



VALIDATION OF THE CHINESE VERSION OF THE MUNICH CHRONOTYPE QUESTIONNAIRE IN HONG KONG YOUTHS



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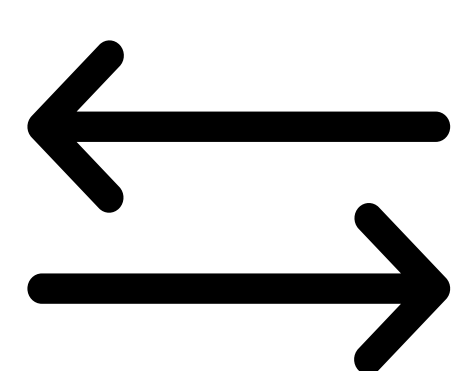
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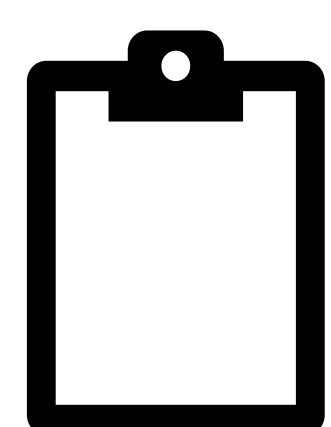
Introduction

Chronotype is referred to as an individual's diurnal preference of timing for sleep and activities. While objective measures, such as using endogenous melatonin as a proxy, is regarded as the most accurate reflection of one's chronotype¹, the measurement process is time-consuming and expensive, thus not practical for use in the clinical setting. The Munich Chronotype Questionnaire² (MCTQ) is one of the commonly used self-reported measures of circadian typology. It has advantages over the Horne and Ostberg's Morningness-Eveningness Questionnaire³ (MEQ) as it differentiates actual sleep and wake time for both workdays/school days and free days. Chronotype is estimated by using the midpoints of sleep and midpoint of sleep in free days corrected for sleep debt accumulated over the workdays (MSFsc). Currently, the MCTQ has not been translated for use in the Chinese population. The present study aimed to validate the Chinese translated MCTQ (C-MCTQ) in the youth population by examining its psychometric properties against other subjective and objective measures of chronotype.

Methods

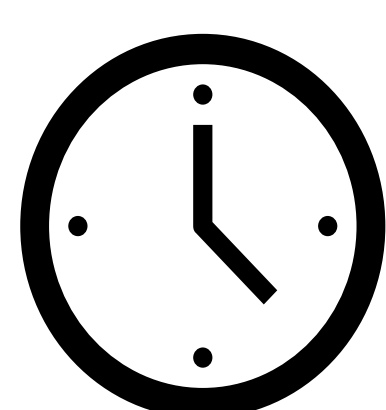


1. Translation and Back-translation



2. Questionnaire Battery (n=612)

- C-MCTQ, MEQ, Insomnia Severity Index (ISI), Patient Health Questionnaire (PHQ-9)



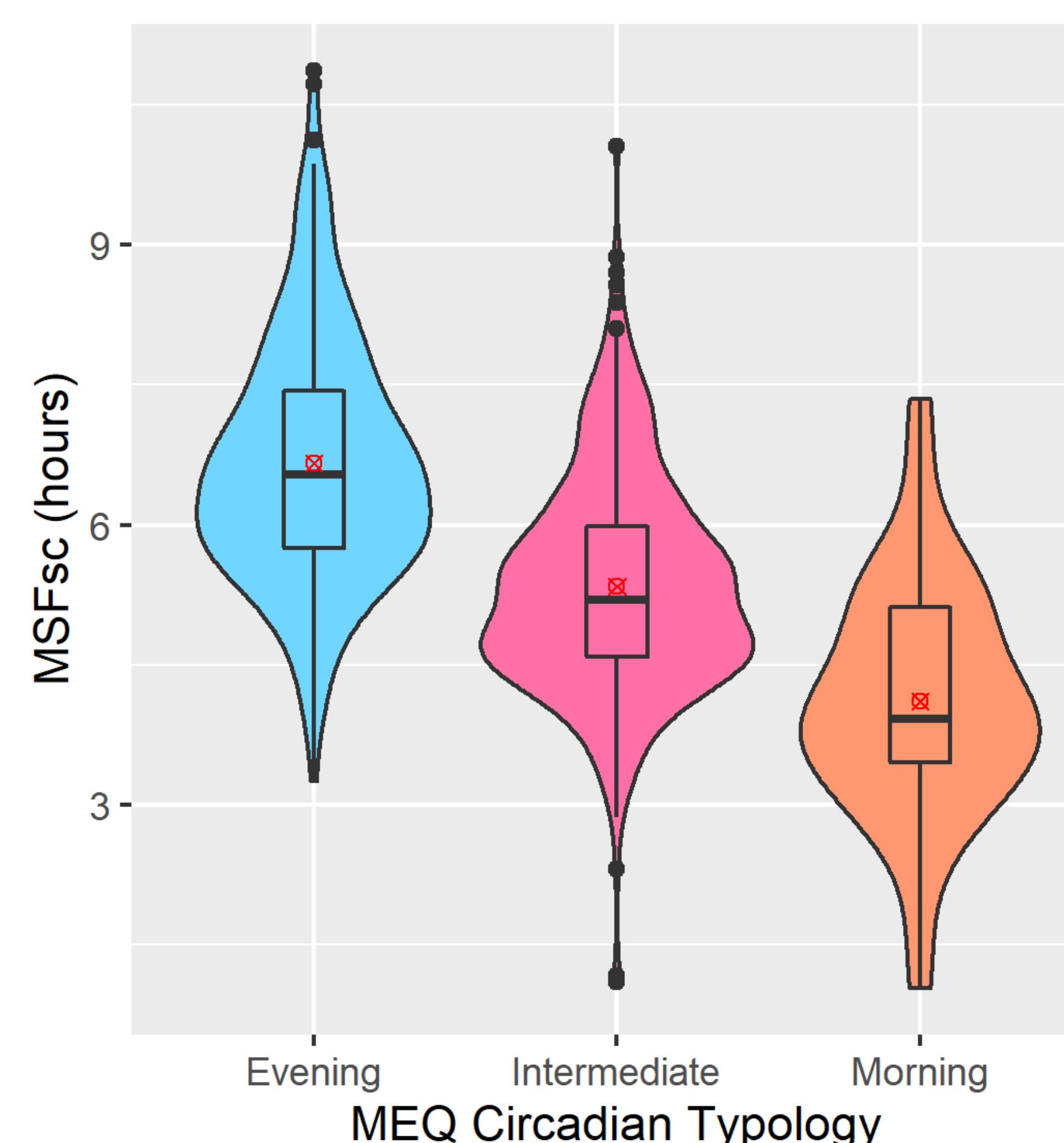
3. Objective Measures

- 7-days actigraphy (n=38)
- Dim-light melatonin onset assessment (DLMO; n=17)

Key Results

- A total of 612 participants (age: 20.81±2.0, range: 16-24; female: 68%) completed the questionnaires.
- Test-retest reliability for C-MCTQ was good. The intra-class correlation was 0.67-0.82.
- MSFsc was 04:12±1:09, 05:21±1:06 and 06:35±1:14 for morning-type, intermediate-type, and evening-type based on MEQ, respectively (see Figure 1).
- All MCTQ parameters significantly correlated with MEQ, actigraphy-based circadian parameters, and sleep and mental health measures (see Table 1).
- DLMO showed a significant association with MSF ($r = 0.49, p = 0.04$), and a marginally significant association with MSFsc ($r = 0.45, p = 0.07$) (see online supplementary materials Figure e4-7).

Figure 1: Violin plots representation of MSFsc distribution stratified by circadian typology as defined by MEQ.



Note: red dot within the violin plot denote the mean.

	MCTQ Parameters			
	<u>MEQ</u>	<u>MSW</u>	<u>MSF</u>	<u>MSFsc</u>
<i>Circadian measures</i>				
MEQ	-	-.543**	-.668**	-.602**
Actigraphy ^a				
<i>Midpoint of Sleep</i>	-.706**	.743**	.852**	.855**
<i>Acrophase</i>	-.483**	.592**	.623**	.634**
<i>L5 Time</i>	-.620**	.626**	.691**	.700**
<i>M10 Time</i>	-.434*	.471**	.439**	.446**
DLMO Time ^b	-.425	.417	.491*	.452
<i>Sleep and Mental health measures</i>				
ISI	-.148**	.177**	.150**	.133**
PHQ-9	-.120**	.116**	.144**	.119**

NOTE: ** $p = 0.01$; * $p = 0.05$ | MEQ = Morningness-Eveningness Questionnaire; MSW/F = Mid-point of Sleep in workdays / free days; MSFsc = Mid-point of Sleep in free days corrected for sleep debt; DLMO = Dim-light Melatonin Onset; ISI = Insomnia Severity Index; PHQ-9 = Patient Health Questionnaire.

a) Acrophase is the time of which the cosinor cycle is at its peak. L5/M10 represent the time of the least active 5 hours / most active 10 hours, respectively as computed by the nonparametric analysis.

b) Salivary melatonin was assayed by liquid chromatography mass spectrometry. DLMO time was determined as the interpolation between the immediate and the preceding sample that exceed 12.9 pmol/L.

Table 1: Correlations between MCTQ parameters with circadian, sleep, and mental health measures

Conclusion

The present study demonstrated that the C-MCTQ is good for use as a clinical tool to reflect an individual's endogenous circadian timing and is suitable for assessing chronotype with good reliability and validity in Chinese youths.

