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CROSS-CULTURAL VALIDATION OF THE ARTIFICIAL INTELLIGENCE ANXIETY SCALE

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ABSTRACT

The Artificial Intelligence Anxiety Scale (AIAS), introduced by Wang and Wang in 2019, was designed to assess the fundamental elements and internal aspects of anxiety associated with artificial intelligence. It was founded based on prior research with computer and robotic fear. Nonetheless, the initial scale was constructed using a Taiwanese sample with unique attributes. The results of the exploratory factor analysis indicated a four-component structure, including a general anxiety factor. The present study conducted a cross-cultural adaption of the AIAS by administering it to 256 students from several Arab nations. The Confirmatory Factor Analysis results indicated that the Arabic version has only three factors, with the learning dimension exhibiting a weak loading, leading to its elimination; hence, the final Arabic AIAS version consists of 13 items.

KEYWORDS: Cross-cultural Validity, Artificial Intelligence AI, AI Anxiety, Scale Adaptation, CFA.

1. INTRODUCTION

Artificial intelligence refers to the development of systems, apps, and software that can execute activities often associated with human cognition. This is an endeavour to replicate these applications for human intellect. It seeks to employ computer science and its applications to address intricate problems and challenging activities in a manner that aligns with human cognition (Grassini, 2023). Recently, there has been significant and swift advancement in artificial intelligence, resulting in the development of programs, software, and tools that offer services across several facets of life. It serves as a significant instrument to expedite the execution of numerous duties efficiently, encompassing humanoid robots and the proliferation of applications such as Alexa, Amazon, Siri, and other extensively utilised technologies in everyday life (Brill et al., 2022). While artificial intelligence possesses the capacity to transform sectors like healthcare and education, opinions vary regarding its usability and the practical experience associated with its applications and technologies (Ahmed et al., 2022). Artificial intelligence has evolved from a supportive technology to a fundamental element of decision-making systems, predictive analytics, and personalised services (Sigov et al., 2024). The incorporation of AI into daily life, from recommendation systems on streaming services to real-time fraud detection in banking, exemplifies its profound integration into modern existence (Sanchez et al., 2023). This unparalleled expansion presents chances for innovation and enhanced efficiency, although it also prompts significant enquiries on its psychological and social effects on individuals and societies. Positive perspectives highlight artificial intelligence's capacity to enhance efficiency and productivity, execute tasks with precision and speed, and generate innovative solutions across diverse domains, often favouring AI over human intervention in numerous contexts (Khurram, 2023; Logg et al., 2019). Tschang and Almirall (2021) highlighted individuals' anxieties and fears around job loss and role alterations stemming from the rapid proliferation of artificial intelligence applications, which may render certain positions obsolete, transform existing roles, and generate new employment opportunities. The conviction that artificial intelligence will exceed human capacities and serve as a non-human partner is sufficient to incite anxiety and fear. At present, artificial intelligence is supplanting service positions and subsequently advancing to replace human labour (Huang & Rust, 2018). Computer anxiety pertains to the direct engagement with computers or the endeavour to utilise their programs and technologies (Almaiah et al., 2022). These apprehensions extend beyond mere job displacement. Numerous users feel discomfort when engaging with AI systems, as they frequently operate as "black boxes," generating outputs that are not readily comprehensible or explicable (As'ad & Al Omari, 2025). The absence of transparency exacerbates distrust and heightens ethical dilemmas, especially in domains where AI-driven judgements can profoundly impact human lives, such as healthcare, education, or judicial systems (Ramachandran et al., 2024). Wang and Wang (2022) elucidated the correlation between anxiety and learner behaviour, which reflects the effort and commitment dedicated to acquiring a specific skill. They examined four factors: Learning, AI Configuration, Job Replacement, and Sociotechnical Blindness, while investigating the psychological implications of artificial intelligence development on individuals' future behaviours. Apprehensions regarding AI related to employment displacement and transformation, as well as technological anxiety, have persisted from the inception of technology utilisation, reflecting a negative emotional and behavioural reaction to technological advancements (Kim, 2019). Artificial intelligence has created new opportunities for learning, research, and assessment within the realm of education (Yim & Su, 2025). Intelligent tutoring systems, automated grading platforms, plagiarism detection software, and AI-driven adaptive learning tools have transformed the interaction between students and instructors with content (Pham & Sampson, 2022). Although these advances foster chances for efficiency and personalised learning, they also engender new stressors for professors and students, who are compelled to continually adjust to rapidly evolving technologies (Nemorin et al., 2023). The dependence on AI in academic processes prompts apprehensions regarding authenticity, the quality of human contact, and the possible diminishment of the roles of educators and mentors. Khasawneh (2018) defines technophobia as the anxiety associated with present or prospective engagement with computers or computer-related technology, as well as adverse worldwide perceptions of the societal impacts of technology. Kim (2019) identified age, gender, and socioeconomic level as characteristics correlated with technophobia. Given the pervasive integration of artificial intelligence across various domains, including education, healthcare, and industry, it is imperative to examine and assess individuals' perceptions of artificial intelligence, its significance in their lives, and their emotional, cognitive, and behavioural responses (Park & Woo, 2022). Cultural considerations additionally affect these perceptions. In certain communities, AI is regarded as a hallmark of innovation and advancement, whereas in others, scepticism and caution prevail because to

concerns over dependency, cultural degradation, or loss of autonomy (Vistorte et al., 2024). The Arab world exemplifies a crucial context where swift digital revolution converges with robust traditional values, resulting in a complicated milieu where perceptions of AI can differ markedly (Alotaibi & Alshehri, 2023). Grasping its cultural significance is crucial when formulating policies, training initiatives, and curricula that consider both technological adoption and the emotional and psychological preparedness of individuals. In this context, various scales have been created to evaluate attitudes towards artificial intelligence, including the Artificial Intelligence Anxiety Scale (AIAS) by Wang and Wang (2022), the General Attitudes Towards Artificial Intelligence Scale (GAISS), and the Attitude Towards Artificial Intelligence Scale (ATAI). The 19-item Computer Anxiety Rating Scale (CARS) developed by Heinssen et al. (1987) is a prominent instrument for assessing anxiety related to computer usage. In addition to the Robot Anxiety Scale, which hinders interaction with robots. Furthermore, the scales (Haring et al., 2014; Nomura, 2017; Ray et al., 2008; Wu et al., 2014) indicate the internal fear humans have when interacting with robots in general. Notwithstanding these endeavours, a distinct deficiency persists in instruments specifically developed to assess fear around AI as a comprehensive phenomena, especially within the realm of higher education. As universities progressively use AI-driven platforms for administration, research, and instruction, it is essential to have a deeper understanding of the emotional responses and perspectives of students and faculty members, who are the primary users of these technologies. Given the diverse perspectives on the utilisation of artificial intelligence and the management of emerging technologies, coupled with the absence of metrics to assess artificial intelligence anxiety and its components—particularly within higher education, where university personnel are significant users of these technologies—it is imperative to develop scales with robust psychometric properties. This research originated from the Cross-Cultural Adaptation of the Wang and Wang (2022) scale into Arabic, aiming to establish an effective instrument for assessing artificial intelligence fear among university students in the Arab world. The primary objective of this research is to provide a dependable scale for assessing students' perceptions of AI in the Arab world, the impact of these beliefs on their engagement with educational technologies, and the methods institutions might implement to address related concerns. The study seeks to enhance worldwide discussions on the ethical integration of AI in academic settings by offering culturally relevant measurement methods, guaranteeing that the implementation of these technologies is informed by psychological and social considerations.

2. METHOD

2.1. Participants

The current study's sample comprised 256 undergraduate and graduate students from several Arab nations in Asia and Africa, specifically Egypt, Kuwait, Jordan, Saudi Arabia, Oman, and the UAE. The sample comprised 97 males (37.9%) and 159 females (62.1%). Of the respondents, 122 (47.7%) are enrolled in scientific faculties, whereas 134 (52.3%) are pursuing arts and humanities degrees. The average age of the sample is 20.75 years, with a standard deviation of 3.54.

2.2. Procedure

The research employed a cross-sectional design and followed the methodology of Beaton et al. (2000) for executing a cross-cultural adaptation. Participants were solicited willingly to complete the questionnaire, with assurances that their responses would remain anonymous. The participants' informed consent was obtained prior to data collection. Additionally, the participants were acquainted with the study's objective and purpose for enhanced comprehension. Participants were instructed to leave the survey incomplete if they were unwilling to disclose the data. Furthermore, the participants were instructed to furnish data devoid of any bias that could influence the outcomes of this investigation. Upon verifying all data collecting processes, the survey was administered to gather the data.

2.3. Instrument

The present study employed the Artificial Intelligence Anxiety Scale (AIAS) created by Wang and Wang (2022). The measure comprises 21 items with a 7-point Likert format, where 1 signifies "strongly disagree" and 7 denotes "strongly agree." The measure comprises four dimensions: Learning (8 items), AI Configuration (3 items), Job Replacement (6 items), and Sociotechnical Blindness (4 items). Higher scores indicate a stronger endorsement of the pertinent construct (i.e. AI anxiety) and vice versa. The scale was translated to Arabic in both forward and backward directions, with a thorough discussion on the synthesis of the translation. The terms "scary" and "intimidating" were initially rendered as a single word in the forward translation; thus, the decision was made to clearly differentiate between them. Nonetheless, the forward and backward translation procedure was endorsed by Ozolins et al. (2020), who

advocated for the translation of a scale to enhance linguistic clarity, comprehension, and readability. Moreover, the scale underwent both backward and forward translation to enhance its readiness and the clarity of the concepts conveyed. Expert opinions were solicited, and a panel was convened to confirm the accuracy of the translation. The translated version of the scale is supplied in the Appendix.

3. RESULTS

3.1. Initial Analyses

A preliminary analysis was conducted for data screening. This extensive screening process ensures data clarity and mitigates any potential bias inherent in the data. No missing data were identified, no univariate or multivariate outliers were observed, normal distribution was maintained with skewness coefficients ranging from -0.085 to 0.918, and kurtosis coefficients ranged from -1.313 to 0.024, indicating univariate normality as per George and Mallery (2010). Mardia's test for multivariate normality yields a value of 139.892, suggesting no significant violation of the multivariate normal distribution (Bollen, 1989). Additionally, descriptive statistics for each construct were calculated, along with McDonald's Omega coefficient (ω) to evaluate dependability, as presented in Table 1.

Table 1: Descriptive Statistics.

	Learning	AI Configuration	Job Replacement	Sociotechnical Blindness	AI Anxiety
Mean	24.176	13.445	29.441	17.215	84.277
Standard deviation	9.887	4.841	9.111	7.113	23.649
Ω	0.840	0.700	0.884	0.880	0.901

Table 1 demonstrated that all scale dimensions, excluding the total scale, exhibited McDonald's Omega values exceeding 0.7, signifying acceptable levels of scale dependability (Hair et al., 2013). The corrected item-total correlation, which measures the correlation of a specific item with the summed score of all other items in the scale, ranged from 0.334 to 0.663. According to Streiner and Norman (2003), a minimum value of 0.20 is recommended, indicating that all scale items are effectively discriminating. The correlations between sub-dimensions and the overall score are calculated as shown in Table 2. Table 2 indicates that the correlations among the scale's sub-dimensions were substantial; however, in contrast to the original study, the correlations between the learning dimension and the other dimensions were modest.

Table 2: Correlations among AIAS Dimensions.

Learning	AI Configuration	Job Replacement	Sociotechnical Blindness	AI Anxiety
1				.688**
.342**	1			.775**
.224**	.667**	1		.802**
.377**	.567**	.621**	1	.814**

3.2. Confirmatory Factor Analysis

Confirmatory Factor Analysis (CFA) was conducted on the 21 items of the AIAS. The researchers utilised the theoretical model proposed by Wang and Wang (2022), as illustrated in Figure 1.

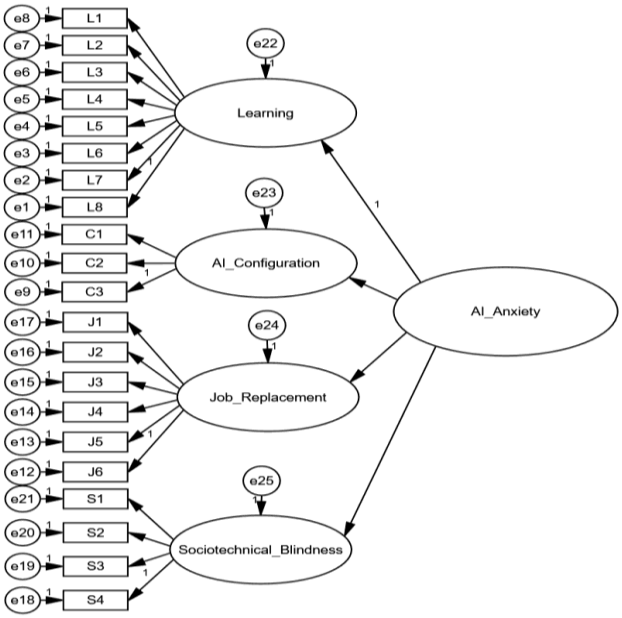

Figure 1: Structure of AIAS.

Standardised factor loadings have been calculated. Table 3 summarises the loadings for the second factor and the first-factor construct, indicating that all items exhibited significant loadings (p≤ 0.05), with a recommended cutoff point of 0.5 for each item as per Hair et al. (2013).

Table 3: First Order Item Loadings for AIAS.

First-order Factor Loadings							
Learning		AI Configuration		Job Replacement		Sociotechnical Blindness	
#	Standardizes Coef.	#	Standardizes Coef.	#	Standardizes Coef.	#	Standardizes Coef.
L1	.721	C1	.589	J1	.800	S1	.617
L2	.766	C2	.691	J2	.738	S2	.872
L3	.693	C3	.700	J3	.821	S3	.838
L4	.663			J4	.620	S4	.870
L5	.680			J5	.708		
L6	.658			J6	.760		
L7	.660						
L8	.207						
Second-order factor loadings							
	.363		.953		.893		.739

Table 4: GOF Indices for AIAS Model.

GOF	Cut-off Point	AIAS Model
χ^2	p-value>0.05	541.062 (p=0.00)
χ^2/df	$\chi^2/df \leq 5$	2.925
IFI	IFI ≥ 0.80	.870
CFI	CFI ≥ 0.80	.869
TLI	GFI ≥ 0.80	.838
RMSEA	RMSEA ≤ 0.10	.087
SRMR	SRMR ≤ 0.10	.086
#sample moments		231
#parameters		46
df		185

Prior findings indicated that all first-order item loadings were ≥ 0.5, with the exception of item L8, however the second-order factor loading for the learning dimension was deemed inadequate (<0.5), implying the necessity for the entire dimension's deletion. The hypothetical model fit was evaluated, followed by the calculation and interpretation of Goodness of Fit (GOF) indices based on the contributions of many researchers (e.g., Bentler & Chou, 1987; Bollen, 1989; Fabrigar et al., 1999), as presented in Table 4.

The CFA results indicated a decent match for the AIAS, as presented in Table 3. The learning dimension was removed due to a low factor loading value, and modifications were made based on the results of the modification indices. The model fit was subsequently re-evaluated, as detailed in Table 5.

Table 5: GOF Indices for AIAS Model.

GOF	Value before Dimension Deleted (21 items)	Value after Dimension Deleted (13items)
χ^2	541.062 (p=0.00)	181.622 (p=0.00)
χ^2/df	2.925	3.131
IFI	.870	.934
CFI	.869	.934
TLI	.838	.911
RMSEA	.087	.091
SRMR	.086	.068

After the elimination and model modification of the Learning dimension most of the GOF were greater, IFI= 0.934, CFI=0.934, TLI=0.911, and SRMR got smaller=0.068. The final model of the Arabic version AIAS construct is shown in Figure 2. McDonald's Omega for 13 items Arabic version 0.916.

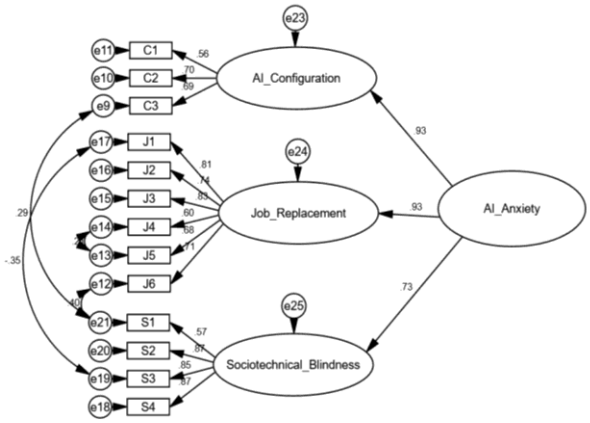

Figure 2: Arabic Version of AIAS Construct with.

4. DISCUSSION

The translated version, the process of cross-cultural adaptation, and the validation of the Arabic version of AIAS produced adequate results for reliability and validity of the final 13-item version. The validation process led to a significant alteration in the Arabic AIAS version. Notwithstanding the meticulous translation procedure employed in scale adaptation, achieving an optimal translation of content from one language to another remains challenging. Despite the Arabic language's abundance of synonyms, there exist nuanced distinctions among them. We contend that the translation process of a scale is inherently susceptible to a degree of mistake. The 21-item version, translated from English to Arabic, exhibited modest goodness of fit (χ^2=541.062**, χ^2/df=2.925,

IFI=0.870, CFI=0.869, TLI=0.838, RMSEA=0.087, SRMR=0.086), with the factor loadings indicating a weak loading for the entire learning sub-dimension. In addition to L8 (Inability to keep pace with advancements in AI techniques/products induces anxiety), there was a minimal load on the learning dimension (loading=0.207). The inadequate loading of L8 may be ascribed to the overall phrase structure, which lacks terminology indicating a connection to AI learning. The diminished loading of the entire sub-dimension may be ascribed to the correlation between anxiety and academic performance (McCraty, 2007; McCraty et al., 2000). Given that academic performance is contingent upon the learning process, it can be inferred that anxiety significantly impedes learning. Students exhibiting low anxiety levels are more inclined to possess an extensive memory span, elevated self-esteem, enhanced concentration, and increased confidence in acquiring new skills. Vitasari et al. (2010) stated that anxiety significantly influences the learning process. This suggests that individuals generally evade sources of fear, resulting in students with AI anxiety being less inclined to engage deeply in AI learning. The correlations among the AIAS sub-scales indicated that the learning dimension exhibited a weak association with other AIAS sub-scales, ranging from 0.224 to 0.377. For instance, those apprehensive about AI may refrain from learning it due to their belief that AI applications will supplant human employment, resulting in a negative disposition towards AI that leads to avoidance and a lack of purpose to acquire knowledge in this domain. McCutcheon (1987) noted that although multiple-item sub-dimension scales have been constructed, researchers differ over the principal aspects of the construct to be characterised. He also asserted that the components of multidimensional scales need not be unconnected; they may exhibit intercorrelation. This suggests that the AIAS may be a multidimensional scale requiring additional research.

The Arabic version of the AIAS showed a better fit for most of GOF indices

$$(\chi^2 = 181.622 **, \chi^2/df = 3.131, IFI = 0.934, CFI = 0.934, TLI = 0.911, RMSEA\ 0.091, SRMR = 0.068),$$

Some modifications had made according to the values of modification indices, all modifications were covariances between disturbances, which suggest wording similarities between items, or existence of a hidden latent trait which needs further examination.

5. CONCLUSION

This study sought to adapt and validate the Arabic version of the Artificial Intelligence Anxiety Scale (AIAS) via a comprehensive cross-cultural adaptation process. The results indicated that the final 13-item Arabic version of the scale exhibits satisfactory reliability and validity, affirming its applicability for evaluating AI-related anxiety in Arabic-speaking environments. The original English version comprised 21 questions; however, the validation procedure indicated that numerous items, especially those related to the learning dimension, did not function effectively in the Arabic context. This result underscores the intricate relationship between language, culture, and psychological structures. The findings further substantiate the perspective that AI anxiety is a multifaceted phenomenon that may not manifest evenly across various aspects of the scale. This research provides empirical evidence that students with elevated anxiety around AI are inclined to evade AI-related learning activities. Consequently, the Arabic AIAS is a legitimate and culturally adept tool for forthcoming research. This work considerably contributes to the literature by introducing the first validated Arabic tool for systematically assessing AI anxiety among university students in the Arab world, despite modest translation issues.

5.1. Implications

The verified Arabic AIAS holds significant ramifications for research, education, and policy. It offers researchers a psychometrically valid instrument that is culturally pertinent and adjustable for investigating AI-related fears within Arabic-speaking populations. This represents an initial step in comprehending how AI anxiety affects attitudes, behaviours, and learning outcomes as AI technologies integrate into academic and professional practices. Educators should recognise that the study's findings highlight the imperative of incorporating programming aimed at alleviating AI concerns within the higher education curriculum. The implementation of student engagement tactics, including awareness workshops, AI literacy programs, and mentorship initiatives, may enable students and faculty to cultivate confidence and mitigate their avoidance behaviour while utilising AI-based products. Policymakers and decision-makers in academic institutions may utilise the pertinent findings from this scale to inform their strategic priorities, particularly on workforce renewal and readiness as catalysts for digital transformation. Furthermore, by utilising signs of AI anxiety, colleges may pinpoint student cohorts predisposed to elevated levels of AI anxiety and cultivate a more conducive learning environment to mitigate these pressures. This scale may also function as a reference for cross-cultural studies

investigating the psychological effects of AI across diverse cultural contexts or as a tool for international collaborations assessing opportunities to implement AI inclusively and ethically in human-centered manners.

5.2. Future Directions

The Arabic AIAS exhibited robust psychometric features; however, numerous opportunities for future research exist. Initially, additional research is required involving larger, more diverse samples that encompass professionals and a wider population, rather than solely students, to investigate the multidimensionality of AI anxiety. This may elucidate the necessity for enhancements in learning dimensions and the introduction of new items to accurately reflect culturally specific experiences. Longitudinal research would elucidate how these worries may evolve with the growing prevalence of AI technology in education and society. Future research may elucidate the relationship between demographic and environmental characteristics, including age, gender, socio-economic status, and prior experience with AI technology, and their correlation with levels of AI anxiety. This research may result in therapies capable of addressing personal and cultural apprehensions around AI. Cross-cultural comparative research can elucidate the significance of AI concern in Arabic-speaking countries, highlighting both the contrasts and parallels with other worldwide regions. Finally, qualitative approaches, like interviews and focus groups, might facilitate a deeper exploration of the epistemic beliefs, misconceptions, and emotions humans may harbour around AI anxiety.

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Appendix A

Sample Items for the Arabic Version of the AIAS

Dimension	Arabic Version	English Version
Learning	إن تعلم استخدام تقنيات/منتجات الذكاء الاصطناعي يجعلني أشعر بالقلق	Learning to use AI techniques/products makes me anxious
AI configuration	أجد تقنيات/منتجات الذكاء الاصطناعي الشبيهة بالبشر (على سبيل المثال الروبوتات الشبيهة بالبشر) مخيفة	I find humanoid AI techniques/products (e.g. humanoid robots) scary
Job replacement	إن فكرة الاعتماد على تقنيات الذكاء الاصطناعي تشعرني بالخوف	I am afraid that an AI technique/product may make us dependent
Sociotechnical blindness	أخشى من المشاكل المختلفة التي قد ترتبط بتقنية/منتج الذكاء الاصطناعي	I am afraid of various problems potentially associated with an AI technique/product.