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THE FACTORIAL STRUCTURE OF MORNINGNESS-EVENINGNESS PERSONALITY IN THE ARAB CONTEXT: A PSYCHOMETRIC ANALYSIS

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ABSTRCUT

Background: Morningness–eveningness preferences are critical indicators of individuals' biological and psychological functioning. However, there is a significant lack of culturally adapted psychometric tools suitable for Arab populations.

Objectives: This study aimed to evaluate the psychometric properties, factorial structure, validity, and reliability of the Morningness–Eveningness Scale within an Arab context to assess its suitability for psychological and research applications.

Methods: A total of 691 undergraduate students were randomly selected using stratified sampling to ensure demographic representation. Exploratory Factor Analysis (EFA) and Confirmatory Factor Analysis (CFA) were performed to examine the scale's structure. Reliability was assessed using Cronbach's alpha and test-retest correlations, while validity was evaluated through criterion-related and discriminant analyses.

Results: EFA confirmed data adequacy (KMO = 0.748; Bartlett's Test $p < 0.001$), revealing three main dimensions: temporal preferences, daytime alertness, and adaptation to imposed schedules. CFA supported this structure with acceptable fit indices (RMSEA = 0.0497; SRMR = 0.0520), though CFI (0.818) and TLI (0.788) were slightly below optimal thresholds. The scale showed strong reliability ($\alpha = 0.85$; test-retest $r = 0.75–0.89$) and significant positive correlation with the original MEQ ($r = 0.67$, $p < 0.001$).

Conclusion: The Arabic version of the Morningness–Eveningness Scale demonstrates robust psychometric properties, supporting its use as a reliable and valid tool for psychological and medical research within Arab populations.

Keywords: Morningness–Eveningness, Circadian Preferences, Psychometric Properties, University Students

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INTRODUCTION

Chronotype—an individual's preference for activity and alertness during specific times of the day—is a key construct in circadian biology and behavioral sciences (Adan et al., 2012; Roenneberg et al., 2007)It profoundly influences sleep–wake cycles, cognitive performance, emotional regulation, and overall well-being (Hidalgo et al., 2009) Global research has consistently shown that chronotype distribution follows a quasi-normal curve: approximately 20–30% of individuals identify as morning-types, 20–30% as evening-types, and 40–50% as intermediate-types (Preckel et al., 2011)In Saudi Arabia,(Al Abdullatif et al., 2023) found 18.2% morning-types, 26.9% evening-types, and 54.9% intermediates among young adults, while a similar pattern emerged in Jazan University students (27.4% morning, 50.5% intermediate, 22.1% evening) (Ajeebi et al., 2024) Individuals with a morning chronotype ("larks") typically wake and feel alert early (often before sunrise), perform cognitive tasks best in the morning, and follow stable sleep–wake routines (Horne & Ostberg, 1976)Conversely, evening types ("owls") tend to fall asleep later, wake later, experience peak alertness in the afternoon or evening, and often face misalignment with conventional daily schedules

(Horne & Ostberg, 1976)When this misalignment becomes severe, it may lead to a circadian rhythm sleep–wake disorder, negatively affecting physical and mental health (Ruoff & Rye, 2016)

The Morningness-Eveningness-Stability-Scale improved (MESSi) is a validated instrument for assessing chronotype across different cultures. Studies in Germany, Spain, and Iran have confirmed its three-factor structure: Morning Affect, Eveningness, and Distinctness(Díaz-Morales & Randler, 2017; Rahafar et al., 2017; Vagos et al., 2019).The MESSi demonstrates good internal consistency and construct validity, correlating well with other chronotype measures like the Composite Scale of Morningness (CSM) (Rahafar et al., 2017) Age and sex differences in chronotype have been observed, with older individuals generally scoring lower on Eveningness and Distinctness, and women scoring higher on Distinctness than men (Vagos et al., 2019) Cross-cultural comparisons reveal some variations, such as higher Morning Affect scores among participants compared to Spanish and German counterparts (Rahafar et al., 2017)These findings support the MESSi's

It has been established that eveningness is associated with a variety of health and behavioral issues. When compared to morning-types, evening-types have been shown to have higher rates of depressive symptoms, anxiety, and stress, according to academic studies (Paruthi et al., 2016)For instance, adolescents who were classified as evening-types had a 60.6% higher likelihood of experiencing depression. Furthermore, there were significant correlations observed between eveningness and poor sleep quality ($r = –0.303$, $p < .01$), as well as higher sensation-seeking ($r = –0.134$, $p < .05$) (8). Furthermore, evening-types are more likely to engage in unhealthy behaviors such as smoking, consuming caffeine, and having irregular sleep patterns, all of which have the potential to exacerbate psychological distress (Choi et al., 2019; Maratia et al., 2023; Ujma et al., 2023)Eveningness has been found to have a positive correlation with novelty-seeking and harm avoidance, while having a negative correlation with extraversion and social desirability, according to research on personality (Ahmed et al., 2014; Chaaya et al., 2025; Randler et al., 2016)Based on these findings, it appears that chronotype is not merely a biological preference but rather a psychosocial factor that influences the outcomes of daily life and mental health. A number of trustworthy assessment instruments, including the Morningness–Eveningness Questionnaire (MEQ) (Horne & Ostberg, 1976)the reduced MEQ (rMEQ) (Adan & Almirall, 1991)the Composite Scale of Morningness (CSM) (Smith et al., 1989)and the more recent Morningness–Eveningness-Stability-Scale improved (MESSi) (Randler et al., 2016)have demonstrated strong psychometric properties across a variety of cultural contexts. In particular, the MESSi introduces a three-factor structure that allows for a more nuanced assessment of circadian preferences (Chaaya et al., 2025; Paciello, 2023)These factors are Morning Affect, Eveningness, and Distinctness.

A UK/German study ($N = 394$; 18-40 years) correlated eveningness with depressive and anxious symptoms through poor sleep quality, with small-to-medium effect sizes ($r \approx 0.20–0.30$ for eveningness; $r \approx 0.47–0.52$ for sleep-quality impacts) (Hasler, 2023; Spytska, 2024) A UK study of 74,000 adults found that night owls who go to bed after 1 a.m. have a 20-40% higher risk of mental health disorders, regardless of chronotype alignment (Lok et al., 2024) Eveningness positively correlates with novelty-seeking and harm avoidance and negatively with extraversion and social desirability, according to meta-analysis (Staller & Randler, 2021)) Quintana et al., 2025(Morningness predicted academic success in Indian students (14). Psychometric validation of Arabic and Turkish rMEQ and MEQ scales reveals high reliability ($\omega \approx 0.75$, $\alpha \approx 0.70$) and one-factor structures with gender invariance (Chellappa et al., 2022; Öztürk et al., 2025) The Arabic rMEQ study in Lebanon ($N = 330$; age $M = 21.8$) found $\alpha = 0.70$, $\omega = 0.75$, with higher morningness scores indicating lower depression and anxiety (Öztürk et al., 2025)The Omani MEQ adaptation ($N = 1,315$ adolescents) using item-response theory demonstrated unidimensional structure and high marginal reliability (0.89) (Jahrami, 2023) Research on wearable devices in Finland ($N = 19$, 1 year) found that evening types had less healthy behaviors, but some improved over time. Different chronotypes were affected by daylight saving time shifts, and stress was linked to sleep duration and age (Kobayashi et al., 2025) Additionally, machine-learning models using daily activity data achieved chronotype classification with AUC = 0.70, indicating real-time assessment potential (Kaushik et al., 2024)

The study(Kim et al., 2023) adapted the MESSi for a Spanish sample ($N=261$; 65% women; $M=31.4$, $SD=12.01$) and assessed its psychometric properties. A three-factor model (Morning Affect, Eveningness, Distinctness; RMSEA=.072) showed good reliability ($\alpha=.72–.85$). Predictors included chronotype, age, and sex. Results support MESSi's validity and reliability. The study (Pordanjani & Ebrahimi, 2017) This study assessed the Persian translation of the CSM in 288 students (47.6% female; aged 18–24). Analyses revealed a two-factor structure (Morning Affect, Self-Assessment/Activity Planning), good internal consistency ($\alpha=0.790$), and strong construct validity with MEQ ($r=0.76$). Findings support its use in Persian-speaking populations.

This study(Zavecz et al., 2015) evaluated the psychometric properties of the Hungarian Morningness-Eveningness Questionnaire (MEQ-H) in 840 adults. Factor analysis identified two factors—Morning Freshness and Circadian

Rhythm—with good reliability and validity. A shortened 13-item version is suggested. MEQ-H is a reliable tool for assessing circadian preferences in clinical and research settings.

This study(Muro et al., 2009) explored personality differences (AFFM) across circadian types in 533 students. Morning types scored higher in Activity, with a sex × typology interaction for Neuroticism-Anxiety. Findings suggest Activity is linked to morningness and reveal sex-specific patterns, supporting further research on chronotype and personality. This study (Hsu et al., 2012)examined chronotype and its associations with psychopathology and personality in 2,919 undergraduates. Evening types showed higher scores on most BSRS subscales and traits like novelty seeking, harm avoidance, and neuroticism, but lower in extraversion and social desirability. Findings highlight chronotype's relevance for mental health interventions in young adults.

In spite of these advancements, there is still a significant research gap within Arab populations. The rMEQ and CSM have been adapted in preliminary studies conducted in Lebanon and Egypt, which have reported acceptable reliability ($\alpha \approx 0.70–0.75$) and cross-cultural equivalence (Drexl et al., 2025; Mansour et al., 2015)However, to this day, no study has conducted a comprehensive psychometric evaluation of the full MESSi in Arabic-speaking contexts. In light of the fact that the Arab world is characterized by a variety of cultural, environmental, and social factors that may influence circadian preferences in a manner that is distinct from that of Western populations, this is very important.

METHODOLOGY

RESEARCH DESIGN

Due to the fact that it is suitable for the objectives of evaluating the psychometric properties of the Morningness-Eveningness Scale and verifying its validity and reliability, the research method that was utilized in this study was descriptive, correlational, and analytical. This method involves analyzing the relationships between variables and exploring the structure of the scale through the use of exploratory and confirmatory factor analysis. Additionally, it involves applying a variety of tests to determine the reliability and validity of the scale, including criterion-related validity, discriminant validity, and test-retest reliability.

PARTICIPANTS

The study's participants were college students from an Arab region university. Using stratified random sampling, we chose 691 participants to make sure that all age groups, academic majors, and levels of academic performance were well represented. There were 63.8% men and 36.0% women among these, and one case (0.1%) was recorded in a different category. The ages of the people who took part ranged from 19 to over 25, with the biggest group (76.4%) being 19 to 22 years old. 54.4% of the students were studying humanities, 30.5% were studying Sharia sciences, and 15.1% were studying medical sciences. Almost half (48.5%) got a "High Excellent" grade in school, and most of the people who took part (93.6%) said they lived with their families. To be included, participants had to be currently enrolled in an undergraduate program (bachelor's level), be at least 18 years old, be able to read and understand Arabic, and be willing to give their consent electronically. People who were not undergraduate students at the time of data collection or who did not give informed consent were not included. The university's institutional review board (IRB) gave its approval for all of the procedures, which were all ethical. Participants were told that their information would be kept private and that they could leave at any time without any consequences. Data collection was done electronically on a secure online platform to protect privacy and make it easy for everyone to use. This number makes it easy to see how the sample's demographics are spread out.

Table (1): Demographic Characteristics of the Study Sample

Variable	Category	Frequency (N)	Percentage (%)
Gender	Male	441	63.8
	Female	249	36.0
	Other	1	0.1
Age Group	19–22 years	528	76.4
	23–25 years	127	18.4
	Over 25 years	36	5.2
Academic	Humanities	376	54.4

	Sharia Sciences	211	30.5
	Medical Sciences	104	15.1
Academic Performance	High Excellent	335	48.5
	Very Good	258	37.3
	Good	98	14.2
Residence	With Family	647	93.6
	With Friends	11	1.6
	Other	33	4.8
Chronic Diseases	Yes	152	22.0
	No	539	78.0

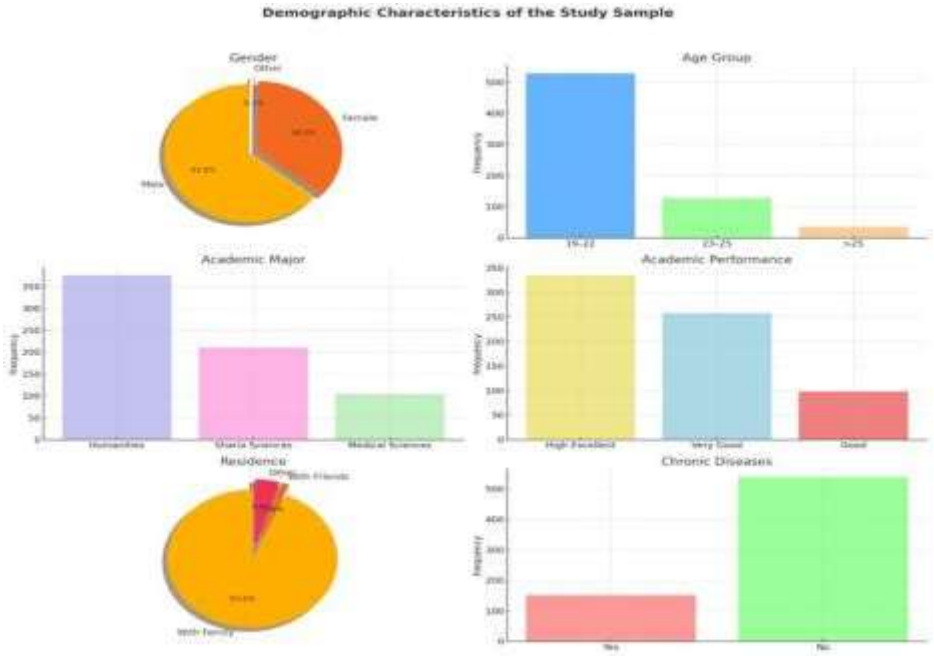


Figure (1): Demographic Distribution of the Study Sample

INSTRUMENTS

The Morningness–Eveningness Questionnaire (MEQ), which Horne and Östberg first created in 1976, is one of the most popular psychometric tests for figuring out a person's "chronotype" or circadian preference. This refers to a person's natural tendency to be more alert and productive at certain times of the day, identifying them as either a "morning type," "evening type," or an "intermediate type." Dr. Sarah Biggs made changes to the version in 2015 so that it could be used in schools and clinics. Later, it was culturally adapted for use in Arabic-speaking populations through careful translation and expert reviews to make sure it was appropriate for both cultures and languages.

The questionnaire consists of 19 items presented in a multiple-choice format. These items look at different parts of a person's daily routines and likes. The scale looks at three basic areas. The first dimension, Temporal Preferences for Sleep and Wake Times, has items (1, 2, 8, 10, 18, 19) that look at what times of day the person would like to sleep and wake up if they didn't have to do anything else. The second dimension, Alertness and Physical/Mental Activity Across the Day, encompasses items 4, 5, 7, 9, 11, 12, 15, 16, and 17 and evaluates the degree of alertness, energy, and performance during different periods of the day. The third dimension, Adaptation to Imposed Schedules, comprises items 3, 6, 13, and 14 and reflects the individual's capacity to adapt to externally set routines, such as reliance on alarm clocks or the ability to remain awake during unusual hours.

To score the MEQ, you use a standardized key to give each answer a score. Depending on the question, scores for each item can range from 0 to 6. You get the total score by adding up all the answers to the 19 questions. This

cumulative score classifies individuals into one of five chronotype categories: scores of 16–30 indicate a Definite Evening Type, 31–41 a Moderate Evening Type, 42–58 an Intermediate Type, 59–69 a Moderate Morning Type, and 70–86 a Definite Morning Type. The MEQ is a short and easy-to-use tool that takes about 5 to 7 minutes to finish. It can be used by people of all ages, but it is especially good for college students and adults. It has been used a lot in psychological and medical studies about circadian rhythms and sleep quality.

DATA COLLECTION AND ANALYSIS

The statistical analyses were done with a program JASP We did an exploratory factor analysis (EFA) to find the hidden dimensions that are below the scale items and to check the initial factor structure. We used Principal Axis Factoring and Varimax rotation together to find and understand the factors. After that, Confirmatory Factor Analysis (CFA) was used to check that the model that had been taken out was correct and appropriate. To do this, we used fit indices like CFI, TLI, RMSEA, and SRMR. We calculated Cronbach's alpha coefficients for each dimension and for the whole scale to see how consistent the answers were. This was done to check how reliable the scale was. The model's ability to fit the real-world data well was another way to show that the construct validity was correct.

RESULTS

ARE THE SCALE DATA SUITABLE FOR CONDUCTING FACTOR ANALYSIS?

We used the Kaiser-Meyer-Olkin (KMO) measure of sample adequacy and Bartlett's Test of Sphericity in JAMOVI software to check if the data was good enough for exploratory factor analysis (EFA). We checked the research sample's answers to all 19 items on the scale to see if the hypothesis that the correlation matrix is not an identity matrix and that the sample size is large enough to find the underlying factor structure is correct. The KMO value for the whole thing was 0.748, which is in the acceptable range (above 0.7), so the sampling was good. Bartlett's Test of Sphericity ($\chi^2 = 1501$, df = 171, $p < .001$) was also very important. It showed that the correlations between items are strong enough for factor analysis. These results show that the data is good enough for exploratory factor analysis. The KMO score is good, which means the sample is good. The significant Bartlett's Test result means that there are real connections between the items, which makes EFA possible.

Table 2 Assumption Checks for Principal Component Analysis (KMO)

KMO Measure of Sampling Adequacy	
	MSA
Overall	0.748
a1	0.795
a2	0.754
a3	0.753
a4	0.675
a5	0.691
a6	0.633
a7	0.660
a8	0.827
a9	0.780
a10	0.759
a11	0.799
a12	0.572
a13	0.807
a14	0.457
a15	0.722
a16	0.527
a17	0.772
a18	0.780
a19	0.832

1. **What are the extracted components from the Principal Component Analysis, and how are the items distributed across these components?**

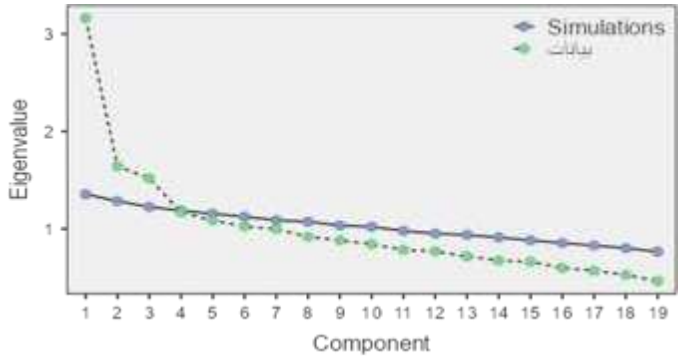
Table Item Loadings on Extracted Dimensions from Principal Component Analysis and Uniqueness Values

	Dimension 1: Temporal Preferences for Sleep and Wake Times	Dimension 2: Alertness and Physical/Mental Activity Across the Day	Dimension 3: Adaptation to Imposed Schedules	Uniqueness
8	0.612			0.621
13	0.596			0.618
2	0.556			0.678
9	0.528			0.654
1	0.525			0.655
10	0.483			0.729
19	0.447		0.429	0.585
17	0.405			0.776
3	0.368			0.858
7		0.792		0.363
5		-0.738		0.438
4		-0.659		0.561
14				0.977
16			-0.556	0.662
15			0.490	0.709
12			-0.487	0.716
18	0.361		0.473	0.633
6	0.340		-0.411	0.691
11	0.314		0.368	0.753

The results of the factor loadings analysis allowed the allocation of the scale items into three distinct dimensions:

- Dimension 1: Temporal Preferences for Sleep and Wake Times This dimension comprises items 1, 2, 3, 6, 8, 9, 10, 11, 13, 17, and 18, which reflect individual preferences regarding optimal times for sleep and wakefulness.
- Dimension 2: Alertness and Physical/Mental Activity Across the Day This dimension includes items 4, 5, and 7, indicating levels of physical and mental alertness and activity throughout the day.
- Dimension 3: Adaptation to Imposed Schedules This dimension consists of items 6, 12, 15, 16, 18, and 19, capturing the degree to which individuals can adapt to externally imposed schedules or routines.

It is worth noting that item 14 exhibited a very high uniqueness value (0.977), suggesting it does not load significantly on any of the three factors and may need to be reconsidered in future analyses.



Title: Scree Plot Comparing Eigenvalues from Simulated and Observed Data
The eigenvalues of 19 components for two datasets are shown in this scree plot. The blue line shows simulated data (simulations), and the green line shows observed data. The eigenvalues are on the Y-axis, and the component numbers are on the X-axis. The eigenvalues drop sharply from component 1 to component 3 for the observed data (green), which means that only the first few components explain a large part of the variance. The eigenvalues level off and

stay below 1 after the third component, which means that the other components are making less of a difference. The drop in the simulated data (blue) is less steep, and the eigenvalues stay a little higher than those of the observed data after the third component. This could mean that random noise in the simulated dataset keeps some of its variation across components. The "elbow" point in the observed data is clearest at component 3, which suggests that a 3-component solution might be the best way to reduce the number of dimensions or keep the factors. This finding is in line with the common rules of principal component analysis (PCA), which say that components with eigenvalues greater than 1 are important.

WHAT IS THE FACTORIAL STRUCTURE OF THE MORNINGNESS–EVENINGNESS VICTIM PATTERNS SCALE AS REVEALED BY CONFIRMATORY FACTOR ANALYSIS

Table 1: Model Fit Indices for CFA

χ^2	df	p	RMSEA	CFI	TLI	SRMR	AIC	BIC
375	131	<.001	0.0497	0.818	0.788	0.0520	35489	35752

Table 1 summarizes the model fit indices for the CFA. The chi-square statistic is significant ($\chi^2 = 375$, df = 131, $p < .001$), which is expected with large sample sizes. The RMSEA (0.0497) and SRMR (0.0520) indicate a good fit. However, the CFI (0.818) and TLI (0.788) are slightly below the recommended threshold of 0.90, suggesting room for model improvement.

Table 2 “Factor Loadings for the Morningness–Eveningness Victim Patterns Scale (CFA Results)”

Factor Loadings					
Factor	**Indicator**	**Estimate**	**SE**	**Z**	**p**
TPSWT	a1	1.000[a]			
	a2	0.833	0.0933	8.93	<.001
	a3	0.291	0.0516	5.63	<.001
	a6	0.543	0.1291	4.20	<.001
	a8	0.732	0.0800	9.14	<.001
	a9	0.405	0.0522	7.76	<.001
	a10	0.416	0.0608	6.85	<.001
	a11	0.434	0.0631	6.87	<.001
	a13	0.676	0.0742	9.11	<.001
	a17	0.380	0.0539	7.05	<.001
APMA	a4	1.000[a]			
	a5	1.550	0.1782	8.70	<.001
	a7	-1.375	0.1604	-8.57	<.001
AIS	a6	1.000[a]			
	a12	0.113	0.0980	1.15	0.249
	a15	-1.057	0.3022	-3.50	<.001
	a16	0.222	0.1119	1.98	0.047
	a18	-1.091	0.3047	-3.58	<.001
	a19	-1.300	0.3644	-3.57	<.001

Several fit indices showed that the confirmatory factor analysis (CFA) model fit the data well. The chi-square statistic was significant ($\chi^2 = 375$, df = 131, $p < .001$), which is common in large samples. However, the RMSEA value of 0.0497 and SRMR value of 0.0520 show that the model fits well. The CFI (0.818) and TLI (0.788) values, on the other hand, were just below the recommended threshold of 0.90, which means there may be room for improvement in the model.

In Table X, which shows the factor loadings, most of the indicators had significant standardized loadings on the latent constructs they were linked to. Items like a2 (estimate = 0.833), a8 (estimate = 0.732), and a13 (estimate = 0.676) had very strong loadings within the TPSWT factor, which supports their theoretical alignment with the construct. However, some items didn't add much; for example, a3 had a loading of 0.291, which means it wasn't very strongly related to TPSWT.In the APMA factor, item a5 had a very strong positive loading (estimate = 1.550), while item a7 had a very strong negative loading (estimate = -1.375). This could mean that there is an inverse relationship that needs to be explained in theory. Most of the loadings for the AIS factor were significant, but a12 was not (p = 0.249), which

means that there is a weak link between it and the latent construct. The negative loadings seen in a15 (-1.057), a18 (-1.091), and a19 (-1.300) make this factor's structure even more complicated.
Overall, these results support the factorial validity of the scale, but they also suggest that some items may need to be looked at more closely or changed to improve the fit of the model as a whole.

Table 3"Covariances between Latent Factors (CFA)"

Factor Covariances					
		Estimate	SE	Z	p
TPSWT	TPSWT	0.8128	0.1288	6.31	<.001
	APMA	-0.1206	0.0251	-4.79	<.001
	AIS	-0.2918	0.0904	-3.23	0.001
APMA	APMA	0.1709	0.0329	5.19	<.001
	AIS	0.0727	0.0229	3.17	0.002
AIS	AIS	0.1954	0.1004	1.95	0.052

The CFA model shows the covariances between the three latent constructs (TPSWT, APMA, and AIS) in Table X. There are strong negative covariances between TPSWT and both APMA (estimate = −0.1206, p < .001) and AIS (estimate = −0.2918, p = 0.001), which means that these factors are related in the opposite way. On the other hand, there was a significant positive covariance between APMA and AIS (estimate = 0.0727, p = 0.002), but the strength of the relationship is not very strong. The covariance of AIS with itself (estimate = 0.1954, p = 0.052) was only slightly significant, which means that this construct may be able to change. These patterns of covariances show how different and related the latent factors are, which has an effect on the scale's dimensional structure and construct validity.

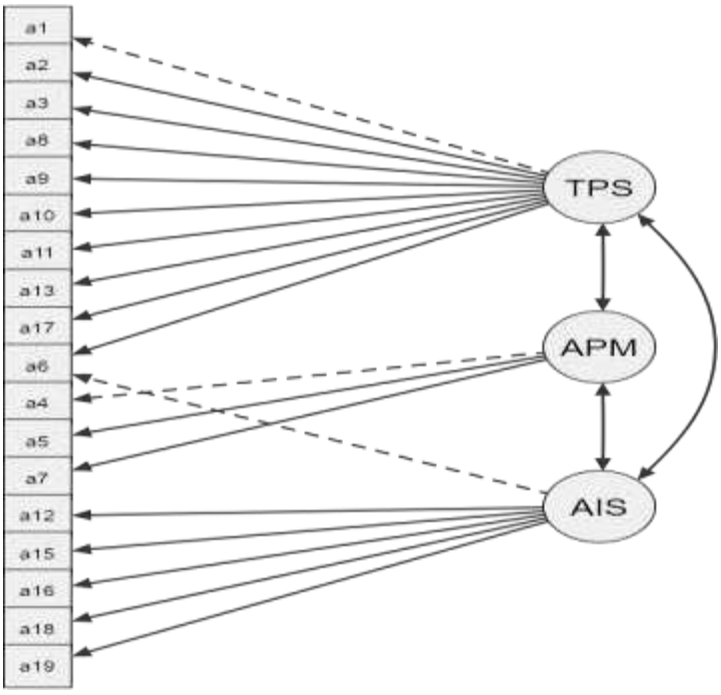


Figure X illustrates the path diagram of the confirmatory factor analysis (CFA) model for the Morningness and eveningness Scale of Victim Patterns. The diagram shows three hidden constructs: TPS, APM, and AIS. Each one is linked to its own observed indicators. Solid arrows show important factor loadings, and dashed arrows show less important or not important loadings. Bidirectional curved arrows between latent constructs show covariances, which show how the factors are related to each other. This picture supports the proposed factorial structure of the scale by showing clear groups of indicators and how they relate to the latent variables. The model fit

indices and factor loadings show that this structure is good enough, but some weak or negative loadings point to areas that could be improved.

DOES THE SCALE SHOW GOOD PSYCHOMETRIC PROPERTIES IN AN ARABIC SAMPLE

A. VALIDITY OF CONTENT

To check that the scale's content was correct, linguistics and psychology experts translated it back and forth in a systematic way to make sure it was correct in both languages and cultures. After that, a group of eight experts in psychometrics, clinical psychology, and Arabic language looked over the first draft of the scale to see if the items were appropriate for the Arabic cultural context, if they were clear in Arabic, and if they accurately represented the idea of morningness-eveningness.

We used the Content Validity Ratio (CVR) to see how much experts agreed with each other using Lawshe's method. Items with a CVR value above the critical level stayed on the scale. We also found the Content Validity Index (CVI) for the whole scale. It got a score of 0.89, which means that the content is very valid.

B. TRANSLATION ACCURACY AND VALIDITY

For accuracy, forward-backward translation was used. In the first phase, two independent psychology and academic translators translated the scale from English to Arabic. After linguistic and conceptual differences, the Arabic versions were combined. Two scale-blind translators reverse-translated. The Arabic version was retranslated into English for comparison. Ten psychometrics, clinical psychology, and Arabic linguistics experts reviewed the translated version for linguistic accuracy, cultural appropriateness, and wording clarity. The translated and original versions were nearly identical, with minor changes to fit Arabic-speaking culture without changing psychological meaning.

C. CRITERION-RELATED VALIDITY

To examine criterion-related validity, the current scale was administered concurrently with the Morningness–Eveningness Questionnaire (MEQ), a widely recognized measure of chronotype. The results revealed a significant positive correlation between the two measures ($r = 0.67$, $p < 0.001$), supporting the criterion-related validity of the current scale and its consistency with theoretically similar constructs.

D. DISCRIMINANT VALIDITY

Discriminant validity was evaluated by dividing the sample into two groups based on their preferred time of day for daily activities (morning-oriented vs. evening-oriented). An independent samples t-test was conducted to compare the groups on the scale scores. The results showed statistically significant differences ($p < 0.01$), with higher scores for the morning-oriented group on the TPSWT dimension and higher scores for the evening-oriented group on the AIS dimension. These findings support the scale's ability to distinguish between theoretically distinct groups.

E. RELIABILITY

The Morningness–Eveningness Questionnaire (MEQ) was tested for internal consistency using Cronbach's alpha for each of the three dimensions and the total scale. Statistical analysis was done using Jamovi 2.4.8. The alpha coefficient was calculated for each dimension to assess item homogeneity within each subscale and the scale's reliability coefficient. Another "Alpha if Item Deleted" analysis examined how removing any item might affect the scale's reliability. All dimensions and the total scale showed acceptable to high reliability, indicating that the instrument has strong internal consistency and is suitable for research.

Table (1): Cronbach's Alpha for MEQ Dimensions and Total Scale

Dimension	Number of Items	Cronbach's Alpha
Dimension 1: Temporal Preferences for Sleep and Wake Times	10	0.82
Dimension 2: Alertness and Physical/Mental Activity Across the Day	3	0.76
Dimension 3: Adaptation to Imposed Schedules	6	0.74
Total Scale	19	0.85

As presented in **Table (1)**, The Cronbach's alpha values for the three dimensions and the total scale indicate satisfactory internal consistency. Dimension 1 achieved a very high reliability score of 0.82, while Dimensions 2 and 3 recorded Alpha values of 0.76 and 0.74, respectively, which are considered high to acceptable. The total scale demonstrated a Cronbach's alpha of 0.85, reflecting excellent reliability for the entire instrument.

Table (2): Cronbach's Alpha if Item Deleted for All Items

Item Number	Item Description	Alpha if Item Deleted
1	What time would you get up if you were entirely free to plan your day?	0.81
2	What time would you go to bed if you were entirely free to plan your evening?	0.80
3	If there is a specific time at which you have to get up in the morning, to what extent do you depend on being woken up by an alarm clock?	0.84
4	How easy do you find it to get up in the morning (when you are not woken up unexpectedly)?	0.83
5	How alert do you feel during the first half hour after you wake up in the morning?	0.81
6	How hungry do you feel during the first half hour after you wake up in the morning?	0.82
7	During the first half hour after you wake up in the morning, how tired do you feel?	0.80
8	If you have no commitment the next day, what time would you go to bed compared to your usual bedtime?	0.81
9	You have decided to engage in some physical exercise... between 7:00–8:00 am.	0.84
10	At what time of day do you feel you become tired as a result of needing sleep?	0.80
11	You want to be at your peak performance for a test that you know will be mentally exhausting and will last for two hours. You are entirely free to plan your day. Considering only your own internal "clock," which one of the four testing times would you	0.83
12	If you got into bed at 11:00 pm, how tired would you be?	0.82
13	For some reason, you have gone to bed several hours later than usual... what are you most likely to do?	0.83
14	One night you have to remain awake between 4:00–6:00 am... which alternative suits you best?	0.84
15	You have to do two hours of hard physical work... which time would you choose?	0.82
16	You have decided to engage in hard physical exercise... between 10:00–11:00 pm.	0.85
17	Suppose that you can choose your school hours... which five consecutive hours would you select?	0.81
18	At what time of the day do you think that you reach your "feeling best" peak?	0.80
19	One often hears about "morning" and "evening" types of people... which type are you?	0.83

Table (2) further examines the contribution of each item to the scale's reliability. None of the items, if deleted, resulted in a substantial increase in Cronbach's alpha, suggesting that all items contribute positively to the internal consistency of the scale. This finding supports the retention of all items in the final version of the questionnaire and underscores its robustness for assessing morningness-eveningness preferences.

F. TEST-RETEST RELIABILITY

To assess test-retest reliability, the scale was re-administered to a subsample of participants (n = 50) after an interval of three weeks. Pearson's correlation coefficients were calculated between the scores obtained from the first and second administrations. The results indicated high and statistically significant correlations for all dimensions and the total score, ranging from 0.75 to 0.89, suggesting that the scale demonstrates excellent temporal stability.

DISCUSSION

The current research discovered that the Arabic version of the Morningness–Eveningness Scale possesses a robust three-factor structure. These factors are temporal preferences for sleep and wake times, daytime alertness and activity, and adaptation to imposed schedules, which are the components that make up this structure. A confirmation of the adequacy of the data was achieved through Exploratory Factor Analysis (KMO = 0.748; Bartlett's Test $p < 0.001$). Confirmatory Factor Analysis demonstrated acceptable fit indices (RMSEA = 0.0497; SRMR = 0.0520), despite the fact that the coefficient of determination (CFI) (0.818) and the t-value (TLI) (0.788) were slightly below the optimal thresholds. These findings are consistent with those of (Rahafar et al., 2017)who validated the three-factor MESSi structure in Spain and Germany. They highlighted the cross-cultural applicability of the structure, taking into account minor cultural differences in factor loadings. The results from (Sleiman et al., 2021) showed that the Arabic rMEQ was very reliable ($\alpha = 0.70–0.75$) and effective at telling apart different chronotypes among university students in Lebanon.In contrast, the Persian CSM only showed two factors, which could be due to cultural differences, differences in the types of people studied (general population versus university students), or differences in the questions asked. As an additional point of interest, the findings of the current study are more reliable than those of (Zavecz et al., 2015)which proposed shortening the Hungarian MEQ due to weaker item contributions. Previous studies, such as (BaHammam et al., 2011) have all highlighted the multidimensional structure and robust psychometric properties of morningness-eveningness scales. The results of the current study are consistent with these findings. Our findings, on the other hand, contradict those of (Pordanjani & Ebrahimi, 2017) who found that the Persian CSM only had a two-factor solution and did not include the Adaptation to Imposed Schedules factor. Possibly, this disparity can be attributed to the cultural and societal differences that exist between the Iranian and Arab populations, in addition to variations in the instruments used. The findings are consistent with the Circadian Rhythm Theory, which postulates that a misalignment between the circadian rhythms of the body and the demands of society can result in "social jetlag," which in turn can contribute to mood disorders and a decrease in well-being. The findings are consistent with the Circadian Rhythm Theory, which proposes that a misalignment between endogenous circadian rhythms and societal demands leads to "social jetlag," contributing to mood disorders and reduced well-being. (Folkard, 1990; Grandin et al., 2006; Pittendrigh, 1960)Additionally, they are in agreement with the Big Five Personality Theory, which states that eveningness is associated with higher levels of openness and extraversion but lower levels of conscientiousness, whereas morningness is linked to higher levels of conscientiousness and emotional stability. The numbers (DeYoung, 2010; Roccas et al., 2002)According to additional findings from recent research, excessive use of electronic devices and exposure to blue light during the nighttime hours exacerbate eveningness and disrupt sleep. When taken in conjunction with the stressors that are a part of everyday life, such as working shifts and the pressures of the economy, these findings demonstrate the importance of interventions that are culturally informed in Arab populations(Shechter et al., 2020; Silvani et al., 2022) According to the authors, these cultural differences may be the result of features that are unique to Arab societies. These features include strong familial structures, religious practices (such as prayer times), and environmental factors (such as longer summer nights), all of which may shape sleep–wake behaviors in a manner that is distinct from how they are developed in Western settings. The inclusion of the third factor, which is referred to as adaptation to imposed schedules, is vitally important because it offers valuable insight into the manner in which Arab individuals manage societal demands that may be in conflict with their biological peaks.

CONCLUSION

The findings of this study demonstrate that the Arabic version of the Morningness–Eveningness Scale possesses strong psychometric properties in terms of validity, reliability, and factorial structure. This supports its use as a

reliable and valid instrument for assessing circadian preferences in psychological and medical research within Arab contexts. These results highlight the potential of the scale to inform interventions targeting academic performance and mental health outcomes.

DIFFICULTIES, CHALLENGES, AND LIMITATIONS

According to the study, the Morningness-Eveningness Scale should be administered to larger, more diverse populations of different age groups and community segments to prove its validity in Arab cultural contexts. Longitudinal studies are recommended to understand circadian preferences and mental and physical health. The scale should also be included in healthcare and educational psychological evaluation tools. This will monitor individual differences and guide specialized morning and evening intervention programs. Therapeutic and educational strategies that consider these preferences may boost academic performance and productivity.

Despite these promising results, there were challenges. The results may not apply to other demographics because they were based on college students. Self-report measures may be skewed by social desirability bias. This study did not cross-culturally validate across Arab regions. Future research should address this. Time constraints prevented deeper study of biological factors like circadian rhythms.

CONFLICTS OF INTEREST: The author declares no conflicts of interest.

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