732						
Q28. Plagiarism can be justified if I currently have more important obligations or tasks to do.	0.479	0.674	0.708						
Rationalising Plagiarism				2.94	15.622	0.866	0.831	0.857	0.503
Q27. Since plagiarism is taking other people's words rather than tangible assets, it should not be considered a serious offence.	0.653	0.807	0.774						
Q3. Self-plagiarism is not punishable because it is not harmful (you cannot steal from yourself).	0.626	0.792	0.818						
Q11. It is justified to use your own previous work, without providing citation, in order to complete the current work.	0.634	0.785	0.775						
Q2. It is justified to use previous descriptions of a concept or theory, because they remain the same.	0.482	0.700	0.562						
Q1. Sometimes you cannot avoid using other people's words, because there are only so many ways to describe something.	0.483	0.679	0.572						
Perceptions of Plagiarism Severity				2.963	14.301	0.821	0.811	0.813	0.518
Q25. Plagiarism is not a big deal.	0.559	0.750	0.736						
Q19. Since plagiarism is taking other people's words rather than tangible assets, it should not be considered a serious offence.	0.550	0.742	0.697						
Q4. Plagiarised parts of a student's paper should be ignored if the paper is otherwise of high quality.	0.537	0.727	0.747						
Q5. Self-plagiarism should not be punishable in the same way as plagiarism is.	0.507	0.712	0.698						

Note: h^2 : Communalities, λ : Eigenvalues, the item numbers presented in this table correspond directly to those in the Howard, Enrich, and Walton (2014) study, ensuring consistency in the categorization and interpretation of questions across the subscales

construct validity and reliability, reinforcing the utility of this tool in assessing attitudes toward plagiarism in multilingual and multicultural settings.

The EFA results aligned well with the three-factor structure proposed by Howard et al. [19], although minor item adjustments were required to improve conceptual clarity and model fit. The CFA confirmed the refined model's suitability, demonstrating excellent fit indices (e.g., CFI=0.981, RMSEA=0.034). These findings echo those of Howard et al. [19], who also identified strong psychometric properties in their revised scale through

Rasch analysis. However, our study differs in its nuanced findings regarding L2 learners. For example, the AVE and factor loadings in our study revealed slightly lower initial convergent validity for two dimensions, likely reflecting the linguistic and cultural challenges faced by Malaysian students. These findings highlight the importance of adapting psychometric tools to specific cultural and linguistic contexts, as recommended by Mavrinic et al. [14] and subsequent researchers [18, 20].

Compared to the original attitudes toward plagiarism questionnaire developed by Mavrinac et al. [14], the



Fig. 1 Measurement Model Assessment of the Revised Plagiarism Attitude Scale

revised scale demonstrates greater precision and clarity. The original instrument, grounded in Ajzen's theory of planned behavior [15, 16], identified three dimensions: positive attitudes, negative attitudes, and subjective norms. While this structure provided a strong theoretical foundation, it lacked empirical specificity in differentiating situational and contextual factors influencing

plagiarism attitudes. In contrast, the revised scale introduced dimensions such as plagiarism triggers and rationalizing plagiarism, capturing the complex interplay of external pressures and internal justifications that influence student behavior. Our findings support these refinements, particularly in the Malaysian context, where students frequently cited factors like tight deadlines, heavy workloads, and language barriers as exacerbating plagiarism risks. These results are consistent with prior studies in similar cultural contexts, such as Mustapha et al. [12], which emphasized the role of external pressures in driving academic dishonesty among Malaysian students.

The results also align with global studies using the revised scale. For instance, Erguvan [18] applied the instrument in a Middle Eastern cohort, highlighting the influence of cultural norms on plagiarism perceptions. Similarly, Loos and Radicke [20] demonstrated that institutional policies and enforcement significantly shaped attitudes in North America. Our findings extend these insights by demonstrating that Malaysian students, who often study in English as a second language (L2), exhibit distinct patterns of rationalizing plagiarism compared to monolingual Western populations. This underscores the necessity of considering linguistic proficiency and cultural expectations when assessing plagiarism attitudes, as noted by Pecorari [6] and Fatemi and Saito [9].

An additional contribution of this study is its emphasis on the importance of discriminant validity in understanding the relationships between dimensions of plagiarism attitudes. The Heterotrait-Monotrait (HTMT) analysis confirmed strong discriminant validity, suggesting that the constructs of plagiarism triggers, rationalizing plagiarism, and perceptions of plagiarism severity are distinct yet interrelated. This finding is particularly relevant for designing targeted interventions to address specific aspects of plagiarism behavior. For example, educational programs focusing on reducing rationalizations for plagiarism might be more effective if combined with strategies to mitigate external pressures, such as time management training or academic support services [28, 29].

Despite its contributions, this study has limitations that warrant consideration. First, in addition to the use of convenience sampling, the study's findings may be influenced by the characteristics of the specific participant group. Future research should explore a broader range of L2 English learners across additional institutions to further validate the scale's applicability in diverse educational settings. Second, while the validated tool demonstrated robust psychometric properties, the three-factor model explained 52.78% of the total variance, which suggests that further refinement or validation studies could enhance its explanatory power. Third, while this study focused on Malaysian students, additional cross-cultural validations are needed to further refine the scale's applicability in other multilingual and multicultural contexts. Finally, the reliance on self-reported data may introduce social desirability bias, although the anonymous nature of the survey likely mitigated this risk to some extent.

Implications and conclusion

The validated scale may provide a reliable and culturally adapted tool for assessing plagiarism attitudes among medical sciences students in Malaysia; however, given the study's limited sample, further validation across additional educational institutions is needed to confirm its generalizability. The findings underscore the need for educational institutions to address the contextual and linguistic challenges faced by L2 learners through tailored interventions, as linguistic barriers and cultural differences often lead to unintentional plagiarism or "patchwriting" among these students [6, 8]. Tailored support, including academic writing workshops and targeted guidance on citation practices, has been shown to be effective in mitigating these issues and fostering academic integrity [9]. By enhancing students' understanding of plagiarism and providing practical strategies to manage academic pressures, educators can foster a culture of academic integrity that aligns with professional ethical standards. Future research should explore longitudinal applications of the scale to examine changes in plagiarism attitudes over time, particularly as students' progress through their medical sciences training and transition to clinical practice.

This study contributes to the global discourse on plagiarism attitudes by demonstrating the versatility of the revised plagiarism attitude scale in a unique cultural and linguistic context. By addressing key gaps in the literature and validating the scale among L2 English learners, this research offers actionable insights for educators, policymakers, and researchers aiming to promote academic and professional integrity in medical sciences education.

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Author contributions

Z.Z. and Y.L. led the conceptualization, study design, and data collection. H.S.N conducted the data analysis and drafted the findings. All authors contributed to writing the manuscript and reviewed and approved the final version.

Data availability

The datasets used and analyzed in this study are available from the corresponding author upon reasonable request, subject to ethical and institutional regulations.

Declarations

Ethical approval and consent to participate

The Ethics Committee of Mazandaran University of Medical Sciences in Sari, Iran, approved this study (Ethics Code: IR.MAZUMS.REC.1403.075). Participants received a comprehensive explanation of the study's objectives and methodologies and were assured that their participation was entirely voluntary. The researcher distributed the scale for self-completion. The study was conducted in compliance with local laws and institutional guidelines. Written informed consent was obtained from all participants.

Consent for publication

Not applicable.

Competing interests

The authors declare no competing interests.

Clinical trial number

Not applicable.

Declaration of generative AI and AI-assisted technologies in the writing process

During the preparation of this work, the authors used Gemini and ChatGPT to improve the readability and language of the manuscript. After using these tools, the authors reviewed and edited the content as needed and take full responsibility for the content of the publication.

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