

# Turkish Version of Morningness-Eveningness Questionnaire (MEQ)

Mehmet Yucel Agargun, M.D., Ali Savas Cilli, M.D.,  
Murat Boysan, Researcher, Yavuz Selvi, M.D.,  
Mustafa Gulec, M.D., Hayrettin Kara, M.D.

The purpose of this study was to provide validity and reliability of the Turkish version of the Morningness-Eveningness Questionnaire (MEQ).

The Turkish version of the scale was administered to the 171 healthy participants (87 men and 84 women) twice in different times. The internal consistency of the each question and total scores of the scale was examined by carrying out Cronbach's alpha statistic and Pearson correlation analysis. The test-retest reliability of the total MEQ scores was researched by applying dependent sample t-test and Pearson correlation analysis in two different application times.

The reliability was satisfactory (Cronbach's alpha=0.81). Points of the questions were found significantly and positively correlated with the total point. There is not a significant change in two different application times.

Internal consistency of the Turkish version was found high in the present study. The scale is adequate to distinguish "morning" and "evening" types in Turkish population. **(Sleep and Hypnosis 2007;9(1):16-23)**

**Key words:** Morningness-eveningness, diurnal rhythm, questionnaire, validity, reliability, Turkish

## INTRODUCTION

Humans can be divided into two different groups which called morning and evening types for their life styles, sleep-wake habits and timing of the best performances. It is possible to differentiate "morning",

"intermediate" and "evening" types by using MEQ which was developed to evaluate circadian rhythms of the individuals and interpersonal biological rhythm changes behaviourally by Horne and Ostberg in 1976 (1).

When we examined the psychiatric literature that connected with our topic, we have seen the remarkable usage of the MEQ in different areas. For instance, it was used in some studies about the relationship between circadian preferences and individual qualifications (2), the shift work (3), the seasonal affective disorder (4), the relationship between circadian preferences and season of birth (5), and the treatment trials over the circadian rhythms (6).

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From Department of Psychiatry, Faculty of Medicine, University of Yuzuncu Yil, Van (Drs. Agargun, Selvi, and Gulec); Department of Psychiatry, Meram Medical School, University of Selcuk, Konya (Dr. Cilli); Department of Psychology, Faculty of Education, University of Yuzuncu Yil, Van (Boysan); and Bakirkoy Psychiatric and Neurological Disorders Hospital, Istanbul (Dr. Kara), Turkey

Address reprint requests to: Mehmet Yucel Agargun,  
Department of Psychiatry, Faculty of Medicine, University of Yuzuncu Yil,  
Van 65200, Turkey.  
+90 0 432 215 04 71/1238.  
myagargun@kure.com.tr

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The goal of our study was to examine validity and reliability of the Turkish version of the MEQ. It would be possible to use MEQ in lots of studies in Turkey, especially regarding the relationships of circadian rhythm with behaviour and mood.

## METHODS

The participants were selected from healthy volunteers who live in Van or Konya randomly. They were recruited via the local announcements. The staff and students of the medical schools participated in the study. The education duration ranges between 11 and 17 years. The exclusion criteria: Existence of a psychiatric disorder, psychoactive substance or alcohol abuse, primary or secondary sleep disorders, a circumstance that might influence the circadian rhythm, like shift work or long journey by plane recently, serious medical illness and being out of the 18-50 age interval.

We included 87 (50.9%) males and 84 (49.1%) females in the study. The current study was not conducted on more subjects and none of the subjects of “neither” types was excluded. The mean age $\pm$ SD was 27.9 $\pm$ 5.5 for the whole group. The participants were aged between 19 and 46. The meanings of the “morning” and “evening” types were explained and they were questioned for the circadian type that seemed close to them. 120 (70.2%) of the participants were assessed themselves as “morning” type. The rest of them thought that “evening” type was more suitable for them.

Written informed consent was obtained from all subjects after they had received a complete description of the study protocol. They were not paid for their participation.

MEQ consists of 19 questions. All the points that were got from the questions are added up. If the total point is between 59 and 86, the individual is evaluated as a morning

typed. The points between 16 and 41 mean the eveningness. If an individual has a point between 42 and 58, we can easily say that we are face to face an intermediate typed person.

MEQ was translated into the Turkish by two independent translators. And then backtranslation process to the source language was performed. After this process, the final form (see Appendix I for Turkish version of the scale) was completed by comparing between the former translations. The final form of the scale was administered to a small pilot sample (15 medical students). The Turkish version was found apparent by all participants. The Turkish version of the MEQ was applied to the participants twice in different times for the test-retest reliability.

The SPSS, release 9.01, was used for data analyses. The internal consistency of the each question and total scores of the scale was examined by carrying out Cronbach's alpha statistic and Pearson correlation analysis. The test-retest reliability of the total MEQ scores was researched by applying dependent sample t-test and Pearson correlation analysis in two different application times. The total MEQ scores and the scores of the each questions of the participants who were evaluated either morning and or evening types were compared to search evidences about the validity of the scale by using independent sample t-test.

## RESULTS

The reliability of the Turkish Version was pleasing. Cronbach's alpha was found 0.81. Another evaluation that was directed towards the internal consistency of the scale was made with the Pearson correlation analysis (see Table 1). Points of the questions were found significantly and positively correlated with the total point (p values=0.001).

When the test-retest reliability of the total MEQ scores and the scores of the each question was investigated by using dependent sample t-test (see Table 2), no

**Table 1. The correlations of the total MEQ scores and the scores of the each question in two different application times†**

Questions	r	p
Question 1	0.76	0.001
Question 2	0.41	0.001
Question 3	0.88	0.001
Question 4	0.90	0.001
Question 5	0.88	0.001
Question 6	0.89	0.001
Question 7	0.87	0.001
Question 8	0.89	0.001
Question 9	0.30	0.001
Question 10	0.87	0.001
Question 11	0.89	0.001
Question 12	0.83	0.001
Question 13	0.84	0.001
Question 14	0.92	0.001
Question 15	0.72	0.001
Question 16	0.87	0.001
Question 17	0.86	0.001
Question 18	0.83	0.001
Question 19	0.98	0.001
Total	0.95	0.001

†Pearson correlation analysis

**Table 2. The test-retest reliability of the total MEQ scores and the scores of the each question†**

Questions	1st evaluation	2nd evaluation	t	p
Question 1	3.00±0.86	2.98±0.82	0.39	0.69
Question 2	2.67±0.75	2.68±0.69	0.19	0.84
Question 3	2.35±0.94	2.33±0.92	0.68	0.49
Question 4	2.83±0.78	2.83±0.78	0.01	0.98
Question 5	2.34±0.82	2.37±0.79	0.96	0.33
Question 6	2.41±0.96	2.39±0.97	0.66	0.50
Question 7	2.49±0.87	2.52±0.86	1.06	0.29
Question 8	2.39±0.78	2.38±0.79	0.20	0.83
Question 9	2.85±0.96	2.91±0.96	1.41	0.16
Question 10	1.74±1.10	1.73±1.08	0.19	0.84
Question 11	3.29±0.87	3.30±0.87	0.57	0.56
Question 12	2.32±0.89	2.34±1.01	0.55	0.58
Question 13	3.19±0.93	3.21±0.91	0.29	0.76
Question 14	2.53±1.17	2.53±1.18	0.16	0.87
Question 15	3.04±1.07	3.11±1.01	1.16	0.24
Question 16	2.36±0.97	2.38±0.94	0.30	0.75
Question 17	3.73±0.79	3.73±0.75	0.01	0.98
Question 18	3.55±0.98	3.57±0.90	0.55	0.58
Question 19	3.69±2.02	3.74±1.99	1.46	0.14
Total	52.81±8.21	53.09±8.26	1.39	0.16

†Dependent sample t-test

stastically significant difference was found between the two different application times (t=1.39, p=0.16 for the total MEQ scores).

The results of the Pearson correlation

analysis of the two different application times showed a significant and positive correlation (p=0.001 for the total MEQ scores and the scores of the each question).

The difference between the two groups (morningness and eveningness groups) was found stastically significant for all questions except two and mean total scores by using independent sample t-test (p value=0.18 for the 10th and 0.20 for the 13th question. Other p values<0.05, see Table 3).

**Table 3. Comparison of the each question and the averages of the total scores of the morningness and eveningness typed individuals†**

Questions	Morningness group (n=120)	Eveningness group (n=51)	t	p
Question 1	3.17±0.78	2.58±0.89	4.28	0.001
Question 2	2.85±0.64	2.225±0.82	5.08	0.001
Question 3	2.46±0.94	2.07±0.89	2.50	0.013
Question 4	2.95±0.76	2.56±0.78	2.96	0.003
Question 5	2.47±0.79	2.03±0.82	3.23	0.001
Question 6	2.54±0.91	2.11±1.03	2.66	0.008
Question 7	2.58±0.87	2.27±0.82	2.14	0.033
Question 8	2.48±0.76	2.17±0.79	2.37	0.019
Question 9	3.04±0.90	2.43±0.98	3.93	0.001
Question 10	1.67±1.04	1.92±1.21	1.34	0.180
Question 11	3.47±0.74	2.86±1.01	4.42	0.001
Question 12	2.40±0.90	2.11±0.84	2.02	0.040
Question 13	1.75±0.87	1.98±1.06	1.27	0.200
Question 14	2.69±1.16	2.17±1.12	2.67	0.008
Question 15	3.27±0.99	2.49±1.04	4.64	0.001
Question 16	2.50±0.96	2.05±0.94	2.75	0.006
Question 17	3.92±0.62	3.27±0.96	5.26	0.001
Question 18	3.83±0.82	2.90±1.02	6.27	0.001
Question 19	4.81±1.04	1.05±1.08	21.27	0.001
Total	56.35±5.46	44.47±7.55	11.54	0.001

†Independent sample t-test

## DISCUSSION

Internal consistency of the Turkish version was found high in the present study. Finding Cronbach's alpha 0.81 and significantly and positively correlation between the points of the 19 questions and the total point of the MEQ showed that internal consistency of the Turkish version of the MEQ has a desired level. The test-retest reliability of the scale was found high too. Although stastically significant difference was not found between the two groups for

questions 10 and 13, the scale is adequate to distinguish morningness typed individuals from the eveningness typed ones generally.

To date MEQ was translated into many languages and used in lots of researches. It was translated into French by Foret, Benoit and Royant-Parola (7), Italian by Mecacci and Zani (8), Dutch by Kerkhof (9), Japanese by Ishihara et al. (10), Hebrew by Lavie and Segal (11), Portuguese by Benedito-Silva et al. (12), Spanish by Adan and Almirall (13), Chinese by Gau et al. (14) and German by Griefahn et al. (15) and validated in these languages.

MEQ was used with the other scales in some of the studies. Some of the scales are as follows: life habits inventory; circadian type inventory; Zung's self-rating depression scale; Structured Interview Guide for the Hamilton Depression Rating Scale-Seasonal Affective Disorders Version, visual analog scale.

We suggest that investigating synchronic validity of the MEQ with the other scales including Beck Depression Inventory, profile of mood states, Pittsburgh Sleep Quality Index, Epworth Sleepiness Scale, symptom check list-90-revised and quality of life index may be useful. This correlation and synchronic validity studies can show the way to solve lots of the theoretical and practical matters.

One of the limitations of the study is not including the alternative validation measurements like the biological markers (e.g., melatonin, body temperature), sleep

diary or the other inventories relating human circadian rhythms. But, a study has already been planned to examine the validation for the Turkish version of the MEQ through using the one or more measurements aforementioned. All participants of the study were well-educated (min. 11 years). A large community sample might have been more suitable for the validation studies. Statistically significant difference was not found between the two groups for questions 10 and 13. We think that the cultural qualifications and life style of the Turkish society might have affected the outcome. Although this does not constitute a problem for the global assessment, future studies investigating the cultural influences are needed.

The circadian type of an individual can be understood easily by the help of this scale. It can be used in the circadian rhythms and sleep-wake cycles studies in our country. Especially, the relationships between biological rhythms, melatonin and behaviours, mood and cognitive functions can be researched. The effects of the biological rhythm changes on the human senses and behaviours can also be studied. Researching the sleep habits of the adolescents, the association between the morningness-eveningness preferences and the season of birth, the relationship between the circadian preferences and the life styles, and the association between the circadian and neuroendocrine correlates is extremely important by means of MEQ.

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## Appendix 1. Turkish version of the MEQ MEQ

Ad ve soyadınız (baş harflerini yazabilirsiniz):  
Cinsiyetiniz: E( ) K( )

Yaşınız:  
Tarih:

### AÇIKLAMALAR

İnsanlar yaşam biçimleri, uyku-uyanıklık düzenleri ve gösterdikleri performansların zamanı bakımından “sabah tipi” ve “akşam tipi” şeklinde sınıflandırılabilirler. Aşağıda bununla ilgili sorular bulunmaktadır. Lütfen her bir soruyu cevaplandırmadan önce dikkatli bir şekilde okuyun. Tüm soruları cevaplandırın. Her bir soru için cevabınız diğerlerinden bağımsız olmalıdır, geri dönmeyin ve cevaplarınızı kontrol etmeyin. Her bir soru için bir tek cevap seçin. Bazı sorularda cevap olarak bir cetvel bulunmaktadır. Size doğru gelen seçeneği cetvel üzerinde ya da uygun sayıyı dikkate alarak işaretleyin.

### SORULAR

1. Eger gündüz planlarınızı başkalarından bağımsız olarak tek başınıza yapabilmiş olsaydınız saat kaç civarında yataktan kalkmak sizin için en uygunu olurdu?

05:00      06:30      07:45      09:45      11:00      12:00  
<--5--> <--4--> <-----3-----> <--2--> <--1-->

2. Eger akşam planlarınızı başkalarından bağımsız olarak tek başınıza yapabilmiş olsaydınız saat kaç civarında yatmak sizin için en uygunu olurdu?

20:00      21:00      22:15      24:30      01:45      03:00  
<--5--> <--4--> <-----3-----> <--2--> <--1-->

3. Sabahları belli bir saatte kalkmak zorunda olduğunuzda saat kurup zil sesiyle uyanmaya ne derecede kendinizi bağımlı hissedersiniz?

- Hiç bağımlı hissetmem ( )-> 4  
 Çok az bağımlı hissedirim ( )-> 3  
 Oldukça bağımlı hissedirim ( )-> 2  
 Çok bağımlı hissedirim ( )-> 1

4. Çevresel şartlar tam olarak uygun olsa sabahları yataktan kalkmak size ne denli kolay gelir?

- Asla kolay gelmez ( )-> 1  
 Çok kolay gelmez ( )-> 2  
 Oldukça kolay gelir ( )-> 3  
 Çok kolay gelir ( )-> 4

5. Sabahları kalktıktan sonraki ilk bir saat içinde kendinizi ne denli canlı ve uyanık hissedersiniz?

- Asla canlı hissetmem ( )-> 1  
 Hafif canlı hissedirim ( )-> 2  
 Oldukça canlı hissedirim ( )-> 3  
 Çok canlı hissedirim ( )-> 4

6. Sabahları kalktıktan sonraki ilk bir saat süresince iştahınız nasıldır?

- Çok kötü ( )-> 1  
 Oldukça kötü ( )-> 2  
 Oldukça iyi ( )-> 3  
 Çok iyi ( )-> 4

7. Sabahları kalktıktan sonraki ilk bir saat içinde kendinizi ne denli yorgun hissedersiniz?

- Çok yorgun ( )-> 1  
 Oldukça yorgun ( )-> 2  
 Oldukça dinlenmiş ( )-> 3  
 Çok dinlenmiş ( )-> 4

8. Ertesi güne ait bir randevu ya da işiniz olmadığında her zamanki yatma vaktinize göre erken ya da geç mi yatarsınız?

- Asla geç yatmam ( )-> 4  
 1 saatten daha az geç yatarım ( )-> 3  
 1-2 saat daha geç yatarım ( )-> 2  
 2 saatten daha fazla gecikirim ( )-> 1

9. Biraz fiziksel egzersiz yapmaya karar verdiniz. Bir arkadaşınız da bunu haftada iki kez ve birer saat yapmanızın uygun olduğunu belirterek bunun için en iyi zamanın sabah 07:00-08:00 arası olduğunu söyledi. En iyi performansı elde etmeyi hedef alarak bunun ne düzeyde gerçekleşebileceğini düşünürsünüz?

- İyi bir şekilde gerçekleşeceğini düşünürüm ( )-> 4  
 Orta derecede başarılı olurum ( )-> 3  
 Güç olacaktır ( )-> 2  
 Çok güç olacaktır ( )-> 1

10. Uyku ihtiyacınızın artmasına bağlı olarak gün içinde saat kaç sularında kendinizi yorulmuş hissedersiniz?

08:00      09:00      10:15      12:45      14:00      15:00  
<--5--> <--4--> <-----3-----> <--2--> <--1-->

11. Bir güne ait planlarınızı tam olarak kendinizin ayarladığınızı düşünün. Size, iki saat sürecek ve sonunda zihinsel olarak yorgun düşürecek bir başarı testi uygulanacak olsa en iyi performansı gösterebilmeniz için bu testin hangi saat diliminde uygulanması sizce uygun olur?

Sabah                      08:00-10:00                      ( )-> 4  
Sabah                      11:00-13:00                      ( )-> 3  
Öğleden sonra              15:00-17:00                      ( )-> 2  
Akşam                      19:00-21:00                      ( )-> 1

12. Gece saat 23.00'de yattığınızı düşünün. Yatağa yattığınızda kendinizi ne düzeyde yorgun hissedersiniz?

Hiç yorgun hissetmem                      ( )-> 0  
Çok az yorgun hissederim                      ( )-> 2  
Oldukça yorgun hissederim                      ( )-> 3  
Çok fazla yorgun hissederim                      ( )-> 5

13. Bir takım nedenlerden ötürü her zamankinden 3-4 saat daha geç yattığınızı ancak ertesi sabah belli bir saatte kalkmanız gerekmediğini düşünün. Aşağıdakilerden hangisi yatış ve kalkış zamanınızı en iyi tanımlar?

Her zamanki vakitte uyanırım ve tekrar uyumam                      ( )-> 4  
Her zamanki vakitte uyanırım ama daha sonra hafifçe uyuklarım                      ( )-> 3  
Her zamanki vakitte uyanırım ama tekrar uykuya dalarım                      ( )-> 2  
Her zamankinden geç uyanırım                      ( )-> 1

14. Sabah 04:00-06:00 arası nöbet tuttuğunuzu ve uyanık durmak zorunda olduğunuzu düşünün. Ertesi güne ait bir randevunuz da yok. Böyle bir durumda aşağıdakilerden hangisini yaparsınız?

Nöbet bitene kadar yatmam                      ( )-> 1  
Nöbetten önce hafif bir şekerleme yapar ve nöbetten sonra uyurum                      ( )-> 2  
Nöbetten önce uyur nöbetten sonra da biraz kestiririm                      ( )-> 3  
Nöbetten önce iyice uyur ve uykumu almış olurum                      ( )-> 4

15. İki saat süreyle bedensel olarak sıkı bir şekilde çalışmak zorunda olduğunuzu düşünün. Günlük çalışma planınızı ayarlamakta da tamamıyla serbest olsanız aşağıdaki zaman dilimlerinden hangisi sizin için en iyi çalışma zamanıdır?

Sabah                      08:00-10:00                      ( )-> 4  
Sabah                      11:00-öğleden sonra 13:00                      ( )-> 3  
Öğleden sonra              15:00-17:00                      ( )-> 2  
Akşam                      19:00-21:00                      ( )-> 1

16. Sıkı bir fiziksel egzersiz yapmaya karar verdiniz. Bir arkadaşınız da bunu haftada iki kez ve birer saat yapmanızın uygun olduğunu belirterek bunun için en iyi zamanın gece 22:00-23:00 arası olduğunu söyledi. En iyi performansı elde etmeyi hedef alarak bunun ne düzeyde

