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Original Research

# The Effect of Weight, Smoking, Passive Smoking, Physical Activity Level and Quality of Sleep on Cognitive Status in Adults

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**ABSTRACT**

**Objective:** This study was planned to investigate how the lifestyles of adults affect their cognitive control, flexibility, and cognitive failure levels.

**Methods:** In this cross-sectional study, 81 individuals aged between 18 and 65 without a history of severe chronic illness, communication and emotional problems were included. The demographic characteristics of all individuals were recorded. The ability of individuals to control their negative thoughts and emotions and to cope with a stressful situation was assessed by the ***Cognitive Control and Flexibility Scale***, cognitive failure status by the *Cognitive Failure Scale*, physical activity levels by the *Short Form of the International Physical Activity Questionnaire*, and sleep quality by the *Pittsburgh Sleep Quality Index*.

**Results:** It was observed that as the Body Mass Index of the individuals increased, cognitive failure also increased and the assessment and coping flexibility levels of individuals exposed to passive smoking were lower ($p<0.05$). It was determined that individuals with poor sleep quality had lower cognitive control scores on emotions and higher cognitive failure scores ($p<0.05$). It was determined that there was a positive and statistically significant very weak correlation between the individuals' assessment and coping flexibility level and their physical activity level ($r=0.273;p<0.05$).

**Conclusion:** It is clearly seen that individuals will improve their cognitive status with changes in their lifestyles in the direction of well-being. In this context, we think that it is important to conduct more extensive research on the factors affecting cognitive status and to raise public awareness in order to minimize negative situations.

**Keywords:** Cognitive Function, Body Weight, Smoking Habit, Physical Activity, Sleep Quality

## INTRODUCTION

Cognitive control and flexibility play a fundamental role in the ability to adapt to ever-changing environmental conditions and are associated with a variety of goal-oriented behaviors such as creativity, problem-solving, multitasking, and decision making [1]. In general, cognitive control is defined as the ability to prevent information, which is not related to the target, while focusing on the information that is related to a specific target [2]. Cognitive control is frequently associated with executive functions such as functioning memory, prevention, and set-changing and it plays an effective role in flexible behavioural responses [1]. Cognitive flexibility is, however, defined as the ability to flexibly think of different opinions and alternate responses depending on the changing environmental conditions [1,3]. Individuals with cognitive flexibility have advanced skills to perceive changes and develop different strategies for anything that might occur due to new situations [1]. An error or failure that might occur in an activity, which the individual could accomplish in daily

life, is defined as cognitive failure [4]. Concentration problems, memory loss, and reduced perception prevent fulfilling the task [4,5].

Dietary habits lay the foundation of health in any period of life. The dietary habits acquired at an early age allow for improving the quality of life and protect health at later ages. Moreover, sufficient and balanced dietary habits also prevent the risk of chronic diseases that might develop such as cancer, diabetes, and hypertension [6]. Besides all these physical problems, many brain scanning and behaviour studies in the literature compared the normal weight individuals and overweight individuals and those studies reported results proving that an increase in the BMI (body mass index) had a close relationship with frontal lobe functions and white matter disorders in brain, significant intellectual and cognitive deficiencies, and increased dementia and Alzheimer's disease prevalence at advanced ages [6-8].

Smoking is another factor affecting cognitive functions. It is seen that there is no complete consistency in the studies in the literature on this subject. In some studies, emphasized that, even at low doses, smoking increased the risk of cardiovascular diseases and stroke and it had a strong biological correlation with dementia and cognitive decline [9]. However, some studies also say that the relationship between current smoking and decline in cognitive functions is less [10,11]. Another condition concerning smoking is passive smoking, defined as being unwillingly exposed to cigarette smoke [12]. In a study carried out by Argüder et al. [12], it was reported that passive smoking increased the risk of lung cancer and other cancer types and that it caused coronary heart disease, stroke, and chronic lung disease [12]. In a study systematically examining the relationship between passive smoking, cognitive disorder, and dementia, it was concluded that there were weak proofs regarding the relationship between passive smoking and cognitive disorder, but the methodological variation and inconsistency of studies prevented the achievement of absolute results [13].

**Main Points;**

- There are many factors influencing individuals' cognitive condition.
- Cognitive failure increases with increasing BMI level.
- Assessment and coping scores of individuals exposed to passive smoking are lower.
- Individuals having sleep disorders have lower cognitive control scores and higher cognitive failure scores.
- Individuals' assessment and coping flexibility levels increases with increasing level of physical activity.

Although it is an easy-to-accept opinion to encourage individuals to physical activity for cardiovascular and musculoskeletal system health, the field of physical activity for cognitive functions continues rapidly expanding [14]. The effects of physical activities performed during life from childhood to elderliness have been reported in previous studies [15,16]. In particular, it was proven that cognitive functions such as attention or cognitive flexibility, which are those affected by brain development the most, and cognitive functions such as memory, which are those depending on the experiences the most, are the fields that are sensitive to physical activity the most [16]. However, despite all, it is also expressed that more comprehensive studies should be carried out about how the parameters of physical activity (such as duration, intensity, etc.) should be and which cognitive functions the physical activity has effects on [17].

The effect of sleep quality on cognitive functions has been examined in many previous studies [18,19]. Degradation in sleep quality was related to degradations in cognitive functions such as concentration, decision-making, memory, etc., and job-related difficulties [18,19].

In the literature, it can be seen that previous studies examining cognitive functions mainly focused on geriatric individuals or adults having a chronic disease and that the number of studies addressing healthy adults is very limited [5,9-11,17-19]. The present study aims to investigate how the lifestyles of healthy adults affect their cognitive control and flexibility level and their cognitive failure levels.

## MATERIALS AND METHODS

### Subjects

The present study involved individuals aged between 18 and 65 years and having no communicational or emotional problems. Those having severe chronic disease history (diagnosis of neurologic disorder or cancer) and nonvoluntary individuals were excluded.

The present study was approved by the Scientific Research and Publication Ethics Committee of Çankırı Karatekin University (desicion date 06.28.2022 and code b36755a4f1504b23). The

study was carried out in line with the Declaration of Helsinki. Consent forms were obtained from all the participants in the study

**Assessment Tools**

Demographic characteristics of participants such as age, height, weight, educational level, employment status, smoking status, passive smoking status, and place of living were recorded.

*Cognitive Control and Flexibility Scale (CCFS)* was used in order to measure individuals' ability to control intrusive and negative thoughts and emotions and flexibly cope with a stressful situation. This scale was developed by Garbys et al. (2018) and adapted to the Turkish language by Demirtaş [20]. Consisting of 18 items in total, the scale is implemented using 7a -point Likert scale (1 = not agreed at all, 7 = completely agreed). The scale has two dimensions (Cognitive Control on Emotions and Assessment and Coping Flexibility) and Cronbach's Alpha reliability (internal consistency) coefficients of dimensions were reported to be .85 and .91. The higher scores on this scale indicate a higher assessment and coping flexibility and cognitive control on emotions [20].

The cognitive failure level of individuals was measured using the *Cognitive Failure Scale*. The Cognitive Failure Scale (CFS) has 7 items about memory, 9 items about attention deficit, 7 items about failure, and 2 items about names. Consisting of 25 items, the scale questions how frequently the cognitive conditions have been experienced in the last 6 months. During the assessment, the individuals use the suitable option in a 4-point Likert scale (Very frequent "4", frequent "3", sometimes "2", rarely "1", and never "0"). The total score ranges between 0 and 100 points. Higher scores indicate susceptibility to cognitive failure [4].

Developed by Craig, *International Physical Activity Questionnaire (UFAA) – Short Form* was used in measuring the physical activity levels of individuals [21]. The reliability and validity study in the Turkish language was carried out by Öztürk [22]. The form consists of 7 items and investigates the time spent in sitting, walking, and medium- and high-intensity activities in the last week. The total score was calculated as the sum of low-intensity physical activity (walking), medium-intensity physical activity, and intense physical activity as time (minutes) and frequency (number of days). The energy needed for the activities is calculated as the MET-min score. One MET-min/week is calculated by multiplying the number of days of activity, minutes, and MET score. Considering the assessment results, individuals are categorized by the physical activity level as inactive (not physically active, <600 MET-min/week), minimally active (low level of physical activity, 600-3000 MET-min/week), and sufficiently active (sufficient level of physical activity, >3000 MET-min/week) [22].

Sleep quality was measured using the *Pittsburgh Sleep Quality Index (PSQI)*. This scale consists of 19 items under 7 sections as subjective sleep quality, sleep onset latency, sleep time, sleep efficiency, conditions affecting the sleep, use of sleep aids, and drowsiness during the day. Items are scored between 0 and 3. Total score ranges between 0 and 21 and higher scores indicate low sleep quality [23].

**Statistical Analysis**

Post-hoc power analysis of the study was performed using the G* Power 3.1.9.7 program [24]. The total number of samples was 81 and, as a result of the calculations, the correlation value was found to be .669 with a 5% error margin (a= .05), the power of this study (1- β) was found to be .99.

Statistical analysis was performed using IBM Statistics SPSS v26.0 (SPSS Inc, Armonk. NY, USA). Fitness to normal distribution was tested using Kolmogorov-Smirnov Test. The variables were determined using measurements (histograms, Kolmogorov-Smirnov test). Among the descriptive statistics, mean, median, standard deviation, minimum, and maximum values were utilized.

During the correlation analyses, the correlation coefficients and statistical significance were calculated using Spearman's test for variables, at least one of which was not distributed normally. As a result of the correlation analysis performed using the absolute value of correlation coefficient, the scores between 0.00 and 0.25 were considered as very weak correlation, those between 0.26 and 0.49 as weak correlation, those between 0.50 and 0.69 as medium level correlation, those between 0.70 and 0.89 as high correlation, and those between 0.90 and 1.00 as very high correlation [25]. The lowest level of significance was set at 0.05.

**RESULTS**

Responses of 100 individuals were taken into analysis but 19 individuals were excluded since they did not meet the inclusion criteria. Thus, the statistical analysis was completed with the responses of 81 individuals.

The demographic characteristics of all individuals are summarized in Table 1. The median age of individuals was found to be 49 (19-65) years and the median BMI (Body Mass Index) was calculated to be 26.14 kg/m$^2$ (18.01-43.12). It was determined that most of the participants were female (54.32%). Besides that, it was found that the educational level of volunteers was mainly the elementary/secondary school (48.15%), that the share of employees was higher (53.09%), and that individuals were living mostly in districts (50.62%). Questioning the smoking status of individuals and if they were exposed to passive smoking, it was determined that 30 (37.04%) of individuals were smokers and 31 (38.27%) were exposed to passive smoking **(**Table 1).

**Individuals' cognitive control and flexibility, cognitive failure, physical activity, and sleep quality levels**

Given the results obtained from Cognitive Control and Flexibility Scale, individuals' score in Cognitive Control on Emotions was 14 at minimum and 63 at maximum and the mean score and standard deviation were found to be 36.88 ± 9.39. For Assessment and Coping Levels, the minimum score was 9, the highest score was 63, and the mean score and standard deviation were 44.09 ± 8.58. In the Cognitive Failure Scale, the lowest score was found to be 0, the highest to be 67, and the mean ± standard deviation to be 34.56±15.03.

Given the results obtained from International Physical Activity Scale, the mean scores of individuals were found to be 8689.05 ± 9596.82 (MET- min/week) for high-intensity physical activity, 1496.71 ± 767.61 for medium-intensity physical activity, and 359.70 ± 151.51 for low-level physical activity.

Given the results obtained from Pittsburg Sleep Quality Index measuring the sleep quality in detail, the mean score was found to be 1.13 ± 0.68 for sleep quality, 1.27 ± 1.03 for sleep latency, 0.6 ± 0.73 for sleep time, 0.17 ± 0.41 for usual sleep efficiency, 1.64 ± 0.71 for sleep disorders, 0.12 ± 0.45 for use of sleep aid, 0.85 ± 0.88 for daytime dysfunctionality, and 5.80 ± 2.85 for total sleep quality (Table 2).

**Individuals' cognitive flexibility and control levels and cognitive failure levels by their lifestyles**

Examining the cognitive conditions of individuals by their lifestyles, it was determined that there was a statistically significant difference in cognitive failure levels of individuals by their BMI values and cognitive failure increased with increasing BMI level ($p<0.05$).

From the aspect of smoking and being exposed to passive smoking, smokers had lower cognitive flexibility and control levels and higher cognitive failure levels but there was no statistically significant difference between the groups. It was also determined that there was a statistically significant difference between the assessment and coping scores of individuals ($p<0.05$) and that assessment and coping scores of individuals exposed to passive smoking were lower.

Examining the cognitive conditions of individuals by their physical activity levels, there was no statistically significant difference between the groups. However, it was also determined that cognitive flexibility and control levels of individuals increased but cognitive failure levels decreased with increasing activity levels ($p>0.05$).

Considering the results obtained from Pittsburg Sleep Quality Index, it was found that there was a statistically significant difference between individuals' cognitive control on emotions and cognitive failure levels ($p<0.05$), and that individuals having sleep disorders had lower cognitive control scores and higher cognitive failure scores. (Table 3).

**Relationship between individuals' lifestyles, their cognitive control and flexibility levels, and their cognitive failure levels**

A positive, statistically significant, and weak relationship was found between individuals' BMI values and cognitive failure levels ($r= 0.280$; $p<0.05$).

A positive, statistically significant, and weak relationship was found between smoking and passive smoking ($r= 0.343$; $p<0.05$).
The level of cognitive control on emotions was found to have a positive, significant, and weak relationship with assessment and coping level ($r= 0.304$; $p<0.001$) and negative, significant, and weak relationships with cognitive failure ($r=-0.487$; $p<0.001$) and sleep quality ($r=-0.344$; $p<0.001$).
A positive, statistically significant, and very weak relationship was found between assessment and coping level and physical activity level; it was determined that individuals' assessment and coping flexibility levels increased with increasing levels of physical activity ($r=0.273$; $p<0.05$).
Finally, it was determined that there was a positive, statistically significant, and weak relationship between individuals' cognitive failure levels and their sleep quality levels; cognitive failure level increased with decreasing sleep quality ($r= 0.477$; $p<0.001$) (Table 4)

**Table 1.** Demographic Characteristics of Individuals

| | | N= 81 |
|---|---|---|
| **Age (year)** | | 45 (19-65) |
| **BMI (kg/m$^{2)}$** | | 26.14 (18.01-43.12) |
| **Gender** | Female | 44 (54.32%) |
| | Male | 37 (45.68%) |
| **Education** | Lettered | 5 (6.17%) |
| | Elementary School | 39 (48.15%) |
| | High School | 18 (22.22%) |
| | University | 19 (23.46%) |
| **Working Status** | Working | 43 (53.09%) |
| | Not Working | 38 (46.91%) |
| **Where Live** | Village | 5 (6.17%) |
| | Tow | 41 (50.62%) |
| | Country | 35 (43.21%) |
| **Smoking Status** | Smokers | 30 (37.04%) |
| | Not Smokers | 51 (62.96%) |
| **Passive Smoking** | Exposed to Passive Smoking | 31 (38.27%) |
| | Not Exposed to Passive Smoking | 50 (61.73%) |

Data are presented as number (%) of participants or median (IQR).

**Table 2.** Cognitive Control and Flexibility, Cognitive Failure, Physical Activity and Sleep Quality Levels of Individuals

| **N= 81** | | **median (min.-max.)** | **x±SS** |
|---|---|---|---|
| **Cognitive Control and Flexibility Scale** | Cognitive Control on Emotions | 36 (14-63) | 36.88±9.39 |
| | Assessment and Coping Flexibility | 46 (9-63) | 44.09±8.58 |
| **Cognitive Failure Scale** | | 34 (0-67) | 34.56±15.03 |
| **International Physical Activity Questionnaire (UFAA) – Short Form** | High-intensity Physical Activity (n=20) | 4531.5 (3012-37.170) | 8689.05±9596.82 |
| | Medium-intensity Physical Activity (n=39) | 1221 (840-2812) | 1496.71±767.61 |
| | Low-intensity Physical Activity (n=22) | 357 (132-591) | 359.70±151.51 |
| **Pitssburg Sleep Quality Index (PSQI)** | Sleep Quality | 1 (0-3) | 1.13±0.68 |
| | Sleep Onset Latency | 1 (0-5) | 1.27±1.03 |
| | Sleep Time | 0 (0-3) | 0.6±0.73 |
| | Sleep Efficiency | 0 (0-2) | 0.17±0.41 |
| | Sleep Disorders | 2 (0-4) | 1.64±0.71 |
| | Use of Sleep Aid | 0 (0-3) | 0.12±0.45 |
| | Daytime Dysfunctionality | 1 (0-3) | 0.85±0.88 |
| | Total Sleep Quality | 5 (1-15) | 5.80±2.85 |

Data are presented as median.

**Table 3.** Cognitive Flexibility and Control Levels and Cognitive Failure Levels of Individuals According to Life Styles

| N= 81 | | Cognitive Control on Emotions | | Assessment and Coping Flexibility | | Cognitive Failure | |
|---|---|---|---|---|---|---|---|
| | | x±SS | p | x±SS | p | x±SS | p |
| **BMI** | >25 | 35.60±10.15 | 0.525[a] | 43.61±6.99 | 0.762[a] | 44.12±15.40 | **0.004[b]** |
| | <25 | 37.77±8.84 | | 44.64±9.16 | | 30.76±12.81 | |
| **Smoking Status** | Smoker | 35.60±11.90 | 0.163[a] | 44.23±8.50 | 0.902[a] | 38.50±14.05 | 0.071[b] |
| | Not Smoker | 37.64±7.58 | | 44.01±8.71 | | 32.25±15.23 | |
| **Passive Smoking** | Exposed to Passive Smoking | 35.03±9.55 | 0.220[a] | 41.96±7.40 | **0.028[a]** | 37.25±12.89 | 0.207[b] |
| | Not Exposed to Passive Smoking | 38.04±9.20 | | 45.42±9.05 | | 32.90±16.11 | |
| **International Physical Activity Questionnaire (UFAA) – Short Form** | High | 37.73±10.07 | 0.867[c] | 46.56±6.05 | 0.498[c] | 34.93±14.80 | 0.462[d] |
| | Medium | 36.34±9.61 | | 42.87±8.09 | | 36.95±16.69 | |
| | Low | 34.93±10.25 | | 42.13±8.72 | | 37.06±13.57 | |
| **Pitssburg Sleep Quality Index (PSQI)** | >5 | 34.20±7.82 | **0.001[a]** | 43.29±8.94 | 0.082[a] | 38.27±14.06 | **0.001[b]** |
| | <5 | 42.25±10.09 | | 45.70±7.71 | | 27.14±14.35 | |

BMI: Body Mass Index, a: Mann-Whitney U Test, b: Student t Test, c: Kruiskal Wallis Test, d: One Way Anova, p<0.05

**Table 4.** The Relationship Between Individuals' Life Styles and Cognitive Flexibility and Control Levels and Cognitive Failure Levels

| | Cognitive Control on Emotions | | Assessment and Coping Flexibility | | Cognitive Failure | | Physical Activity Levels | | Pitssburg Sleep Quality | |
|---|---|---|---|---|---|---|---|---|---|---|
| | r | p | r | p | r | p | r | p | r | p |
| **BMI** | -0.149 | 0.185 | -0.003 | 0.981 | **0.280*** | 0.011 | -0.067 | 0.463 | -0.010 | 0.335 |
| **Smoking Status** | -0.156 | 0.164 | -0.014 | 0.903 | 0.211 | 0.058 | -0.137 | 0.207 | 0.160 | 0.154 |
| **Passive Smoking** | -0.137 | 0.222 | **-0.245*** | **0.028** | 0.151 | 0.178 | -0.140 | 0.195 | 0.120 | 0.284 |
| **Cognitive Control on Emotions** | | | **0.304**** | **0.006** | **-0.487**** | **0.001** | 0.039 | 0.983 | **-0.344**** | **0.002** |
| **Assessment and Coping Flexibility** | | | | | -0.121 | 0.282 | **0.273*** | **0.022** | -0.111 | 0.323 |
| **Cognitive Failure** | | | | | | | 0.036 | 0.595 | **0.477**** | **0.001** |
| **Physical Activity Levels** | | | | | | | | | -0.088 | 0.572 |

BMI: Body Mass Index, Spearman test, *p<0.05, **p<0.01

## DISCUSSION

The present study aims to investigate how adults' lifestyles affect their cognitive flexibility and control levels and cognitive failure levels. During this study, the most exciting results were that overweight individuals and those having low sleep quality had higher cognitive failure levels, that individuals subjected to passive smoking had a lower assessment and coping flexibility scores, and that individuals with low sleep quality had low cognitive control levels. Moreover, there was a positive relationship between physical activity level and assessment and coping flexibility.

Nowadays, it is known that lifestyle factors such as diet, smoking, and exercise affect health and that morbidity and mortality in chronic diseases could be significantly decreased by lifestyle changes [26]. Cognitive functionality, which is a factor influencing the health perception, might influence an individual's quality of life, even their ability to live independently [27].

The prevalence of weight problems increases throughout the world. There is an increasing number of findings proving that high body mass index is related with frontal lobe dysfunction and cognitive disorders [28]. In a study carried out by Sellaro and Colzato on this subject, similar to the design of this study, university students were categorized into two groups as normal weight individuals and overweight individuals; they concluded that overweight students had a higher level of cognitive failures [28]. In the present study, when questioning if being overweight affected the cognitive functionality, it was determined that overweight individuals had higher cognitive failure levels and that, in parallel with the literature, there was a statistically significant relationship between cognitive failure level and body weight.

Smoking, one of the habits of individuals, has many important effects on health. However, despite all evidence, tobacco consumption continues around the world. In previous studies, it was reported that smoking has a clear relationship with cognitive dysfunctions and dementia [9-11]. Moreover, even though the benefit of quitting smoking at any time has been stated, it is also emphasized that it is important to quit smoking at middle age to reduce the dementia risk since the risk of dementia is related to the time after quitting smoking [9-11]. Another important result developing due to common smoking is passive smoking. In a study carried out by He et al. on elderly people, it was reported that cognitive disorder was at a higher level among individuals, who didn't smoke but tobacco was consumed in their living environment [29]. In another study carried out with adults, it was reported that there were remarkable declines in cognitive functions' processing speed among adults, who had never smoked but been exposed to cigarette smoke, especially in executive functions such as problem-solving, memory, and cognitive flexibility [30]. However, in a systematic analysis examining the relationship between passive smoking and cognitive disorder, it was determined that most of the studies reported that passive smoking had a weak relationship with cognitive disorder and dementia. Considering the results achieved here regarding both smoking and passive smoking, it can be stated that the cognitive control and flexibility levels of smokers were low, that their level of cognitive disorder was at a higher level in comparison to non-smoker individuals, and that the results were not statistically significant. In comparison to similar studies in the literature, this finding is thought to be because of the low number of participants in the present study. Given the results achieved here, it was observed that, in harmony with the literature, there was a difference in the assessment and coping levels of individuals exposed to passive smoking and there was a statistically significant difference between the two parameters.

In the literature, cross-sectional and epidemiologic studies on young and elderly adults presented evidence showing that physical activity improved cognitive functions, memory, attention processes, and executive functions [31]. Many studies showed that physical activity prevented age-related cognitive degradation, reduced dementia risk, and increased quality of life [14,16-18]. It is stated that those rehabilitative structural and functional effects were dependent upon if physical activity stimulated the blood circulation in neural circuits playing role in cognitive functions [31]. In the present study, in which physical activities of individuals were categorized as low-, medium-, and high-level and their cognitive conditions were examined in relation to their physical activity levels, it was observed that individuals' cognitive control and assessment and coping levels increased and cognitive failure levels decreased with increasing physical activity levels but the differences were not statistically significant. Considering the correlation between physical activity level and cognitive condition, it was determined that there was a statistically significant relationship between individuals' physical activity level and their assessment and coping flexibility levels. This difference in cognitive condition related to physical activity levels is consistent with the literature but it is thought that the difference was not statistically significant because the number of participants in the present study was not sufficient.

Sleep, as a regenerative mechanism, affects performance in activities requiring cognition [32]. It is stated that sleep quality affects the functioning of the brain's prefrontal cortex related to cognitive functions such as creativity, integration, and planning, and that resting, like sleep did, helped with refreshing the depleted cognitive resources [32,33]. In a large-scale study carried out on high number of young adults, the relationship between sleeplessness and daily cognitive failures was examined and it was reported that sleeplessness and low sleep quality were related with cognitive failures, especially such as attention deficit and memory [34]. In a study carried out by Stickgold and Walker [35], the authors claimed that sleep quality affected the new learning process, which is related to the brain's ability to record the newly learned task to long-term memory and causes daily cognitive failures. In sum, examining the literature, it can be seen that sleep time and quality might

mediate the relationship between cognitive failures in daily life. Consistent with the literature, the results achieved here suggest that individuals with poor sleep quality had low cognitive control on emotions and high cognitive failure levels.

The limitations of the present study include insufficient data and cross-sectional design of the study.

## CONCLUSION

Health, which is considered as a multidimensional concept, is defined as the "state of wellness", beyond not being patient. In literature, the concept of wellness is generally defined as "a lifestyle, in which it is aimed to improve an individual's functionality in all physical, mental, and psychologic aspects". The most interesting point here is that the concept of wellness was defined as lifestyle. It can be seen that there are many factors influencing individuals' cognitive condition, which is a field in health that is a very comprehensive concept. According to the results of our study, it has been revealed that weight, passive smoking, physical activity level and sleep quality are associated with cognitive functions in adults. And also, it can be clearly observed that, through changes in their lifestyles, individuals could achieve improvement in their cognitive condition in form of wellness. From this aspect, in order to minimize the negative situations, the authors of this study think that more comprehensive studies should be carried out on the factors influencing the cognitive condition and that raising social awareness is very important for holistic wellness. Cognitive problems are frequently observed among elderly people. Determining the lifestyle behaviors affecting the cognitive condition of adults is very important to develop preventive strategies.

**Conflicts of interest:** The Authors declare that there is no conflict of interest.

**Consent to participate:** Consent forms were obtained from all the participants in the study.

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**Author Contributions (Roles)**

**Nilay Şahan:** design, data collection, analysis and interpretation of data, literature research, writing the manuscript
**Ceyhun Türkmen:** data collection, analysis and interpretation of data, literature research, writing the manuscript
**Tuğba Arslan:** data collection, interpretation of data, literature research, writing the manuscript
**Meltem Yazıcı Gülay:** data collection, interpretation of data, literature research, writing the manuscript

**Ethics Approval:** The present study was approved by the Scientific Research and Publication Ethics Committee of Çankırı Karatekin University (decision date 06.28.2022 and code b36755a4f1504b23). This study was performed in line with the principles of the Declaration of Helsinki.

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