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Circadian Preferences and Coping Styles for Stressful Life Events in Major Depressive Disorder

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Abstract

Introduction: Depressive disorder is a common public health problem that significantly impairs quality of life and has a high risk of mortality and morbidity. The aim of this study was to investigate circadian rhythm differences, stressful life events and coping styles in patients with depression.

Materials and Methods: The study involved 100 participants, including 50 patients with depression and 50 healthy controls, recruited from the psychiatric clinic of one-university hospital. The participants completed a sociodemographic information form, Beck Depression Inventory (BDI), Life Events Checklist (LEC-5), Coping Inventory for Stressful Situations-Short Form (CISS-21) and Morningness-Eveningness Questionnaire (MEQ).

Results: The mean age of the patients with depression was 31.88±10.6 years, and the control group was 29.84±8.02 years. Emotional coping was significantly higher in patients with depression compared to the control group, whereas task-oriented coping was significantly lower than the control group. The majority of both depression and the control group consisted of intermediate type. Natural disasters, severe suffering, and other stressful events or experiences were more frequent stressful life events in the depression group. Task-oriented coping scores and emotional coping scores showed significant discrimination with sensitivity and specificity values.

Conclusion: Recognizing stressful life events and the coping strategies used to deal with them is important for identifying major depression and developing treatment and follow-up plans. Longitudinal studies are needed to fully understand how coping methods interacts with depression in recovery from traumatic events.

Key words: Circadian rhythm; adverse events; coping skills; depression.

Introduction

There are differences between individuals in the timing of biological and behavioral rhythms. Individuals are divided into three categories according to their circadian differences: morning type, intermediate type and evening type. Morningness types wake up earlier, go to bed earlier, reach their peak mental and physical performance early in the day and vary sleep times less than eveningness types. Eveningness types, on the other hand, tend to go to bed later and find it much more difficult to get up in the morning (1). While being an evening type is considered a risk for the development of depression in healthy individuals, it has been determined that patients with an evening type of depression have higher depression scores, higher suicidal thoughts and lower sleep quality than those with a morning type (2, 3). There have been studies with both small and large samples reporting the relationship between the circadian typology of eveningness and depression (2, 4). Stressful life events are often correlated with the onset of depressive symptoms and are a notable risk factor for depressive disorder (5). Stressful life events can happen at any point in an individual's life, ranging from childhood to adulthood. Some of the stressful conditions including illness, the loss of a family member or parental separation, natural disasters such as earthquakes, terrorism and wars have a strong association with depressive symptoms (5, 6). There are several ways to measure stressful life events. Although interviews provide more detailed information about events, checklists predict psychopathology equally well as interviews do (5, 7). In order to cope with stressful life events, individuals usually use one or a combination of coping styles, which are referred to as task-oriented, emotion-oriented, and avoidance-oriented coping (8). Task-oriented coping involves the efforts and thoughts of individuals aimed at resolving problems, whereas avoidance-oriented coping encompasses activities and cognitive strategies utilized to evade stressful situations. Emotion-oriented coping refers to an individual's attempts to alleviate stress through emotional responses (8). Depressive symptoms correlate with a decrease in the utilization of task-oriented coping mechanisms (9). Rumination, catastrophizing the situations and self-blame are all examples of emotion-focused coping strategies

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that have a positive association with depressive symptoms (10). In addition to genetic factors, the literature has found that stress-related traits and maladaptive coping styles are determinants of chronotype (11). There are few studies examine the relationships between stressful life events, coping styles and depressive symptoms (12, 13). To date, no study has examined both the differences in circadian rhythms and the coping strategies of patients with depression. The objectives in this study were to examine the stressful life events, coping styles and circadian rhythm differences in patients with major depression. We hypothesize that individuals who exhibit low levels of task-focused coping, high levels of emotion-focused coping, and high levels of avoidant coping with stressful life events and who are defining as evening type have an increased risk of developing depression.

Materials and Methods

One hundred participants, consisting of 50 patients diagnosed with depression and 50 healthy controls were enrolled to the study after registering at the psychiatric clinic between March 2022 and July 2022. Fifty participants, diagnosed with major depressive disorder according to DSM-5 diagnostic criteria and assessed with SCID-I to exclude other mental disorders, were asked to complete the measures in the scale set. Inclusion criteria for participation in the study include voluntary enrollment, age above 18 but below 65, absence of substance abuse or dependence history, and non-pregnancy. The control group was selected patient's family members who were matched for age, sex and marital status. They were also screened with SCID-I for the exclusion of any mental health disorders. All of the participants were requested to complete a paper questionnaire including their demographic information, circadian preferences, life event stressors, coping styles, and depressive symptoms through the self-reported questionnaire. All participants received informed consent before taking part in the study and were informed of the purpose and significance of the study.

Measures

Sociodemographic Data Form: The researchers developed a form to gather information on individuals' characteristics, including age, gender, marital status, education level, and history of psychiatric illness in both personal and familial backgrounds.

Morningness-eveningness Questionnaire (MEQ): The Horne and Ostberg developed the MEQ in 1976, which is a 19-question Likert-type scale (14). The self-report scale categorizes individuals into chronotypes based on their sleep-wake patterns, lifestyle, and performance timing as "morning type" " intermediate" or "evening type". A score ranging from 16 to 41 will be classified as "evening type", from 42 to 58 as "intermediate type", and from 59 to 86 as "morning type". Agargün et al. assessed the validity and reliability of the Turkish version of the scale (15).

Beck Depression Inventory (BDI): Beck et al. developed the initial version of the scale and in 1989 and Hisli conducted validity and reliability studies in Turkey (16, 17). This assessment tool comprises 21 items, and each item receives a score from 0-3. Patients are instructed to select the relevant option indicating their mood from the previous week. Patients can score a maximum of 63 points on this test, and it is suitable for administration to all patients 15 years of age and older. Several studies have suggested that a score of 17 or higher may indicate depression in patients, while for screening purposes, scores of 10 or higher may indicate mild depression. It is important to note the variability in these findings across different studies.

Life Events Checklist (LEC-5): LEC-5 was developed by Weathers et al. in 2013 (18). It is a checklist of life events aims to gather comprehensive information about the highly stressful or traumatic events individuals have experienced, as well as their personal experiences of each event. It comprises a list of 16 events categorized as highly stressful or traumatic, along with an option to specify additional events of a similar nature that are not included in the aforementioned list but have been encountered by the participants. Individuals indicate their experiences of the events by selecting one or more responses from the list of 17 options: "the event happened to me", "I witnessed the event", "I learned that the event happened", "I encountered the event due to my work", "I am uncertain", and "I have never experienced such an event". No numerical scale score can be obtained from the LEC-5. In accordance with the DSM-5, the Turkish psychometric properties of the LEC-5 were examined (19).

Coping Inventory for Stressful Situations - Short Form (CISS-21): It is a 21-item, five-point Likert-type measurement instrument developed by Endler and Parker to evaluate the coping styles typically favored during stressful situations (20). The scale comprises three subscales, namely task-oriented coping, emotional coping, and avoidant coping, with seven items each.

Table 1: Comparison of sociodemographic characteristics of the depression and control groups

		Group					
		Control (n=50)		Patient (n=50)			
		Mean±SD		Mean±SD			p
Age		29.12±9.44		30.11±9.5			0.174
		N	N %	N	N %	X2	p
Gender	Male	21	42.0	21	42.0	0.00	0.580
	Female	29	58.8	29	58.0		
Marital status	Unmarried	32	64	22	44	1.39	0.490
	Married	16	32	25	50		
	Widowed	2	4	3	6		
Education status	Primary	3	6	12	24	3.73	0.027
	Secondary	4	8	8	16		
	High School	16	32	16	32		
	University	24	48	13	26		
	Illiterate	3	6	1	2		
Family history of mental illness	No	36	72	38	76	3.47	0.787
	Yes	14	18	12	24		
MEQ	Morning	11	22	9	18		0.582
	Intermediate	35	70	39	78		
	Evening	4	8	2	4		

MEQ: Morningness-eveningness Questionnaire

The Turkish version of the scale, adapted by Boysan, demonstrated high validity and reliability (21).

Ethical consent: This study was approved by the Van Yüzüncü Yıl University Faculty of Medicine Non-Interventional Research Ethical Committee with the decision dated 11.02.2022 and numbered 2022/02-10. Informed written consent was obtained from all patients participating in the study.

Statistical analysis: Descriptive statistics for continuous variables are presented as mean, standard deviation, and minimum and maximum values and categorical variables are presented as number and percentage. The prospective study's sample size was calculated with the statistical program G*Power (version 3.1.9.7). Accordingly, we used a power of 0.80, an effect size of 0.6, and a Type-1 error (α) of 0.05 for both control and patient groups, resulting in a whole of 90 samples with at least 45 patients (samples) in each group. The number of samples is increased to a total of 100 in each group, with 50 samples in each group, to ensure an adequate number of samples and to maintain a high power value. Power (the power of the test) recalculated according to this sample size increased to 84%. One-way analysis of variance was used to compare continuous variables based on categorical variables. Duncan's multiple comparison test was used to identify groups after analysis of variance. Pearson's Correlation Coefficients were calculated for each group to determine how these variables correlated with each other. Chi-square test was utilized to establish the association between groups and categorical variables. Statistical significance was determined at a 5% level and calculations were performed using the SPSS software package (version 26).

Results

Table 1 describes the key sociodemographic characteristics of the participants. A total of 100 participants were studied, 50 in the control group and 50 in the depression group. The mean age of the depression group was 30.11±9.5 years and that of the control group was 29.12±9.44 years, and no significant difference was observed between the two groups. Gender, marital status, education level, and family history of mental illness were compared in order to assess whether a difference between in the depression and control groups. The analysis found no significant difference between these variables except education level. Intermediate type participants were the most prevalent in both groups in regards to circadian preference.

Table 2: Comparison of BDI, CISS-21 subscales and total scores and MEQ total score of the patient and control groups

	Group	N	`X	Sd.	t	p
BDI	Control	50	7.71	7.06	-7.73	0.001
	Patient	50	27.10	13.31		
MEQ Total	Control	50	51.7	8.01	0.475	0.636
	Patient	50	50.9	8.39		
Avoidant coping	Control	50	20.12	5.81	0.646	0.519
	Patient	50	19.34	6.24		
Emotional coping	Control	50	20.02	5.62	-4.16	0.001
	Patient	50	24.42	4.93		
Task oriented Coping	Control	50	24.92	5.67	2.95	0.004
	Patient	50	21.52	5.95		

Note: *p<0.05 **BDI**: Beck Depression Inventory, **MEQ**: Morningness-eveningness Questionnaire

Table 3: Comparison of the Life Events Checklist-5 between the groups

	Patient (n)	%	Control (n)	%
Other stressful events	23	%46	21	%42
Natural Disaster	22	%44	30	%60
Severe Suffering	21	%42	4	%8
Physical assault	19	%36	18	%36
Motor vehicle accident	13	%26	13	%26
Fire or explosion	10	%20	10	%20
Life-threatening illness or injury	10	%20	5	%10
Assault with weapon	9	%18	4	%8
Sexual assault	9	%18	2	%4
Combat	8	%16	5	%10
Other serious accident	7	%14	6	%12
Captivity	7	%14	1	%2
Sudden death of important others	7	%14	5	%10
Exposure to toxic substance	6	%12	6	%12
Unwanted sexual experience	6	%12	1	%2
Caused death/injury of another	6	%12	2	%4
Witness violent death	0	%0	0	%0

Table 2 displays the statistical comparison between the scores of the healthy and depressed groups on the subscales of BDI, CISS-21, and MEQ total scores to assess significant differences. There are notable differences between the depression and control groups in coping with stressful life events. While the patients with depression exhibited statistically significant increase in emotional coping style (p=0.001), the control group showed a statistically significant increase in task-oriented coping style (p=0.004).

The important findings of our study were that natural disasters, severe suffering, and other stressful events or experiences were more frequent stressful life events in the depression group. Natural disasters, other stressful events or experiences, and physical assaults were more common in the control group. As seen in table 3, rates of sexual assault, assault with a weapon, captivity, life-threatening illness or injury, and severe suffering are higher among the depression group compared to the control group. Pearson correlation analysis was conducted to examine significant relationships between age, BDI and MEQ total scores and CISS-21 subscales in depressed patients. BDI total scores were significantly positively correlated with emotional coping ($r = 0.481$, $p < 0.01$), whereas avoidance

Table 4: Correlations between age and other psychological instruments in patients with depression

	Age	BDI	MEQ	Taskoriented Coping	Emotional Coping	Avoidant Coping
Age	1					
BDI	0.134	1				
MEQ	0.027	-0.372**	1			
Task-oriented Coping	-0.022	-0.195	0.003	1		
Emotional Coping	0.027	0.481**	-0.042	-0.070	1	
Avoidant Coping	-0.314*	-0.290*	0.275	0.114	0.050	1

BDI: Beck Depression Inventory, **MEQ:** Morningness-eveningness questionnaire ***.** p<0.05, ****.**p<0.01

Table 5: Determining cut-off values of "MEQ total scores, task-oriented coping, emotional coping and avoidant coping scores" based on group determination.

Test Variable(s)	Area (AUC)	Std. Error	*p.*	Cut-Off	Sensitivity	Specificity
MEQ	0.538	0.058	0.510	48.50	0.560	0.480
Task-oriented Coping	0.670	0.054	0.003	22.50	0.580	0.560
Emotional Coping	0.725	0.051	0.001	22.50	0.660	0.620
Avoidant Coping	0.526	0.058	0.649	19.50	0.540	0.500
Age	0.582	0.058	0.159	28.50	0.580	0.620

MEQ: Morningness-eveningness Questionnaire**, AUC:** Area Under Curve**. Categorical variable:** Patient-control group.

coping styles were negatively correlated with total BDI scores (r = -0.290, p < 0.05). Furthermore, a noteworthy inverse correlation existed between MEQ total scores and BDI scores (r=-0.372, p<0.01). Table 4 shows the correlations between age and other psychological scales in the depression group. Table 5 and Figure 1 present the scales, including area under the curve (AUC), sensitivity and specificity values, and cut-off values as part of the ROC analysis, that predict the discriminative power of the MEQ total, task-oriented coping, emotional coping, and avoidant coping scores based on the identification of "groups". Therefore, the "task-oriented coping" score was found to have a 67% discrimination (AUC) with a specified cut-off value of 22.5. This metric is used as a discriminating value to indicate that the "disorder" exists. Similarly, the study revealed a 72.5% discrimination (AUC) for the "emotional coping score" with a cut-off value of 22.5. The above measure serves as an indicator of the specified "disorder". The statistical analysis revealed that the "emotional coping score" demonstrated a significant discrimination with sensitivity (66%) and specificity (62%) values (p=0.001). However, no significant differences were observed in the other scores (p > 0.05).

Group	Valid N (listwise)
Positive (Patient)	50
Negative (Control)	50

MEQ: Morningness-eveningness questionnaire

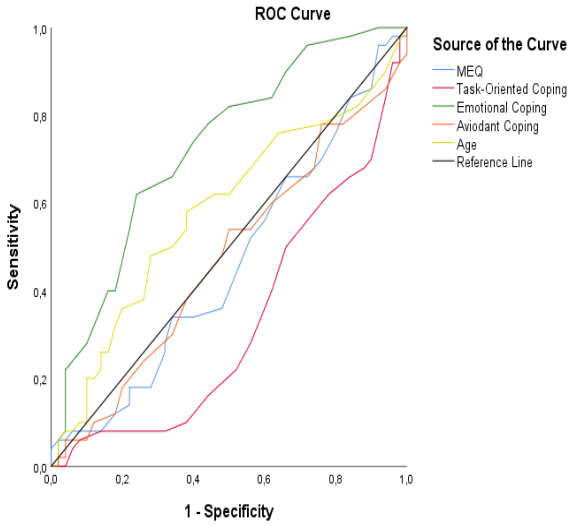

Figure 1: Determining cut-off values of "MEQ total scores, task-oriented coping, emotional coping and avoidant coping scores" based on group determination.

Discussion

The current study found substantial differences between the depression and control groups regarding how they coped to stressful life events.

Emotional coping scores were significantly higher in depressed patients compared to controls, while task-oriented coping scores were significantly lower in depressed patients than in controls. Coping strategies, stressful life events and circadian rhythms in patients with depression have been studied separately. However, our study is the first to evaluate stressful life events whole and separately and to asses coping methods and circadian differences together in patients with depression. Progression, delay or disruption of circadian rhythms is strongly associated with major depression (4). Most of the reported studies indicated a positive association between eveningness and depression (22, 23). In our study of 50 depressed patients and 50 healthy volunteers, we observed that similar quantities of individuals in both groups demonstrated intermediate-type chronotypes. However, based on the correlations between BDI and MEQ, we can conclude that there is a positive association between depression scores and eveningness in line with the literature. A stressful life event significantly increases the likelihood of subsequent major depression. However, not all people who experience stressful life events will develop symptoms of depression (5). After experiencing stress, individuals evaluate their ability to cope with the situation and determine courses of action. This ultimately leads to the selection of a coping strategy. A maladaptive coping construct that strongly predicts distress is a combination of categories from the CISS, specifically high emotion-oriented coping, high distraction, and low task-oriented coping. The association between stressful life events and depressive symptoms was attenuated among those who used task-oriented coping. Therefore, task-oriented coping may serve as a protective factor against the development of depressive symptoms in previous studies (9, 24). In particular, task-oriented coping is considered to be adaptive because it allows the individual to confront the stressor and deal with it directly, resulting in a reduction in the overall level of stress. Individuals who rely on emotion-oriented coping strategies in stressful situations tend to experience increased symptoms of depression, as shown in numerous studies (5, 13). Consistent with previous research, our findings indicate that patients with depression showed significantly higher levels of emotional coping and significantly lower levels of task-oriented coping compared to the control group. It can be recommended that more effective task-oriented coping methods be used to alleviate depressive symptoms. This study found no significant associations between the groups on avoidant coping scores. Age and the type of trauma experienced can be considered as an important factor here. Some studies have shown that avoidant coping did not mediate the association between stressful life events and depressive symptoms (5). Stressful life events can be classified along some dimensions including the type of event, such as loss, violence, or trauma, with events that require more extensive readjustment posing a greater risk of adverse outcomes than everyday problems, the intensity of an event, including its severity; and the total number of events in a given period (25). Longitudinal studies have consistently demonstrated the link between stressful life events and depression. Community-based studies have shown that 80% of patients diagnosed with depression have experienced major stressful life events prior to their diagnosis. The findings indicate a causal relationship between stressful events and depression. It is important to note, however, that this information should be evaluated objectively, and additional research is necessary in order to further substantiate these claims (26, 27). A significant portion of the sample in our study experienced the 2011 Van Earthquake under the heading of natural disasters. The earthquake was experienced by 44% of the patients in the depression group and 60% of the individuals in the control group. Severe suffering and these rates were followed by other types of stressful events, including reports of adverse life experiences that were not included in the 16 types of traumatic events that were assessed in the LEC-5. Long-term exposure to chronic stress can elevate the risk of affective disorders, especially when paired with acute stressors (28, 29). In the literature, we could not find a study evaluating stressful life events in patients with depression using the LEC-5, which is compatible with DSM-5. A notable finding from the research indicates a negative correlation between avoidant coping and BDI scores, and a positive correlation between emotional coping and BDI scores in the patient group. However, in the ROC analysis conducted to determine whether the groups have distinctive features, we can say that task-oriented coping and emotional coping have distinctive features.

Limitations: The study's primary shortcoming is its cross-sectional design, which, like many life event studies, undermines reliable causal information. The sample in the clinical study, particularly in patients with depression, was relatively small. Additionally, stressful life events in the LEC-5 survey are measured as binary variables, with participants indicating whether they

experienced an event or not. Thus, the frequency and repetitiveness of events is not considered, but only whether they occur or not. The study's results may not be generalizable due to the use of self-report measures and the collection of the sample from a single center over a short period.

Conclusion

Overall, this research contributes significantly to the literature by examining the role of coping styles in understanding the relationship between stressful life events and major depression. Our results can be generalized to patients with depression who are predominantly of the intermediate type of chronotype. While identifying stressful life events and coping mechanisms were important to detect potential mental health problems and the development of individualized treatment plans, it is also important to acknowledge the multifactorial nature of mental health. Further research is necessary to gain a better understanding of the specific types of stressful life events and coping mechanisms that are most relevant, as well as how they interact with other factors. Targeted interventions can improve the effectiveness of positive coping strategies, such as task-oriented coping, in promoting mental health and preventing depression. However, the effectiveness of an intervention depends on various factors, such as the individual's needs and preferences and contextual factors. In addition to task-oriented coping strategies, it is crucial to enhance other positive coping strategies and address emotional and social needs.

Ethical approval: The research was approved by the Yüzüncü Yıl University Faculty of Medicine Non-Interventional Research Ethics Committee with the decision dated 11.02.2022 and numbered 2022/02-10. Informed written consent was obtained from all patients participating in the study.

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