

Relationship between chronotype and depression schemas and sensitivity to depression in medical students

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Abstract

Aim: We aimed to investigate the relationship between chronotype and depression schemas and sensitivity to depression in healthy medical students with sensitivity and cognitive scales.

Materials and Methods: The study included 38 healthy fifth-year medical students enrolled in Van Yuzuncu Yil University Medical Faculty. All the participants were administered a sociodemographic background questionnaire, followed by the Morningness-Eveningness Questionnaire (MEQ), the Dysfunctional Attitude Scale (DAS), and the Leiden Index of Depression Sensitivity-Revised (LEIDS-R).

Results: The average total MEQ score was 51.60 ± 8.71 . No significant correlation was found between total DAS score total LEIDS-R score ($p: 0.5847$; $r: 0.09154$) and LEIDS-R type ($p: 0.9081$, $r: 0.01936$). Both MEQ type and total MEQ score established a significant correlation with the 'perfectionism' parameter on LEIDS-R. Moreover, the correlation between total MEQ score and 'perfectionism' was at a moderate level ($p: 0.0014$, $r: 0.50021$), it indicated that the level of perfectionism increases with the increase in the tendency towards morningness.

Conclusion: No relationship was found between chronotype and tendency to depression among medical students. It was determined that the perfectionism scheme was strengthened with the increasing tendency towards the morningness. Hypothetically, the hyperactivation of morning-type features can be a protective factor against depression.

Keywords: Chronotype; depression schemas; depression sensitivity; medical student

INTRODUCTION

The sleep/wake cycle can be influenced by numerous factors such as light, stress, genes, and the hormones and peptides produced in the periphery (1). Almost every organism has biological rhythms of ~24 h which are strictly influenced by the predictable alterations in their environment. These biological periods are termed 'circadian rhythms'. The term chronotype (circadian typology), on the other hand, refers to a construct reflecting individual differences in circadian cycles.

Chronotype consists of three main components: morningness-eveningness, and intermediate. Of these, the evening type has been shown to be associated with a higher risk of depression compared to other two types. Moreover, the evening type and insomnia have been shown to be independent risk factors for non-remission in depression (2). Additionally, the evening type is considered to be a risk factor for negative emotionality regardless

of sleep disorders (3). On the other hand, another study reported that the severity of depressive episode and suicidal thoughts are also influenced by the evening type regardless of sleep disorders (4). Taken together, these studies implicate that depressive disorder is mainly associated with the evening type (5).

Besides chronotype, the relationship between optimism and sleep has also been documented in the literature. Some of the studies revealed that optimism and resilience were more common in the morning-type subjects while pessimism was more common in the evening-type subjects (6). Accordingly, optimism is considered to increase sleep quality and insufficient sleep is considered to be a cause of pessimism (7). Moreover, insufficient sleep has been shown to increase job-related, emotional, and academic stress (8). On the other hand, the studies have also found a bidirectional relationship between optimism and sleep (7). Considering that the evening type has a remarkable effect on the emergence of sleep disorders, it is logical to assert

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that there is a causal relationship between optimism and the evening type.

Medical students are known to be one of featured population, on the other hand, it should not be forgotten that they may also have psychiatric problems no significant. In this population, the medical program, which leads to the creation of a competitive environment, is a major cause of psychiatric disorders (9). Studies on medical students' psychiatric disorders have focused on environmental factors. The biological and cognitive factors, on the other hand, have been evaluated by recent studies.

Literature reviews indicate that the previous studies investigating the relationship between proneness to depressive disorders and the chronotypes have evaluated this relationship mainly by focusing on the immediate severity of the depressive symptoms of the subjects within a given time period. Moreover, these studies have mostly evaluated a general population rather than a featured population. Therefore, the present study is of importance as it evaluated a featured population (i.e., medical students) to determine the chronotype features within this population, to assess the level of proneness to depression for each chronotype separately, and to analyze depressive schemas parameters that could be useful in the prevention of depression for medical students.

MATERIALS and METHODS

The study was conducted with 38 healthy fifth-year medical students enrolled in Van Yuzuncu Yil University Medical Faculty. Prior to the study, an approval was obtained from the local ethics committee. Inclusion criteria were the absence of DSM-V mental disorders, additional diseases, and ongoing psychiatric or non-psychiatric treatments. Oral informed consent was obtained from all participant medical students.

All the participants were administered a sociodemographic background questionnaire, followed by the Morningness-Eveningness Questionnaire (MEQ), the Dysfunctional Attitude Scale (DAS), and the Leiden Index of Depression Sensitivity-Revised (LEIDS-R).

Morningness-Eveningness Questionnaire (MEQ)

MEQ was designed by Horne and Ostberg (10) and was adapted to the Turkish language by Punduk et al. (11). MEQ consists of 19 items with a total score ranging between 16 and 86. Lower scores indicate greater eveningness and higher scores indicate greater morningness, with the scores ranging between 16-41 indicating the evening type, 42-58 indicating the intermediate type, and 59-86 indicating the morning type.

Dysfunctional Attitude Scale (DAS)

DAS was designed by Weissman and Beck to assess the intensity of dysfunctional attitudes, which is a hallmark feature of depression (12). DAS is a Likert-type scale without reverse scoring and consists of seven subscales including: Perfectionism, Approval, Achievement, Love, Autonomy, Omnipotence, and Entitlement.

Leiden Index of Depression Sensitivity-Revised (LEIDS-R)

The Leiden Index of Depression Sensitivity (LEIDS-R) is a self-report measure of cognitive reactivity (CR). CR refers to the ease with which maladaptive cognitions become reactivated during a low mood and is considered to be an indication of latency despite the remission of depressive cognition. Negative cognitions are considered to remain latently present in individuals even when depressive symptoms are in remission. The LEIDS-R consists of 34 Likert-type items and 6 subscales including hopelessness/suicidality, acceptance/coping, aggression/hostility, control/perfectionism, harm avoidance, and rumination. The validity and reliability study for the Turkish population of the test was conducted by Batmaz et al. These studies are about the effect of music on eating behavior through the reward path (13).

Statistical Analysis

Statistical analysis was performed using SPSS 22.0 (Statistical Package for Social Sciences, IBM Inc., Chicago, IL, USA) package program. The consistency of continuous variables to normal distribution was checked with the Shapiro-Wilks test. Descriptive statistics of continuous variables expressed as Mean \pm SD. The presence of correlation between the groups was determined by Pearson Correlation Test for parametric and Spearman Correlation Test for nonparametric variables. The level of significance was set at $p < 0.05$ for all test.

RESULTS

The participants included 12 (31.58 %) female and 26 (68.42 %) male students. According to the MEQ scores, 12 (31.5 %) students were morning type, 21 (55.3 %) students were intermediate type, and 5 (13.2%) students were evening type, which indicates that the frequencies of the intermediate and morning types were remarkably higher than that of the evening type. The average total MEQ score was 51.60 ± 8.71 .

No significant difference was found between the genders with regard to the chronotypes ($p: 0.7613$; $r: -0.050$). Accordingly, the individuals working and living under the same constant routine conditions, however, a moderate correlation was found between female gender and the 'harm avoidance' parameter on LEIDS-R ($p: 0.032$; $r: -0.347$).

The age range in our participants was remarkably narrow (24.6 ± 1.6 years). In addition, a moderate negative correlation was found between age and MEQ type ($p: 0.01$; $r: -0.407$). However, although this correlation was at a moderate level, not supported by the significant correlation between age and total MEQ score ($p: 0.17$; $r: 0.23$).

On the other hand, no significant correlation was found between total DAS score and MEQ type ($p: 0.4907$; $r: -0.11527$) and total MEQ score ($p: 0.4232$; $r: 0.13381$). Similarly, no significant correlation was found between total DAS score and MEQ type ($p: 0.5847$; $r: 0.09154$). Furthermore, no significant correlation was found between total DAS score and total LEIDS-R score ($p: 0.5847$;

r: 0.09154) and LEIDS-R type (p: 0.9081, r: 0.01936). However, both MEQ type and total MEQ score established a significant correlation with the 'perfectionism' parameter on LEIDS-R. The correlation between total MEQ score

and 'perfectionism' was at a moderate level (p: 0.0014; r: 0.50021), it indicated that the level of perfectionism increases with the increase in the tendency towards morningness (Table 1).

Table 1. The relationship between the chronotypes with the LEID-S total score and the subscales with the LEID-S scale / The relation of the LEID-S sub-parameters with each other

	T-LEIDS	T-MEQ	MEQ type	RAN	CON	AGG	ACC	HOP	RUM
T-LEIDS	1.00000	0.09154	-0.10373	0.77463	0.68294	0.63192	0.67769	0.75178	0.74896
		0.5847	0.5354	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
T-MEQ	0.09154	1.00000	-0.78547	0.10729	0.50021	-0.11458	0.13267	-0.09152	-0.04585
	0.5847		<0.0001	0.5214	0.0014	0.4934	0.4272	0.5847	0.7846
MEQ type	-0.10373	-0.78547	1.00000	-0.18483	-0.40914	0.08096	-0.09749	0.05070	-0.00233
	0.5354	<0.0001		0.2666	0.0108	0.6290	0.5604	0.7625	0.9889
RAN	0.77463	0.10729	-0.18483	1.00000	0.42991	0.31387	0.49212	0.57351	0.58238
	<0.0001	0.5214	0.2666		0.0071	0.0550	0.0017	0.0002	0.0001
CON	0.68294	0.50021	-0.40914	0.42991	1.00000	0.28144	0.51848	0.35634	0.37960
	<0.0001	0.0014	0.0108	0.0071		0.0869	0.0009	0.0281	0.0187
AGG	0.63192	-0.11458	0.08096	0.31387	0.28144	1.00000	0.35197	0.38200	0.47718
	<0.0001	0.4934	0.6290	0.0550	0.0869		0.0302	0.0179	0.0025
ACC	0.67769	0.13267	-0.09749	0.49212	0.51848	0.35197	1.00000	0.36243	0.25887
	<0.0001	0.4272	0.5604	0.0017	0.0009	0.0302		0.0253	0.1166
HOP	0.75178	-0.09152	0.05070	0.57351	0.35634	0.38200	0.36243	1.00000	0.49295
	<0.0001	0.5847	0.7625	0.0002	0.0281	0.0179	0.0253		0.0017
RUM	0.74896	-0.04585	-0.00233	0.58238	0.37960	0.47718	0.25887	0.49295	1.00000
	<0.0001	0.7846	0.9889	0.0001	0.0187	0.0025	0.1166	0.0017	

Pearson Correlation Coefficients, N = 38 Prob > |r| under H0: Rho=0

T-LEIDS: Total LEIDS-R score, T-DAS: Total DAS score, T-MEQ: Total MEQ score, RAN: Risk Aversion, CON: Control AGG: Agression, ACC: Acceptance, HOP: Hopelessness, RUM: Rumination, Pa: Perfectionist Attitude, Na: Need for acceptance, Ia: Independent Attitude, Ca: Change Attitude

DISCUSSION

Almost one-third of medical students are prone to depressive disorders, which is much higher than that of general population (14). The prevalence of burnout syndrome and other psychological symptoms is much higher in medical students compared to the general population (15).

Previous studies have shown a relationship between the severity of depressive disorders and eveningness. In our study, however, no significant relationship was found between total DAS and LEIDS-R scores and total MEQ score and MEQ type, which could be attributed to the similarity of the amplitudes of circadian rhythms among medical students.

The distinctness of diurnal variations of arousal, i.e. the difference between morningness and eveningness, defines the 'individual circadian amplitude' which refers to the awareness of difference between hyper- and hypo-activation phases and the ability to voluntarily alter one's strength of morning-evening preferences and flexibility of the circadian rhythm. Meaningfully, for a strong influence to occur on individual functionality, large circadian

variations ought to occur during the day (16). However, excessive circadian variations may result in difficulties in dealing with emotional lability and stress, ultimately leading to increased tendency of mood disorders (17).

In our study, the average total Accordingly, the individuals working and living under the same indicates low diurnal variability of circadian rhythm genes. On the other hand, although different chronotypes were found in our participants, it should be recognized that academic conditions of the students lead to the formation of constant routine conditions for all the students. Accordingly, the individuals working and living under the same constant routine conditions, regardless of the differentiation of their chronotypes, obligate to have awakesness for similar hours.

Positive individual traits are known to be promoted by the tendency to morningness (18). In contrast, the evening subjects, who can experience social jetlag, need to exert greater effort to adapt to the daily life, which can result in difficulties in their working life (19). Of note, students are typically required to wake up, go to school, and perform some of their daily life routines at certain times defined within a constant system. However, although these

routines can be difficult to perform for the evening-type medical students, these routines can be regarded as a protective factor against depression.

A previous study by Antypa et al. evaluated depressive tendency in both healthy and patient groups and reported that the evening-type subjects had a higher risk of depression compared to intermediate-type subjects and the number of evening-type subjects in the healthy group was lower than that of morning-type subjects. Moreover, in the healthy group, a significant relationship was found between chronotypes and rumination, aggression, and acceptance. Similarly, in the group of depressive patients in remission, a significant relationship was found between chronotypes and rumination, aggression. In the group of patients that were still being followed up with a diagnosis of depression, a significant relationship was revealed between acceptance and chronotypes (20).

The final-year medical students are known to be relatively more successful in dealing with stress (14). The population of our study population is close to graduation. Accordingly, this situation could be a protective parameter to the tendency to depression among our participants. Nevertheless, a comparison to be performed between first-year and final-year medical students is needed to substantiate this finding.

In our study, both MEQ type and total MEQ score established a significant correlation with the 'perfectionism' parameter on LEIDS-R, with the correlation between total MEQ score and 'perfectionism' being a positive correlation. These findings implicate that an increase in the tendency towards morningness is associated with higher control/perfectionism scores on LEIDS-R.

Two types of personality have been defined for academic individuals in the literature: Type A and Type B. Type A individuals are extremely ambitious, workaholic, aggressive, impatient, and particularly rigid in their attitudes. Accordingly, medical students are more likely to have Type A personality rather than Type B, and Type A is more common in women than in men (21). Moreover, the traits of Type A individuals are highly consistent with the traits of perfectionist individuals.

The control/perfectionism subscale on LEIDS-R refers to high levels of accomplishment and the prioritization of the desire for perfectionism. When this desire is not fulfilled, perfectionism then leads to the formation of depressive symptoms.

However, perfectionism is directly associated with poor sleep (22). In turn, the acute sleep disturbances in perfectionist individuals are likely to have an impact on their daily life performance. However, previous studies have mostly focused on the relationship between perfectionism and general sleep quality and a review of the studies on Pubmed revealed no studies reporting on the relationship between perfectionism and chronotype.

A previous study investigated the relationship between higher education students' sleep patterns and their levels

of perceived stress over the course of an exam period. The study reported that the students with less perfectionism had a later bedtime, greater sleep problems, and higher stress on the morning of the exam (23). These findings implicate that perfectionist individuals tend to have higher functionality and a higher mood in the morning hours.

Our study have limitations. One of limitations the number of participants in our study was lower when compared to those of similar studies. Moreover, the number of evening-type participants was remarkably lower than those of other chronotypes.

CONCLUSION

No relationship was found between chronotype and tendency to depression among medical students. Because of academic requirements, medical students become more active in the morning hours. Hypothetically, the hyperactivation of morning-type features can be a protective factor against depression.

Competing interests: The authors declare that they have no competing interest.

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Ethical approval: Prior to the study, an approval was obtained form the local ethics committee (2019/18-01).

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