



# Circadian Rhythm Sleep Disorders in the Young Population and Their Relationship with Psychological Distress and Disability

## Genç Popülasyonda Sirkadiyen Ritim Uyku Bozuklukları ve Psikolojik Sıkıntı ve Engellilik ile İlişkisi

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### Abstract

**Objective:** The sleep/wake cycle plays a vital role in mental health and daily life. Therefore, this study aimed to investigate the prevalence of circadian rhythm sleep disorders in the young population and their effect on psychological health and mental disability.

**Materials and Methods:** The present study is part of the first phase of the Ravansar cohort (a branch of the Prospective Epidemiological Research Studies in Iran cohort) and included 2991 participants from Ravansar, Iran. Data were collected using standard questionnaires, including the Kessler Psychological Distress (PD) Scale (K10), Sheehan Disability Scale, and sleep timing.

**Results:** The prevalence of advanced sleep phase disorder (ASPD) was 0.4% in the sample, the prevalence of delayed sleep phase disorder (DSPD) was 4.1%, and the prevalence of the desire to change sleep patterns was 61.3%. The results also showed that the level of PD in people with and without ASPD was not significant, but the level of PD was significantly higher in people with DSPD compared to those without ( $p<0.001$ ). In another section, the results showed that there was no association between ASPD and disability, but there was a positive association between DSPD and disability. This means that the higher the DSPD, the greater the severity of disability. Additionally, the prevalence of ASPD and DSPD was higher in males.

**Conclusion:** According to our results, the sleep/wake cycle in the sample did not follow a fixed pattern, and this irregularity was present in both sexes. Furthermore, the results demonstrated that the sleep/wake cycle and circadian rhythm are important factors in mental health and individual performance.

**Keywords:** Circadian rhythm sleep disorders, psychological distress, mental health, disability

### Öz

**Amaç:** Uyku/uyanıklık döngüsü, ruh sağlığı ve yaşamda hayati bir rol oynamaktadır. Buna göre, bu çalışma genç popülasyonda sirkadiyen ritim uyku bozukluklarının prevalansını ve bunun psikolojik sağlık ve mental engellilik üzerindeki rolünü araştırmayı amaçlamıştır.

**Gereç ve Yöntem:** Bu çalışma, Ravansar kohortunun (İran'da Prospektif Epidemiyolojik Araştırma Çalışmaları kohortunun bir kolu) ilk aşamasının bir parçasıdır ve örnekleme Ravansar şehrinden (İran) 2991 kişiyi içermektedir. Veriler, Kessler Psikolojik Sıkıntı (PD) Ölçeği (K10), Sheehan Engellilik Ölçeği ve uyku zamanlaması gibi standart anketler kullanılarak toplanmıştır.

**Bulgular:** Örneklemde İleri Uyku Evresi Bozukluğu (ASPD) yaygınlığı %0,4, Gecikmiş Uyku Evresi Bozukluğu (DSPD) yaygınlığı %4,1 ve uyku düzenini değiştirme isteği yaygınlığı %61,3 olarak bulundu. Sonuçlar ayrıca, ASPD'si olan ve olmayan kişilerde PD miktarının anlamlı olmadığını, ancak PD miktarının DSPD'si olan ve olmayan kişilerde anlamlı olduğunu, dolayısıyla PD miktarının DSPD'si olan kişilerde daha yüksek olduğunu gösterdi ( $p<0,001$ ). Başka bir bölümde sonuçlar, ASPD ile engellilik arasında bir ilişki olmadığını, ancak DSPD ile engellilik arasında pozitif bir ilişki olduğunu gösterdi; bu durum ise, DSPD ne kadar yüksekse, engelliliğin şiddetinin o kadar yüksek olduğu anlamına gelmektedir. Ayrıca, sonuçlar ASPD ve DSPD prevalansının erkeklerde daha yüksek olduğunu göstermiştir.

**Sonuç:** Bulgularımıza göre örneklemedeki uyku/uyanıklık döngüsü sabit bir örüntüye sahip değildi ve bu düzensizlik her iki cinsiyette de mevcuttu. Ayrıca, sonuçlar uyku/uyanıklık döngüsü ve sirkadiyen ritmin ruh sağlığı ve bireysel performansa önemli bir faktör olduğunu göstermiştir.

**Anahtar Kelimeler:** Sirkadiyen ritim uyku bozuklukları, psikolojik sıkıntı, ruh sağlığı, engellilik

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## Introduction

Circadian rhythm (CR) plays an important role as the internal clock of the human body. According to the 24-hour light and dark cycle in the environment, it coordinates human behavior and physiology (1). CR regulates daily physiological and behavioral rhythms such as the sleep-wake cycle, body temperature, hormonal secretion, and mood (2). One of the functions of CR is to regulate the sleep/wake cycle. However, it should be noted that each person's sleep time can be affected by various factors such as the endogenous circadian clock, behavioral factors, work conditions, and family environment. In other words, these factors can determine sleep time (3). This means that not all people follow the same rule in the sleep/wake pattern, so we are dealing with a phenomenon called CR Sleep Disorders (CRSD). The cause of CRSD is the incoordination of the endogenous circadian timing system and the 24-hour schedule in the external environment (4).

The most common circadian sleep disorders are Delayed Sleep Phase Disorder (DSPD), Advanced Sleep Phase Disorder (ASPD), jet lag, non-24 h Sleep Wake Disorder, and Shift Work Disorder (5). Patients with DSPD are known as "evening-types"; they usually sleep 3-6 hours later than the rest of the community (3). People with ASPD are also known as "morning-types"; they usually fall asleep 3 hours earlier than the social norm, have insufficient sleep duration, and are usually drowsy during the day (3).

CRSD can cause sleep disturbances, often in the form of drowsiness and excessive tiredness during the day (5). This disorder has negative consequences for family, social, occupational, and health aspects (5), and can lead to psychological and functional problems (6). The results of a review study showed that there is evidence of a link between CRSD and mental health. According to the study, CRSD is associated with mental disorders such as depression, anxiety, and bipolar disorder (7). Another review study also reported that CRSD played a major role in developing mood disorders (8). The results of other studies also indicated the effective role of CRSD in bipolar disorder (2,9-12).

Research has also shown that CRSD plays a role in depression (13-15). The results of other studies also indicate the role of CRSD in anxiety disorders (14,16). On the other hand, it is believed that turbulence in CRSD is the core feature of mood disorders and anxiety (17). In addition to mental health, CRSD is involved in physical health and the occurrence of physical diseases such as diabetes, obesity, cancer, and cardiovascular disease (18). This evidence confirms the important role of CR in health. According to what has been said, new studies should be conducted for a precise understanding of this phenomenon and its role in different aspects of life.

Psychological distress was one of the variables examined in the current research. This variable is one aspect of mental health problems and has a relatively high prevalence (19). This phenomenon is associated with symptoms such as lack of desire, hopelessness about the future, and restlessness (20), which indicate symptoms of anxiety and depression disorders (21,22). There is little research on the role of CRSD in psychological distress, and there is no comprehensive understanding of this relationship.

Disability was another variable that was examined as a consequence in this study. Impaired function is significant as a diagnostic criterion for major psychiatric disorders, but the concept and severity of disability is more than a diagnosis (23), referring to dysfunction and limitation in performance (24). The role of CRSD in mental illness has been mentioned above, but no research has been found on the role of CRSD in disability due to mental disorders. Due to the importance of disability and its costs, this research was conducted to study the prevalence of CRSD in the Iranian population. This study was conducted to answer the question: Is there a relationship between CRSD and mental distress and disability?

## Materials and Methods

### Design and Background

The Prospective Epidemiological Research Studies in Iran (PERSIAN) Youth Cohort (PYC) study is being run as a supplement to the main PERSIAN Cohort study. The PERSIAN Cohort is a nationwide cohort study launched in 2014 which covers 170,000 adults aged 35-70 years old (25,26). This study is designed as a research platform to investigate a variety of exposures and outcomes related to physical health, such as cardiovascular diseases, and provides infrastructure for the implementation of other potential cohort studies. Several sub-cohort studies, including the PERSIAN birth cohort, PYC, and elderly cohorts, have been added to the main PERSIAN cohort study over the years (<http://persiancohort.com/aboutus/>). The PYC mainly investigates the incidence, course, and correlated factors of common psychiatric disorders as well as substance use disorder, suicide attempt, traffic and non-traffic injuries, outpatient and inpatient psychiatric service use, and death.

### Data Collection

The registration and data collection of the first wave was done from April 2015-2017 in the cohort center located in an urban area. A face-to-face interview was conducted by trained clinical psychologists or counselors, after receiving necessary information regarding the study, ensuring privacy and confidentiality of the information, and signing the informed consent. Each interview took an average of 60 minutes. Participants' responses were recorded in an electronic online questionnaire connected to the central cohort server. The quality of the work process was monitored daily by a general practitioner as field manager. The data were continuously assessed by the data management center located in Kermanshah University of medical sciences for completeness of the information, detecting possible errors, and providing technical feedback.

### Data Collection Tools

**Sleep:** We used a 5-item questionnaire to measure sleep timing. The questions included: when to start sleeping, when to wake up, want to change your sleep schedule, sleep during the day, and work at night. Based on questions 1 and 2, the duration of night sleep was calculated. CRSD was classified based on the International Classification of Sleep Disorders- 2 which states that people who sleep earlier than 9 PM and wake up earlier than 5am are in the ASPD class, and people who sleep later than 2:00 AM and wake up later than 11 AM are in the DSPD class (3).

**Kessler Psychological Distress Scale:** The Kessler Psychological Distress Scale is a 10-item scale developed by Kessler et al. (27) to screen psychological problems in a nonclinical population. Questions are scored according to the Likert scale from never (score zero) to always (score 4). The total score of the scale ranges from zero to 40. The reliability and validity of the scale have been reported as appropriate (21). This scale measures symptoms of anxiety and depression over the past 30 days (21) and is one of the best and most attractive tests for measuring mental health (27). The reliability and validity of the PERSIAN version of this scale has also been reported as suitable, with a Cronbach's alpha coefficient of 0.87 (28). In our study, the reliability of the scale was evaluated with a Cronbach's alpha coefficient, which was 0.90.

**Sheehan Disability Scale (SDS):** The SDS measures disability in four elements: home management, work responsibilities, close relationships, and social life. This scale evaluates a person's performance in the four mentioned areas during the month that had the worst mental status over the past year. It also indicates the number of days that a person has been unable to perform their normal daily activities in the past 12 months due to a mental disorder. In a research conducted in Iran, the results showed that in clinical conditions, the Cronbach's alpha coefficient of this scale was 0.88 and the item-total correlation was 0.71 to 0.78 in different areas (23). The Cronbach's alpha

coefficient in the general population was also 0.81 (23). The visual analog scale of this instrument scores the severity of disability as lack of disability (=0), mild disability (3-1), moderate disability (4-6), and severe disability (7-10) (29). In the present study, the reliability of this scale was checked and Cronbach's alpha was 0.75.

### Statistical Analysis

Statistical analyzes were performed using SPSS20 software. All tests were two-sided and statistical significance was defined as p value <0.05. Data related to continuous variables were reported as mean and standard deviation, and discontinuous data were reported as amount and percentage. Chi-square statistical test was used to examine the difference between the groups according to the categorization of CR disorders, one-way analysis of variance (ANOVA) was used to compare PD means, and to compare the severity of disability, chi-2 statistical test was used.

Ethics approval of the study was taken from Kermanshah University of Medical Sciences Research Ethics Committee (approval no: IR.KUMS.REC.1397.652, date: 14.11.2018).

### Results

As shown in Table 1, data from 2991 people were analyzed, of which 1663 (55.6%) were women and 1328 (44.4%) were

Characteristics		Total	ASPD	DSPD	CR3*	Daily sleep	Shift work 1-5 h	Total sleep time (night)		
								5-9 h	9 h>	
Sex	Female	1663 (55.6)	3 (0.2)	56 (3.4)	1042 (62.7)	947 (56.9)	5 (0.3)	64 (3.8)	1369 (82.3)	229 (13.8)
	Male	1328 (44.4)	9 (0.7)	66 (5)	791 (59.6)	692 (52.1)	187 (14.1)	116 (8.7)	11446 (86.3)	66 (5)
	P-value	0.001	0.033	0.028	0.084	0.008	0.001	0.001		
Age	15-19	313 (10.5)	1 (0.3)	22 (7)	230 (73.5)	153 (48.9)	5 (1.6)	32 (10.2)	239 (76.4)	42 (13.4)
	20-24	610 (20.4)	3 (0.5)	41 (6.7)	354 (58)	320 (52.5)	30 (4.9)	26 (4.3)	510 (83.6)	610 (12.1)
	25-29	902 (30.2)	1 (0.1)	42 (4.7)	537 (59.5)	507 (56.2)	61 (6.8)	40 (4.4)	771 (85.5)	91 (10.1)
	30-34	1166 (39)	7 (0.6)	17 (1.5)	712 (61.1)	659 (56.5)	96 (8.2)	82 (7)	995 (85.3)	88 (7.5)
	P-value	0.001	0.356	0.001	0.001	0.048	0.001	0.001		
Education	Illiterate	11 (0.4)	0	1 (9.1)	6 (54.5)	7 (63.6)	0	2 (18.2)	8 (72.7)	1 (9.1)
	Primary school	481 (16.1)	3 (0.6)	6 (1.2)	298 (62)	289 (60.1)	9 (1.9)	25 (5.2)	402 (83.6)	54 (11.2)
	Middle school	530 (17.7)	6 (1.1)	18 (3.4)	310 (58.5)	280 (52.8)	39 (7.4)	27 (5.1)	437 (82.5)	66 (12.5)
	High school	1222 (40.9)	2 (0.2)	55 (4.5)	770 (63)	651 (53.3)	90 (7.4)	81 (6.6)	1014 (83)	126 (10.3)
	University	747 (25)	1 (0.1)	42 (5.6)	449 (60.1)	412 (55.2)	54 (7.2)	45 (6)	654 (87.6)	48 (6.4)
P-value	0.001	0.029	0.003	0.404	0.100	0.001	0.010			
Marital status	Never married	1227 (41)	6 (0.5)	80 (6.5)	722 (58.8)	623 (50.8)	70 (5.7)	87 (7.1)	1009 (82.2)	130 (10.6)
	Married	1668 (55.8)	6 (0.4)	36 (2.2)	1055 (63.2)	963 (57.7)	116 (7)	89 (5.3)	1429 (85.7)	150 (9)
	Previously married	96 (3.2)	0	6 (6.3)	56 (58.3)	53 (55.2)	6 (6.3)	4 (4.2)	77 (80.2)	15 (15.6)
	P-value	0.001	0.706	0.001	0.046	0.001	0.398	0.032		
Occupation	Employed	1098 (36.7)	10 (0.9)	27 (2.5)	665 (60.6)	582 (53)	182 (16.6)	102 (9.3)	949 (86.4)	47 (4.3)
	Unemployed	280 (9.4)	0	26 (9.3)	150 (53.6)	153 (54.6)	0	19 (6.8)	235 (83.9)	26 (9.3)
	Student	324 (10.8)	0	33 (10.2)	218 (67.3)	173 (53.4)	0	27 (8.3)	266 (82.1)	31 (9.6)
	Housewife	1289 (43.1)	2 (0.2)	36 (2.8)	800 (62.1)	731 (56.7)	0	32 (2.5)	1065 (82.6)	191 (14.8)
	P-value	0.001	0.009	0.001	0.006	0.310	0.001	0.001		
Total		2991	12 (0.4)	122 (4.1)	1833 (61.3)	1639 (54.8)	192 (6.4)	180 (6)	2515 (84.1)	295 (9.9)

\*Would like to change sleep schedule later, ASPD: Advanced Sleep Phase Disorder, DSPD: Delayed Sleep Phase Disorder, CR: Circadian rhythm, CRSD: Circadian rhythm sleep disorder

men. In our sample, the prevalence of ASPD was 0.4%, the prevalence rate of DSPD was 4.1%, and the prevalence of the desire to change sleep patterns was 61.3%. Additionally, 54.8% of participants had daily sleep, and 6.4% had night shift work. The results also showed that 6% of subjects reported night sleep in the range of 1 to 5 hours, and 9.9% had more than 9 hours of night sleep. The prevalence of ASPD and DSPD was higher in men, but in terms of the desire to change sleep patterns, 62.7% of women tended to change their sleep pattern, while this rate was 59.6% in men, although this difference was not statistically significant. Moreover, 56.9% of women and 52.1% of men had daily sleep, which was a significant difference. In terms of shift work, 14.1% of men had shift work, while this rate was 0.3% for women. The mean duration of night sleep in women was  $8.10 \pm 1.14$  hours, and in men, it was  $7.38 \pm 1.42$  hours ( $p < 0.001$ ). Also, 13.8% of women slept more than 9 hours in 24 hours, compared to 5% in men.

Table 2 presents data on "CR" and "psychological distress". The table shows the mean and standard deviation of PD for each of the CRD groups. The differences between the groups were examined by one-way analysis of variance (ANOVA), and the results are presented in Table 2. The findings indicated that the difference in PD level in people with and without ASPD was not significant, whereas the difference in PD levels in people with and without DSPD was significant. The PD rate was higher in those with ASPD ( $p < 0.001$ ). The results also showed that the mean of PD was higher in people who wanted to change their sleep pattern. Moreover, the mean score of PD was lower in people with night shift work. The role of the duration of nighttime sleep in PD was also significant ( $p < 0.001$ ), meaning that people with less than 5 hours of sleep per night had more PD, and people with 5 to 9 hours of sleep per night had less PD. The mean PD score in people who slept more than 120 minutes a day was significantly different from other people ( $p < 0.001$ ). According to Table 3, which expresses the results of disability, and its severity and CRD, there was no significant correlation

between ASPD and disability, but there was a significant relationship between DSPD and disability ( $\text{sig} < 0.001$ ), means that with increasing severity of DSPD, the severity of disability also increases. The results also showed that people who wanted to change their sleep pattern had more disability, but night shift did not have a significant relationship with disability. The results of Table 3 show that people who sleep less than 5 hours a night have more severe disability than others.

Multinomial logistic analysis was used to predict DSPD based on demographic variables, and the results are shown in Table 4.

## Discussion

The present study aimed to investigate the prevalence of CRSD in young Iranian population in western Iran. The results showed that the prevalence of ASPD and DSPD in the sample was 0.4% and 4.1%, respectively. These results differ from those reported in studies of other nationalities. For example, a study by Paine et al. (3) in the population of 20-59 years in New Zealand showed that the prevalence of ASPD ranged from 0.25% to 7.13%, while the prevalence of DSPD was 1.51% to 8.90%. A study in Sweden also reported a prevalence of DSPD of 4% (30). The results of another study reported a prevalence of DSPD of 1.1%, although the results showed that 51.9% of people had at least one criterion for diagnosing DSPD (31). On the other hand, the results of our study revealed that the prevalence rate for ASPD and DSPD was higher in men. The prevalence of DSPD also decreased with increasing age, but age did not play a significant role in ASPD. The results of a study showed that DSPD is not equally prevalent in men and women, and age has no significant effect on it (30). The findings of another study also revealed that there is no significant difference in the prevalence of DSPD in terms of age and sex (31). Men's employment and the role of social culture can be considered as factors in the difference between DSPD in men and women. In the other part of our study, the results showed that the difference in PD between people with and without ASPD was

**Table 2. Mean and standard deviation of psychological distress in terms of circadian rhythm**

		Mean	Standard deviation	F	P-value	Effect size
ASPD	No	12.654	8.005	0.326	0.568	0.001
	Yes	11.333	5.851			
DSPD	No	12.503	7.926	23.170	0.001	0.008
	Yes	16.049	8.882			
CR3*	No	11.841	8.052	19.594	0.001	0.007
	Yes	13.166	7.926			
Daily sleep	No	12.792	8.173	9.420	0.001	0.009
	>30 m**	11.859	7.722			
	30-120 m	12.312	7.727			
	<120 m	15.717	8.383			
Shift work	No	12.737	8.045	4.825	0.028	0.002
	Yes	11.427	7.225			
Sleep time (night)	1-5 h***	14.605	8.849	6.980	0.001	0.005
	5-9 h	12.442	7.941			
	9 h>	13.210	7.759			

\*Would like to change sleep schedule later, \*\*m=Minutes, \*\*\*h= hour, ASPD: Advanced Sleep Phase Disorder, DSPD: Delayed Sleep Phase Disorder, CR: Circadian rhythm

not significant, but PD was different in people with and without DSPD. According to the results, PD was higher in people with DSPD. The results of a study showed that DSPD was associated with psychological distress. PD was also more prevalent in the evening-type group (32). Regarding the relationship between CRSD and mental disorders, the results of our study are consistent with previous studies. For example, a study revealed that there is a relationship between CRSD and depressive and anxiety disorders (33). The results of previous research indicate

the role of CRD in the severity of depression (34-37). And the findings of a study have shown that CRD is a basic biological aspect for mood vulnerability (34).

The results of our study showed that PD was lower in people who worked night shifts, which was inconsistent with previous studies. The results of past studies have shown the negative impact of shift work on mental health (38,39). Regarding the possible cause of this discrepancy, we can mention the age of the sample, which was lower in this study than in other studies.

**Table 3. Amount of disability in terms of circadian rhythm**

		Disability-n (%)				p
		No disability	Mild	Moderate	Severe	
ASPD	No	215 (7.2)	1243 (41.7)	996 (33.4)	524 (17.6)	0.641
	Yes	0	4 (33.3)	5 (41.7)	3 (25)	
DSPD	No	214 (7.5)	1209 (42.2)	960 (33.5)	485 (16.9)	0.001
	Yes	1 (0.8)	38 (31.1)	41 (33.6)	42 (34.4)	
CR3*	No	110 (9.5)	494 (42.7)	372 (32.1)	182 (15.7)	0.001
	Yes	105 (5.7)	754 (41.1)	629 (34.3)	345 (18.8)	
Daily sleep	no	107 (7.9)	562 (41.6)	445 (32.9)	238 (17.6)	0.001
	>30 m**	28 (8.6)	136 (41.6)	116 (35.6)	47 (14.4)	
	30-120 m	73 (6.3)	507 (43.7)	385 (33.2)	196 (16.9)	
	<120 m	7 (4.6)	44 (28.9)	55 (36.2)	46 (30.3)	
Shift work	No	200 (7.1)	1174 (41.9)	937 (33.5)	488 (17.4)	0.693
	Yes	15 (7.8)	74 (38.5)	64 (33.3)	39 (20.3)	
Sleep time (night)	1-5 h***	12 (6.7)	53 (29.4)	57 (31.7)	58 (32.2)	0.001
	5-9 h	187 (7.4)	1058 (42.1)	848 (33.7)	422 (16.8)	
	9 h>	16 (5.4)	136 (46.1)	96 (32.5)	47 (15.9)	
<b>Total</b>		215 (7.2)	1248 (41.7)	1001 (33.5)	527 (17.6)	0.001

\*Would like to change sleep schedule later, \*\*m=Minutes, \*\*\*h= hour, ASPD: Advanced Sleep Phase Disorder, DSPD: Delayed Sleep Phase Disorder, CR: Circadian rhythm

**Table 4. The results of Multinomial logistic analysis to predict DSPD**

Characteristics		B	OR	95% (CI)	P value
Sex	Female	0.47	1.61	0.92-2.77	0.09
	Male	0	1	1	-
Age	15-19	-0.64	0.53	0.23-1.21	0.13
	20-24	-0.99	0.37	0.19-0.71	0.003
	25-29	-0.94	0.39	0.21-0.71	0.002
	30-34	0	1	1	-
Education	Illiterate	-1.67	0.18	0.02-1.62	0.128
	Primary school	-0.79	2.21	0.85-5.73	0.104
	Middle school	-0.05	0.95	0.50-1.81	0.885
	High school	-0.03	0.98	0.59-1.61	0.921
	University	0	1	1	-
Marital status	Never married	0.53	1.71	0.68-4.28	0.254
	Married	0.95	2.59	1.05-6.42	0.039
	Previously married	0	1	1	-
Occupation	Employed	0.72	2.06	0.98-4.31	0.055
	Unemployed	-0.45	0.64	0.31-1.34	0.237
	Student	-0.51	0.60	0.28-1.29	0.191
	Housewife	0	1	1	-
The reference category is: yes, DSPD: Delayed Sleep Phase Disorder, CI: Confidence interval					



The findings of our study indicated that sleeping less than 5 hours a night can be a risk factor for mental disorders. A meta-analysis showed that sleep duration negatively affects mood (40). Another study reported that short sleep time is linked with depression, anger, confusion, anxiety, vigor, and fatigue (41), which is consistent with our research in some components.

In another part of our study, the findings indicated that there is no association between ASPD and disability, but there is a positive relationship between DSPD and disability, which means that higher DSPD is associated with more severe disability. In other words, people who wake up later have lower performance. Literature shows that CR plays an important role in individual performance. For example, a study showed that CR played a role in professional performance (42). The results of another study reported that CR was correlated with cognitive functioning (43). Another study has emphasized the role of CR in functional performance (44).

One of the factors that can explain the effect of CR on mood disorders, especially depression, is the use of light in the living environment and lifestyle (45). Exposure to light can change the CR and suppress the secretion of melatonin in the human body (46). People who have a sleep/wake cycle that receives less natural light have problems in CRs. Light plays an important role in melatonin secretion (47), which is particularly important for regulating the sleep/wake cycle. Research has also reported that the use of light can be useful in the treatment of depression (48-50). On the other hand, the lifestyle of people who have a different sleep/wake cycle is probably a very important factor in causing mental health problems. Research has shown that lifestyle is associated with mental health problems (51-53).

The results of the logistic regression analysis showed that the variables of age and marital status play a role in predicting DSPD, which means that with increasing age, the probability of DSPD occurrence increases, and it is more prevalent in people who are married. Although the prevalence of DSPD is higher in men in terms of frequency, the sex variable does not have a significant role in predicting it. The results of previous studies (30,31) have also shown that age and sex variables do not have a significant role in this field. More research should be done to investigate these contradictions. However, it is important to note that in the current research, this is only a secondary finding and is not related to the main hypothesis.

## Conclusion

In this study, we found that the sleep/wake pattern in the sample was variable (is not fixed) and affected both sexes. Additionally, we identified a prevalence of 0.4% for ASPD and 4.1% for DSPD disorders. Women had longer nighttime sleep durations than men. Our results further suggest that sleep/wake patterns and CRs play a crucial role in mental health and mental function. Therefore, more research is necessary to better understand the relationship between CRSD and mental health. Based on our findings, we recommend that sleep/wake pattern modifications for young people be considered, and targeted educational programs be developed and tailored to the community to address this issue.

## Ethics

**Ethics Committee Approval:** Ethics approval of the study was taken from Kermanshah University of Medical Sciences Research Ethics Committee (approval no: IR.KUMS.REC.1397.652, date: 14.11.2018).

**Informed Consent:** A face-to-face interview was conducted by trained clinical psychologists or counselors, after receiving necessary information regarding the study, ensuring privacy and confidentiality of the information, and signing the informed consent.

**Peer-review:** Internally peer-reviewed.

## Authorship Contributions

Surgical and Medical Practices: H.K., Y.P., Concept: M.M.N., R.M., Design: F.N., A.Z., Data Collection or Processing: A.R.M., M.A.E., Analysis or Interpretation: A.Z., Literature Search: A.C., A.A., Writing: H.K., A.Z., R.M.

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