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Original Article

The effects of public transportation use on occupational balance, stress, and fatigue in young adults: a cross-sectional study

Os efeitos do uso do transporte público no equilíbrio ocupacional, estresse e fadiga em adultos jovens: um estudo transversal

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Abstract

Objective: This study aimed to examine the effects of time spent and travel experiences during public transportation on fatigue, perceived stress, insomnia severity, and occupational balance among young adults living in Istanbul, Turkish. **Method:** This study was designed as a cross-sectional survey. Data were collected via an online survey between October 1, 2024, and January 31, 2025. The sample consisted of healthy individuals aged 20-30 residing in Istanbul, recruited through snowball and convenience sampling methods. Individuals who had traveled abroad in the past month, had physical limitations, or were diagnosed with major depression or anxiety were excluded. Data were collected using a sociodemographic questionnaire, the Perceived Stress Scale (PSS-14), Chalder Fatigue Scale (CFQ-11), Insomnia Severity Index (ISI), and the Turkish version of the Occupational Balance Questionnaire (OBQ11-T). A total of 150 participants were included in the analysis. **Results:** The majority of participants evaluated public transportation negatively. Environmental factors such as noise and vibration were significantly associated with higher levels of fatigue and insomnia severity. Participants engaging in cognitively or socially interactive activities during commuting demonstrated higher occupational balance scores compared to those who listened to music or podcasts. Additionally, individuals using multiple modes of public transportation reported elevated levels of physical fatigue and perceived stress. **Conclusion:** The findings suggest that the quality of public transportation experiences, rather than the duration alone, plays a critical role in determining physical and psychological well being, as well as occupational balance, among young adults.

Keywords: Transportation; Young Adult; Stress, Psychological; Fatigue; Occupational Therapy.

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Resumo

Objetivo: Este estudo teve como objetivo examinar os efeitos do tempo gasto e das experiências de viagem durante o uso do transporte público sobre a fadiga, o estresse percebido, a gravidade da insônia e o equilíbrio ocupacional entre adultos jovens residentes em Istambul, Turquia. **Método:** Este estudo foi delineado como uma pesquisa transversal. Os dados foram coletados por meio de um questionário online entre 1° de outubro de 2024 e 31 de janeiro de 2025. A amostra consistiu em indivíduos saudáveis com idades entre 20 e 30 anos residentes em Istambul, recrutados por meio dos métodos de amostragem por conveniência e bola de neve. Foram excluídos indivíduos que viajaram para o exterior no último mês, tinham limitações físicas ou foram diagnosticados com depressão maior ou ansiedade. Os dados foram coletados utilizando um questionário sociodemográfico, a Escala de Estresse Percebido (PSS-14), a Escala de Fadiga de Chalder (CFQ-11), o Índice de Gravidade da Insônia (ISI) e a versão turca do Questionário de Equilíbrio Ocupacional (OBQ11-T). Um total de 150 participantes foi incluído na análise. **Resultados:** A maioria dos participantes avaliou o transporte público de forma negativa. Fatores ambientais como ruído e vibração foram significativamente associados a níveis mais elevados de fadiga e gravidade da insônia. Participantes que se engajaram em atividades cognitivas ou socialmente interativas durante o trajeto apresentaram escores mais altos de equilíbrio ocupacional em comparação com aqueles que apenas ouviram música ou podcasts. Além disso, indivíduos que utilizaram múltiplos modos de transporte público relataram níveis elevados de fadiga física e estresse percebido. **Conclusão:** Os resultados sugerem que a qualidade das experiências de transporte público, mais do que apenas a duração do trajeto, desempenha um papel crucial no bem-estar físico e psicológico, bem como no equilíbrio ocupacional entre adultos jovens.

Palavras-chave: Transportes, Adulto Jovem, Estresse Psicológico, Fadiga, Terapia Ocupacional.

Introduction

The number of people using public transport worldwide is increasing and is expected to reach 5.2 billion by 2029 (Statista, 2025). This increase is accompanied by young adults driving less and less and an increase in the use of public transport (Brown et al., 2016). However, the existing infrastructure of cities is insufficient to meet the increasing demand for public transport, and the construction of new infrastructure is not progressing at the desired pace (Canitez et al., 2020). This situation leads to an increasing number of urban mobility problems such as continuous traffic congestion, increased motorized vehicle use, overcrowded public transport, noise and air pollution in Istanbul and similar cities (Canitez et al., 2020).

In metropolises such as Istanbul, most of the time spent daily is spent traveling. Journeys are carried out in different modes such as private car use, walking, cycling and public transport. It has been proven that transport modes have an impact on travel satisfaction (Clark et al., 2020). In this context, studies have shown that the highest satisfaction levels are observed in walking and cycling, followed by car use, and the lowest satisfaction levels are seen especially in public transport passengers who use more than one means of transport (Clark et al., 2020; Mao et al., 2016). Various reasons for the low levels of travel satisfaction among public transport users have been discussed.

In a systematic review conducted by Sogbe et al. (2024), it was reported that the most important factor affecting journey satisfaction was safety and security. Other factors in the review include travel delays and reliability of timing, total time spent in the vehicle, cost, frequency of trips and waiting times, perceived comfort, crowding, comfort of seats, in-vehicle and station temperature, cleanliness of vehicles, accessibility, difficulties during transfers, ease of use, availability and quality level of information tools and equipment, driver behavior and speed of the vehicle (Sogbe et al., 2024). In the systematic review conducted by Norgate et al. (2020), it was emphasized that long-term use of public transport by working people would affect work-life balance.

Journeys on public transport with unfavorable conditions in Istanbul may reduce young adults' travel satisfaction and have negative effects on their physical and mental health. In a study conducted on 1615 healthcare workers; Chen et al. (2024) reported that journeys lasting longer than 50 min increased the risk of burnout and musculoskeletal pain in the neck, shoulder and ankle regions regardless of the type of journey (Chen et al., 2024). Hansson et al. (2011) reported that journeys lasting longer than 60 min increased the perceived stress and fatigue levels of passengers, decreased sleep quality and caused absenteeism in a study conducted with 21,088 people in Sweden (Chen et al., 2024). Ryu et al. (2024) reported that above 120 min of time spent in public transport may cause insomnia.

However, unlike other travel methods, public transport journeys may allow participation in various activities during the journey. Ettema et al. (2012) reported that the most common activities during traveling were relaxation (sleeping, resting, looking outside) and entertainment (reading, playing games, listening to music). Less frequent activities were observed to be work/study, talking with other travelers and using information communication technologies (Ettema et al., 2012).

Occupational balance is defined as individuals having the types of occupation appropriate to their personal needs in their lives, providing optimum balance and diversity among these occupations and being satisfied with this situation (Wagman & Håkansson, 2014). Occupational balance may affect health and well being levels independently of the other factors mentioned (Park et al., 2021; Romero-Ayuso et al., 2024). Therefore, problems related to public transport may have various effects for young adults, an age group that already has difficulty in achieving occupational balance (Yaman & Bilsel, 2025). Excessive time spent on public transport and low satisfaction with the journey may negatively affect the occupational balance by causing stress and fatigue or reducing the time for different activities, or it may have positive effects by enabling individuals to establish social interactions, perform productive activities or spend time on entertainment. Our study primarily aims to fill this research gap by identifying the factors associated with occupational balance among young adults in relation to public transport usage. Secondarily, we aim to examine the relationships between journey experience, time spent in public transport, and outcomes such as insomnia severity, perceived stress levels, and fatigue.

Methods

Design

This study was designed as a cross-sectional study. The ethical approval required for data collection was obtained by the the Istanbul Gelisim University Ethics Committee (Decision No: 2024-14-46, dated September 20, 2024). Participation in the study was completely voluntary, and all participants were informed about the collection and processing of their data and written informed consent was obtained. The study, which was designed to evaluate the effects of the time spent by young adults in public transport on perceived stress, fatigue, insomnia, musculoskeletal pain and occupational balance levels, was conducted completely online. All data collection tools were transferred to Google Forms questionnaire and presented to the participants between 01.10.2024 and 31.01.2025.

Sample size and characteristics

The study used a combination of snowball sampling and convenience sampling methods to facilitate access to participants due to time constraints of the researchers. Members of the public aged 20-30 years, residing in Istanbul were included in the study. Those with physical limitations that may affect measurements and public transport use, those who traveled abroad in the last month, and those with major depression or anxiety were excluded from the study. The number of participants required for the study was calculated using G*Power (Version 3.1.9.4, Franz Paul, Universitat Kiel, Germany) software with a power value of 0.95 and an effect size of 0.3 with a 5% margin of error, and the minimum number of participants required for the study was determined as 134. During the study period, 152 people were reached, inconsistent and incomplete data were removed, and the study was finalized with 150 people.

Participation in the study was entirely voluntary, and no financial or material incentives were offered to participants. While no direct compensation was provided, participants were informed that their contribution would support ongoing research on public transportation and health.

Measures

Sociodemographic form

A self-report sociodemographic form was prepared by the researchers to collect data on the participants' travel experiences and the time spent on the types of journeys. The form consisted of 20 questions including various question formats (linear scale, multiple choice questions). Data were collected from the participants on their age, gender, employment status, which public transport they spend the most time on, how they spend their time on public transport journeys, whether they feel pain in their body due to public transport journeys, how many vehicles of public transport they use per day, how many minutes they spend daily on different types of transport, which public transport vehicles they use, and how they evaluate the quality level of public transport (ventilation, frequency, cleanliness, temperature, noise level, vibrations and shocks, malfunctions, safety and security).

The Perceived Stress Scale (PSS-14)

Perceived Stress Scale (PSS) was developed by Cohen et al. (1983). The scale represents the individual's subjective assessment of the past month (Harris et al., 2023). The scale consists of two subscales (perceived self-efficacy and perceived helplessness) and 14 items in total (Eskin et al., 2013). 7 of the 14 items is positive, and the remaining 7 is negative (Eskin et al., 2013). Each item is scored by participants using a 5-point Likert-type scale, with positive items scored in reverse (Eskin et al., 2013).

The minimum score is 0 and the maximum is 56 with higher scores indicating more perceived stress (Eskin et al., 2013). The Turkish validity and reliability of the scale were assessed by Eskin et al. (2013) and it was found that the scale demonstrated high internal consistency (Cronbach's α = 0.84) and excellent test-retest reliability (ICC = 0.87). The Turkish version of PSS-14 was utilized in our study.

The Chalder Fatigue Scale (CFS-11T)

The Chalder Fatigue Scale (CFS) was developed in 1993 to assess physical and mental fatigue levels in clinical and general populations (Chalder et al., 1993). The scale evaluates fatigue levels over the past month using a self-report method (Chalder et al., 1993). The scale consists of eleven items and two subscales (mental and physical fatigue) (Adin et al., 2022). A 4-point Likert scale, with each item scored in range of "Less than usual (0)" to "Much more than usual (3)," is used (Adin et al., 2022). The minimum score that can be obtained from the scale is 0 and the maximum is 33. Higher total scores on the scale indicate greater levels of fatigue (Adin et al., 2022). A cut-off value of 12 points has been established by studies to differentiate between people who are healthy and those who are fatigued. Adin et al. (2022) tested the validity and reliability of the Turkish adaptation of the scale and demonstrated that it had good test-retest reliability (ICC = 0.76) and strong internal consistency (Cronbach's α = 0.863) (Adin et al., 2022). In our study participants filled the 11-item Chalder Fatigue Scale in its Turkish version.

Insomnia Severity Index (ISI)

The Insomnia Severity Index (ISI) is a scale designed to be used as an outcome measure in insomnia research (Bastien, 2001). The scale assesses the participants' subjective experiences with insomnia over the past month and the impact of insomnia on their daily lives, including the evaluation of both daytime and nighttime components of insomnia (Morin et al., 2011). The scale has a total of 7 dimensions, including the severity of problems with falling asleep, maintaining sleep, waking up early in the morning, dissatisfaction with sleep, the effect of sleep difficulties on daytime functions, the noticeability of sleep problems by others, and the distress caused by sleep difficulties (Morin et al., 2011). The scale is based on self-report but can also be completed by clinicians and others (Boysan et al., 2013). It is increasingly used to evaluate treatment response especially in clinical trials (Morin et al., 2011). The scale consists of a total of 7 items, and each item is scored on a 5-point Likert scale between 0 and 4 (Boysan et al., 2013). The minimum score is 0 and the maximum score is 28, and higher scores are indicative of more severe insomnia symptoms (Boysan et al., 2013). The results are interpreted as no insomnia if the total score is between 0 and 7, subthreshold insomnia if 8-14, moderate insomnia if 15-21 and severe insomnia if 22-28 (Morin et al., 2011). Studies have confirmed that the ISI is a valid, reliable (high internal consistency Cronbach's α = 0.74 - 0.78) and sensitive scale for measuring the severity of insomnia (Morin et al., 2011) Turkish validity and reliability of the scale was performed by Boysan et al. (2013) and it was found to show high internal consistency (Cronbach's α = 0.79) and acceptable test-retest values (ICC = 0.65-0.82) (Boysan et al., 2013). In our study, the Turkish version of the scale was used, and the participants completed the scale on their own behalf.

The Turkish Occupational Balance Questionnaire (OBQ11-T)

The Occupational Balance Questionnaire (OBQ) is a self-report tool first designed by Wagman & Håkansson (2014) to measure individuals' perceptions of their occupational balance. The scale has a subjective and personalized structure and instead of focusing on specific activities and the time allocated to these activities, it focuses on the satisfaction level of individuals with their occupations in their daily life (Wagman & Håkansson, 2014). In other words, the scale evaluates individuals' perceptions of having the right amount and variety of occupations in daily life. The original scale consisted of 13 items scored on a six-step ordinal scale, but later, in another study conducted by the authors, 2 items were found to be multidimensional, so these items were removed, and the scale was revised by reducing it to a total of 11 items (Håkansson et al., 2020; Wagman & Håkansson, 2014). Both the original scale and the revised scale have high internal consistency and adequate test-retest reliability (Håkansson et al., 2020; Wagman & Håkansson, 2014). The 11-item version is scored on a 4-point Likert scale ranging from 'Strongly disagree (0)' to 'Strongly agree (3)' (Günal et al., 2019). The scale is unidimensional and does not contain any subscales (Håkansson et al., 2020). The score of the scale is obtained by summing the score value of each item and the minimum score that can be obtained from the scale is 0 and the maximum score is 33 (Günal et al., 2019). Higher scores reflect a higher occupational balance (Günal et al., 2019). The adaptation, validity and reliability of the scale into Turkish was performed by Günal et al. in 2019 and showed acceptable internal consistency (Cronbach's $\alpha = 0.785$) and high test-retest values (ICC=0.922) (Günal et al., 2019). In our study, the 11-item Turkish version of the scale (OBQ11-T) was used.

Data evaluation and statistical analysis

The data obtained from the study were transferred to a digital environment and initially organized using Microsoft Excel. Statistical analyses were then conducted using the Statistical Package for the Social Sciences (SPSS) version 29.0. Prior to the analyses, the distribution of numerical data was assessed for normality through Skewness and Kurtosis values, as well as visual inspection via Histogram and Q-Q Plot graphs. The results indicated that the data conformed to a normal distribution. Categorical variables were presented as frequencies and percentages, whereas continuous variables were expressed as means and standard deviations. To compare two independent groups, the Independent Samples t-test was employed. Pearson's correlation analysis was conducted to examine relationships between continuous variables. Furthermore, hierarchical regression analysis was performed to explore the predictive effects among variables. In the study, $P < 0.05$ values were considered as statistically significant.

Results

The demographic characteristics of the participants showed that most of them were female ($n = 121$, 80.1%), while a smaller proportion were male ($n = 30$, 19.9%). Additionally, a large part of the participants were students ($n = 71$, 47.0%) and full-time employees ($n = 45$, 29.8%). Among public transportation modes, the longest duration was spent on the bus rapid transit (45.7%), followed by buses (27.8%) and the metro (12.6%). The most common activity during transit was listening to music or podcasts (58.3%), followed by doing nothing (13.9%). A substantial portion of participants (70.2%) reported experiencing musculoskeletal pain associated with public transportation use. The mean age of the participants was 23 years (±4.40), and on average, they used three public transportation vehicles per day, spending approximately 99.54 min (±83.49) in transit. The average daily walking time was 70.62 min, whereas the time spent driving was considerably lower, at 28.75 min (Table 1).

Table 1. Participants' Demographic Characteristics, Public Transportation Usage Habits, Travel Experiences, Satisfaction Evaluations Regarding Public Transportation Services.

		Frequency (n)	Percentage (%)
Gender	Female	121	80.1%
	Male	30	19.9%
Employment Status	Full-time	45	29.8%
	Part-time	6	4.0%
	Part-time Student	14	9.3%
	Student	71	47.0%
	Unemployed	15	9.9%
Most Frequently Used Public Transportation Mode	Bus	42	27.8%
	Metro	19	12.6%
	Bus Rapid Transit (BRT)	69	45.7%
	Does not use	7	4.6%
	Tram	1	0.7%
	Suburban Rail	5	3.3%
	Minibus	8	5.3%
Most Common Activity During Travel	Chatting with Friends	7	4.6%
	Reading a Book	4	2.6%
	Sleeping	10	6.6%
	Watching TV Series or Movies	7	4.6%
	Using Social Media	12	7.9%
	Doing Nothing	21	13.9%
	Listening to Music/Podcasts	88	58.3%
	Studying	1	0.7%
	Playing Mobile Games	1	0.7%
How do you evaluate the ventilation in public transportation?	Very Poor	44	29.1%
	Poor	60	39.7%
	Undecided	40	26.5%
	Good	7	4.6%
	Very Good	0	0%
How do you evaluate the crowding in public transportation?	Very Poor	111	73.5%
	Poor	22	14.6%
	Undecided	7	4.6%
	Good	8	5.3%
	Very Good	3	2.0%
How do you evaluate the cleanliness of public transportation?	Very Poor	31	20.5%
	Poor	44	29.1%
	Undecided	51	33.8%
	Good	22	14.6%
	Very Good	3	2.0%

SD: Standard Deviation.

Table 1. Continued...

		Frequency (n)	Percentage (%)
How do you evaluate the temperature in public transportation?	Very Poor	34	22.5%
	Poor	49	32.5%
	Undecided	51	33.8%
	Good	15	9.9%
	Very Good	2	1.3%
How do you evaluate the noise level in public transportation?	Very Poor	43	28.5%
	Poor	39	25.8%
	Undecided	48	31.8%
	Good	20	13.2%
	Very Good	1	0.7%
How do you evaluate the vibration in public transportation?	Very Poor	49	32.5%
	Poor	38	25.2%
	Undecided	47	31.1%
	Good	16	10.6%
	Very Good	1	0.7%
How do you evaluate the breakdown frequency in public transportation?	Very Poor	34	22.5%
	Poor	31	20.5%
	Undecided	42	27.8%
	Good	36	23.8%
	Very Good	8	5.3%
How do you evaluate the safety level in public transportation?	Very Poor	32	21.2%
	Poor	43	28.5%
	Undecided	54	35.8%
	Good	20	13.2%
	Very Good	2	1.3%
How do you evaluate the frequency of public transportation services?	Very Poor	32	21.2%
	Poor	33	21.9%
	Undecided	57	37.7%
	Good	21	13.9%
	Very Good	8	5.3%
Do you experience any musculoskeletal pain related to public transportation travel?	Yes	106	70.2%
	No	45	29.8%
		Mean ± SD	
Age		23.04 ± 4,40	
Number of Public Transportation Rides per Day		3.22 ± 1.73	
Average Daily Time Spent Walking (min)		70.62 ± 60.06	
Average Daily Time Spent Driving (min)		28.75 ± 66.31	
Average Daily Time Spent in Public Transportation (min)		99.54 ± 83.49	

SD: Standard Deviation.

According to the data, participants generally evaluated public transportation services negatively. Ventilation was largely rated as poor (39.7%) and very poor (29.1%), while crowding in public transportation was rated as "very poor" by 73.5% of respondents. Although the majority were indecisive about cleanliness (33.8%), the combined percentage of those who rated it as "poor" and "very poor" reached 49.6%. Temperature, noise level, and vibration were also generally found to be negative; in particular, vibration was rated as "very poor" by 32.5% of participants. Evaluations regarding breakdowns and safety were also mostly negative, despite high levels of indecisiveness (27.8% and 35.8%, respectively). Although indecisiveness regarding the frequency of service was dominant (37.7%), the proportion of those rating it as "poor" and "very poor" was also considerable (43.1%). In summary, public transportation received significant criticism, particularly in terms of crowding, ventilation, cleanliness, and comfort (Table 1).

According to the data, the participants' average total score on the CFS was 14.87 ± 6.64. The fatigue experienced was primarily physical in nature (10.32 ± 4.93), whereas mental fatigue was relatively lower (4.54 ± 2.45). The mean score on the Perceived Stress Scale was 29.64 ± 7.68, with similar values observed in its subdimensions: perceived distress (15.83 ± 4.85) and perceived inadequacy (13.81 ± 4.38). Furthermore, the mean score for Insomnia Severity was 9.39 ± 5.83. Regarding the Turkish Occupational Balance Scale, the mean score was 15.37 ± 6.30. When skewness and kurtosis values fall within the ±2 range, the assumption of normality is considered to be met (George & Mallery, 2010). An examination of the table indicates that all variables included in the study satisfy the assumption of normality (Table 2).

Table 2. Participants' Fatigue, Perceived Stress, Insomnia, and Occupational Balance.

	Mean	SD	Skewness	Kurtosis
Chalder Fatigue	14.87	6.64	0.491	–0.198
● Physical Fatigue	10.32	4.93	0.479	–0.173
● Mental Fatigue	4.54	2.45	0.462	–0.483
Perceived Stress	29.64	7.68	–0.509	1.688
● Perceived Helplessness	15.83	4.85	–0.227	–0.020
● Perceived Self-Efficacy	13.81	4.38	–0.209	0.766
Insomnia Severity	9.39	5.83	0.780	0.452
Occupational Balance	15.37	6.30	–0.177	–0.657

SD: Standard Deviation.

A comparison was conducted between participants who listened to music/podcasts and those who engaged in other activities during commuting in terms of the mean and standard deviation values across several variables. A statistically significant difference was observed in the Occupational Balance variable (t = 2.495, P = 0.014). For the Insomnia Severity variable, a borderline significance was noted (t = 1.931, P = 0.055). No statistically significant differences were found in the remaining variables, including Chalder Fatigue (total score), Physical Fatigue, Mental Fatigue, Perceived Stress (total score), Perceived Helplessness, and Perceived Self-Efficacy (P > 0.05) (Table 3).

According to the correlation analysis, participants' evaluations of public transportation features were related to their psychological, physical, and behavioral outcomes.

Table 3. Differences in Scale Scores According to Commuting Activity.

	Activity Engaged in During the Commute				t	p
	Listening to Music/Podcasts		Others			
	Mean	Standard Deviation	Mean	Standard Deviation		
Chalder Fatigue	15.26	6.56	14.32	6.76	0.861	0.39
Physical Fatigue	10.68	5.03	9.83	4.79	1.053	0.29
Mental Fatigue	4.58	2.36	4.49	2.59	0.216	0.82
Perceived Stress	29.77	7.83	29.46	7.51	0.246	0.80
Perceived Helplessness	15.92	4.81	15.70	4.94	0.277	0.78
Perceived Self-Efficacy	13.85	4.31	13.76	4.51	0.125	0.90
Insomnia Severity	10.16	6.00	8.32	5.45	1.931	0.05
Occupational Balance	14.31	6.50	16.86	5.73	2.495	**0.01**

Independent Sample t Test, $P < 0.05$.

Ratings ranged from 1 to 5, with higher scores indicating more positive evaluations. A significant and weak negative relationship was observed between the evaluation of public transportation ventilation and CFS (r = –0.209, *P* = 0.010), Physical Fatigue (r = –0.178, *P* = 0.029), and Mental Fatigue (r = –0.210, *P* = 0.010) levels. Furthermore, ventilation was found to be weakly and negatively correlated with ISI (r = –0.190, *P* = 0.020), and weakly and positively correlated with Occupational Balance (r = 0.204, *P* = 0.012). The evaluation of crowdedness in public transportation showed a weak and statistically significant negative relationship only with ISI (r = –0.172, *P* = 0.035). Cleanliness of public transportation exhibited a moderate negative correlation with Insomnia Severity (r = –0.266, *P* = 0.001). Temperature in public transportation was weakly and negatively associated with CFS (r = –0.184, *P* = 0.024), Mental Fatigue (r = –0.185, *P* = 0.023), and ISI (r = –0.166, *P* = 0.041). When the noise level of public transportation was perceived negatively, moderate negative correlations were observed with general fatigue (r = –0.260, *P* = 0.001), physical fatigue (r = –0.273, *P* = 0.001), and Insomnia Severity (r = –0.233, *P* = 0.004), while a weak positive correlation was found with occupational balance (r = 0.224, *P* = 0.006). Vibration and shakiness of public transportation showed a moderate negative relationship with general fatigue (r = –0.259, *P* = 0.001), a moderate-to-strong negative relationship with physical fatigue (r = –0.287, *P* < 0.001), and a moderate negative relationship with Insomnia Severity (r = –0.307, *P* < 0.001). Breakdowns in public transportation were found to be moderately and negatively correlated only with ISI (r = –0.242, *P* = 0.003). Perceived safety in public transportation was found to have moderate negative correlations with CFS (r = –0.253, *P* = 0.002), Physical Fatigue (r = –0.245, *P* = 0.002), and ISI (r = –0.264, *P* = 0.001), and a weak negative correlation with Mental Fatigue (r = –0.194, *P* = 0.017). Conversely, safety perception was weakly and positively correlated with occupational balance (r = 0.171, *P* = 0.035). Service frequency of public transportation did not exhibit any significant relationship (*P* > 0.05).

The variable "How many different public transportation vehicles do you use per day?" demonstrated weak but statistically significant positive correlations with Physical Fatigue (r = 0.201, *P* = 0.014), PSS (r = 0.162, *P* = 0.047), and Perceived Helplessness (r = 0.248, *P* = 0.002). These findings suggest that frequent use of multiple types of public transportation may be associated with increased levels of physical strain and psychological discomfort. Daily time spent walking did not show any statistically significant associations with the examined variables ($P > 0.05$). In contrast, average daily time spent driving was found to be weakly and negatively correlated only with Physical Fatigue ($r = -0.167$, $P = 0.041$), indicating that longer periods of driving may be related to lower levels of physical fatigue, possibly due to reduced physical exertion. Finally, daily time spent using public transportation was weakly to moderately and positively associated with both CFS ($r = 0.236$, $P = 0.003$) and Physical Fatigue ($r = 0.251$, $P = 0.002$), suggesting that prolonged commuting by public transport may contribute to heightened general fatigue and physical exhaustion (Table 4).

Table 4. Relationships Between Public Transportation Factors, Daily Transportation Habits, and Physical, Mental, Perceived Stress, and Occupational Balance.

	Chalder Total	Physical	Mental	Perceived Stress Total	Perceived Helplessness	Perceived Self-Efficacy	Insomnia Severity	Occupational Balance
How do you evaluate the ventilation in public transportation?	**-0.209***	**-0.178***	**-0.210***	–0.105	–0.119	–0.053	**-0.190***	**0.204***
	0.010	**0.029**	**0.010**	0.198	0.147	0.516	**0.020**	**0.012**
How do you evaluate the crowding in public transportation?	–0.116	–0.121	–0.069	–0.116	–0.096	–0.097	**-0.172***	–0.014
	0.158	0.138	0.400	0.155	0.239	0.236	**0.035**	0.863
How do you evaluate the cleanliness of public transportation?	–0.124	–0.136	–0.062	–0.141	–0.158	–0.072	**-0.266****	0.088
	0.129	0.095	0.450	0.084	0.052	0.377	**0.001**	0.285
How do you evaluate the temperature in public transportation?	**-0.184***	**-0.156**	**-0.185***	0.049	–0.056	0.147	**-0.166***	**0.180***
	0.024	**0.056**	**0.023**	0.553	0.495	0.072	**0.041**	**0.021**
How do you evaluate the noise level in public transportation?	**-0.260****	**-0.273****	**-0.156**	–0.112	–0.137	–0.044	**-0.233***	**0.224***
	0.001	**0.001**	**0.056**	0.172	0.092	0.594	**0.004**	**0.006**
How do you evaluate the vibration in public transportation?	**-0.259****	**-0.287****	**-0.123**	–0.017	–0.071	0.049	**-0.307****	0.067
	0.001	**0.000**	**0.132**	0.837	0.389	0.554	**0.000**	0.414
How do you evaluate the breakdown frequency in public transportation?	–0.130	–0.128	–0.095	–0.064	–0.092	–0.010	**-0.242***	0.136
	0.111	0.117	0.244	0.438	0.261	0.906	**0.003**	0.097
How do you evaluate the safety level in public transportation?	**-0.253***	**-0.245***	**-0.194***	–0.116	–0.128	–0.061	**-0.264****	**0.171***
	0.002	**0.002**	**0.017**	0.157	0.117	0.459	**0.001**	**0.035**
How do you evaluate the frequency of public transportation services?	–0.150	–0.127	–0.151	–0.045	–0.080	0.009	–0.125	0.106
	0.066	0.121	0.064	0.582	0.330	0.910	0.125	0.193
Number of Public Transportation Rides per Day	0.156	**0.201***	0.019	**0.162***	**0.248***	0.009	0.114	–0.003
	0.056	**0.014**	0.817	**0.047**	**0.002**	0.914	0.164	0.975
Average Daily Time Spent Walking (min)	–0.036	0.007	–0.112	–0.104	–0.027	–0.153	0.154	–0.085
	0.659	0.935	0.173	0.203	0.742	0.061	0.058	0.299
Average Daily Time Spent Driving (min)	–0.145	**-0.167***	–0.058	–0.118	–0.136	–0.056	–0.066	–0.071
	0.075	**0.041**	0.480	0.149	0.096	0.492	0.421	0.384
Average Daily Time Spent in Public Transportation (min)	**0.236***	**0.251***	0.134	0.076	0.130	–0.012	0.099	–0.150
	0.003	**0.002**	0.100	0.356	0.110	0.887	0.228	0.066

*p<0.05; ** p<0.01. Pearson Correlation Test, $P < 0.05$.

A hierarchical regression analysis was conducted to examine the effects of public transportation factors on CFS. In the first model, only the variable "Noise Level in Public Transportation" was included, and it was found to make a significant contribution to the model (B = −1.649, Beta = −0.260, t = −3.290, P = 0.001). Although the model's explanatory power was low (Adjusted R^2 = 0.061), the overall model was statistically significant (F = 10.825, P < 0.001). In the second model, the variable "Vibration in Public Transportation" was added, and it also contributed significantly (B = −1.160, Beta = −0.181, t = −2.106, P = 0.037). The explanatory power increased in this model (Adjusted R^2 = 0.083), and the model remained significant (F = 7.756, P < 0.001). In the third model, "Perceived Safety in Public Transportation" was included; however, it did not significantly contribute to the model (B = −0.852, Beta = −0.130, t = −1.428, P = 0.155). Although the increase in explanatory power was minimal (Adjusted R^2 = 0.089), the model remained statistically significant overall (F = 5.887, P < 0.001). In the fourth model, "Ventilation in Public Transportation" was added, but again, this variable did not have a significant effect (B = −0.676, Beta = −0.088, t = −1.010, P = 0.314). In the fifth and final model, "Temperature in Public Transportation" was included, which also showed no significant effect (B = 0.022, Beta = 0.003, t = 0.033, P = 0.974). While the final model remained statistically significant (Adjusted R^2 = 0.083, F = 3.711, P = 0.003), only the variables "noise level" and "vibration," included in the first two models, had significant effects on the dependent variable. These results indicate that perceptions of noise and vibration in public transportation stand out as key factors, while other factors did not make meaningful contributions to the model (Table 5).

Table 5. Hierarchical Regression Analysis Results of the Effects of Public Transportation Factors on Chalder Fatigue.

Model		B	Standard Error	Beta	t	p	Adjusted R^2	F	p
1	(Constant)	18.689	1.274		14.668	<0.001	0.061	10.825	<0.001
	How do you evaluate the noise level in public transportation?	−1,649	0,501	-0,260	−3,290	0,001			
2	(Constant)	20.145	1.437		14.021	<0.001	0.083	7.756	<.001
	How do you evaluate the noise level in public transportation?	−1.166	0.546	−0.184	−2.137	0.034			
	How do you evaluate the vibration in public transportation?	−1.160	0.551	−0.181	−2.106	0.037			
3	(Constant)	21.096	1.579		13.360	<0.001	0.089	5.887	<0.001
	How do you evaluate the noise level in public transportation?	−0.945	0.566	−0.149	−1.671	0.097			
	How do you evaluate the vibration in public transportation?	−0.879	0.583	−0.138	−1.508	0.134			
	How do you evaluate the safety level in public transportation?	−0.852	0.596	−0.130	−1.428	0.155			
4	(Constant)	21.786	1.720		12.665	<0.001	0.089	4.671	<0.001
	How do you evaluate the noise level in public transportation?	−0.907	0.567	−0.143	−1.601	0.112			
	How do you evaluate the vibration in public transportation?	−0.724	0.603	−0.113	−1.201	0.232			
	How do you evaluate the safety level in public transportation?	−0.739	0.607	−0.113	−1.219	0.225			
	How do you evaluate the ventilation in public transportation?	−0.676	0.669	−0.088	−1.010	0.314			
5	(Constant)	21.774	1.761		12.363	<.001	0.083	3.711	0.003
	How do you evaluate the noise level in public transportation?	−0.912	0.585	−0.144	−1.560	0.121			
	How do you evaluate the vibration in public transportation?	−0.726	0.607	−0.114	−1.196	0.234			
	How do you evaluate the safety level in public transportation?	−0.741	0.612	−0.113	−1.211	0.228			
	How do you evaluate the ventilation in public transportation?	−0.687	0.741	−0.089	−0.927	0.356			
	How do you evaluate the temperature in public transportation?	0.022	0.666	0.003	0.033	0.974			

Constant: Chalder.

Discussions

In this study, the associations between travel time and public transportation experiences and fatigue, stress, insomnia severity, and occupational balance were examined. The findings demonstrated that negative travel experiences particularly noise, excessive vibration, and overcrowding significantly were associated with high fatigue levels. Furthermore, the type of activities performed during travel was related to occupational balance and insomnia severity. These results highlight that public transportation is not merely a physical means of mobility but represents an essential environmental context linked to psychosocial well being and occupational engagement.

Significant differences in occupational balance were observed based on the activities participants engaged in during public transportation journeys. Participants who preferred listening to music or podcasts demonstrated lower levels of occupational balance compared to those who engaged in other activities. Socially interactive or cognitively engaging occupations (e.g., chatting with friends, reading a book, studying) may contribute to a more meaningful use of time that aligns with personal values. However, caution is warranted when interpreting this finding, as the majority of participants in our study reported listening to music during commuting. Due to smaller sample sizes in other activity categories, comparisons were conducted using grouped data. This imbalance limited both the sample size and homogeneity across activity types, thereby constraining the generalizability of the findings. On the other hand, the relatively higher levels of insomnia severity observed among participants who listened to music may suggest that the choice of sensory stimuli during commuting may be related to level of alertness, which in turn could be linked to the balance between wakefulness and sleep throughout the day. In line with this, another study reported that mental and physical load caused by environmental factors during long-distance driving negatively impacted sleep quality (Ryu et al., 2024). Therefore, the nature and personal meaning of activities performed during public transportation should not be viewed merely as time-filling behaviors but rather as significant correlates of an individual's occupational balance.

Clark et al. (2020) examined the relationship between travel time, transportation mode, and subjective well being, identifying significant associations particularly in the areas of job satisfaction, leisure time use, and mental health (Clark et al., 2020). Our findings similarly suggest that both the quality of the travel experience and the complexity of transportation modes may serve as key determinants of physical and psychological symptoms. This supports a perspective that conceptualizes commuting not merely as an obligatory task but as a health-related environmental experience. Consistent with Clark et al.'s observations regarding stress-inducing travel conditions, our study also found significant associations between environmental aspects of public transportation and levels of fatigue and insomnia severity. In particular, vibration and shaking demonstrated the strongest association with insomnia severity, as well as a moderate association with physical fatigue. Similarly, high noise levels and lower perceptions of cleanliness were linked to increased fatigue and insomnia severity. These findings suggest that exposure to adverse environmental stimuli during commuting may not only reduce travel satisfaction but may also act as a persistent source of stress.

Our study showed that even among individuals using the same mode of transportation, there is considerable variability in travel experiences and satisfaction levels.

Inadequate ventilation within public transportation environments showed a weak yet statistically significant association with insomnia severity and was negatively correlated with both mental and physical fatigue levels. Considering that the BRT was the most frequently used mode of transportation among participants, the malfunctioning of air conditioning systems and limited airflow through windows combined with overcrowding may contribute to fatigue by creating a stuffy and uncomfortable environment. Additionally, our findings indicated that higher perceived safety was consistently associated with more favorable outcomes across several domains. Moderate negative correlations were observed between perceived safety and insomnia, general fatigue, and physical fatigue, highlighting the importance of feeling secure during commuting. Moreover, improved safety and ventilation conditions showed weak associations with occupational balance, suggesting that comfortable and secure commuting environments may facilitate greater participation in daily life activities.

Our findings differ from those reported by Chen et al. (2024). This study found that longer commuting durations contributed to burnout among healthcare professionals, with musculoskeletal pain experienced during commuting mediating this relationship (Chen et al., 2024). In our study, the majority of participants also reported experiencing musculoskeletal pain following their commute; however, no significant associations were observed between the reported pain and other variables examined. This discrepancy may be attributable to differences in the working fields of the study samples, such as healthcare workers who typically operate under higher levels of occupational stress compared to the general population.

In our study, environmental stressors such as temperature, vibration, and frequency of service disruptions were found to be negatively associated with both mental and physical fatigue, independent of commuting duration. In particular, a moderate correlation between service disruptions and insomnia severity suggests that unpredictability or anxiety about delays may increase the psychological burden during travel. When these findings are interpreted in the context of the BRT system, which was the most frequently used mode of transportation among our participants, they may reflect issues such as inadequate regulation of temperature due to malfunctioning air conditioning, pronounced vibration on concrete roads and in older vehicles, and severe overcrowding following service interruptions that require passengers to switch vehicles. However, further research is needed to better understand these associations.

In addition to environmental factors, the complexity of commuting routines also emerged as a noteworthy issue. Participants who used multiple modes of public transportation on a daily basis reported higher levels of perceived stress, physical fatigue, and perceived helplessness. These relationships indicate that frequent transfers or connectivity gaps may elevate the mental health burden associated with commuting. In Istanbul, where passengers often rely on multiple transfers to reach their destinations, contributing factors may include time lost during transfers, long walking distances due to poor connections, crowding at transfer hubs, and difficulties in finding available seating on subsequent vehicles. The total time spent in public transportation was also found to be associated with both general and physical fatigue. This may be explained by factors such as limited mobility during travel, prolonged standing, maintaining uncomfortable postures due to overcrowding, and continuous exposure to overstimulating environments. Conversely, use of private vehicles was weakly associated with lower physical fatigue. Despite Istanbul's heavy traffic congestion, high vehicle acquisition and maintenance costs, and overall stressful and lengthy commutes, private vehicle use may offer commuters a greater sense of control, reduced physical exertion, and flexibility in determining routes and schedules. Additional factors may include limited access to public transportation in certain areas, the ability to select travel times and destinations more freely, the convenience of transporting personal belongings, and a generally more comfortable travel experience. In contrast, daily walking duration showed no significant association with stress or fatigue levels. Although some studies have highlighted the health benefits of active commuting, walking duration did not significantly influence reported health outcomes in our sample. This may be attributed to irregular pedestrian routes, the heavy motor vehicle traffic typical of Istanbul, limited pedestrianized streets, and the generally long distances between destinations, all of which may make walking a less enjoyable experience for many individuals.

In conclusion, our findings suggest that commuting by public transportation represents a multifaceted public health issue. Not only the duration of travel and mode of transportation, but also the environmental and experiential characteristics of the commute appear to serve as significant health determinants. Interventions aimed at improving the commuting experience may have the potential to reduce stress-related health risks, particularly for individuals with limited flexibility in their transportation choices or scheduling.

This study offers a comprehensive evaluation of how both travel duration and environmental features of public transportation influence fatigue, stress, insomnia, and occupational balance in young adults. The inclusion of occupational balance, an often-overlooked outcome in transportation studies, adds novelty. Additionally, the use of multiple validated assessment tools strengthens the methodological quality and ensures multidimensional data collection.

Strengths and limitations

The data collection in this study was entirely based on participants' self-reports. Self-reported measures may be subject to various cognitive biases such as response bias, recall bias, and social desirability bias, which may limit the objectivity of the findings. However, self-report tools also provide an important strength by allowing the direct capture of participants' subjective perceptions and lived experiences, which are particularly relevant for understanding perceived stress, fatigue, and occupational balance. Additionally, there was a notable imbalance in the distribution of activities performed during commuting. The predominance of participants who listened to music or podcasts reduced the statistical power for comparisons with other activities, limiting the generalizability of these specific findings. Furthermore, environmental factors assessed in the study (e.g., noise, vibration, temperature, crowding) were based solely on participants' subjective perceptions, making it difficult to capture the true magnitude of environmental stressors. Future studies incorporating objective measurements (e.g., decibel meters, temperature sensors, vibration monitors) would strengthen the validity and interpretability of such findings.

Conclusion

This study demonstrated that public transportation is not merely a mode of travel but a complex life context that influences individuals' physical, psychological, and occupational balance. The findings revealed that adverse environmental factors such as noise, vibration, inadequate ventilation, and low perceived safety are significantly associated with increased fatigue, greater insomnia severity, and reduced occupational balance among young adults.

Moreover, the type of activities performed during commuting also appears to affect occupational balance, with more cognitively and socially engaging activities being linked to higher levels of occupational balance. These results highlight the need to approach public transportation environments from a health and quality of life perspective. Interventions aimed at reducing environmental stressors and improving travel conditions may have positive implications for health and well being.

References

Adin, R. M., Ceren, A. N., Salcı, Y., Fil Balkan, A., Armutlu, K., & Ayhan Kuru, Ç. (2022). Dimensionality, psychometric properties, and population-based norms of the Turkish version of the Chalder Fatigue Scale among adults. *Health and Quality of Life Outcomes*, *20*, 161. https://doi.org/10.1186/s12955-022-02074-x.

Bastien, C. (2001). Validation of the Insomnia Severity Index as an outcome measure for insomnia research. *Sleep Medicine*, *2*(4), 297-307. https://doi.org/10.1016/S1389-9457(00)00065-4.

Boysan, M., Güleç, M., Beşiroğlu, L., & Kalafat, T. (2013). Psychometric properties of the Insomnia Severity Index in a Turkish sample. *Anadolu Psikiyatri Dergisi*, *11*, 248-252.

Brown, A., Blumenberg, E., Taylor, B., Ralph, K., & Voulgaris, C. (2016). A taste for transit? Analyzing public transit use trends among youth. *Journal of Public Transportation*, *19*(1), 49-67. https://doi.org/10.5038/2375-0901.19.1.4.

Canitez, F., Alpkokin, P., & Kiremitci, S. T. (2020). Sustainable urban mobility in Istanbul: challenges and prospects. *Case Studies on Transport Policy*, *8*(4), 1148-1157. https://doi.org/10.1016/j.cstp.2020.07.005.

Chalder, T., Berelowitz, G., Pawlikowska, T., Watts, L., Wessely, S., Wright, D., & Wallace, E. P. (1993). Development of a fatigue scale. *Journal of Psychosomatic Research*, *37*(2), 147-153. https://doi.org/10.1016/0022-3999(93)90081-P.

Chen, Y.-H., Lin, J. J., Yang, C., Tang, H.-M., Jong, G.-P., & Yang, T.-Y. (2024). The effect of commuting time on burnout: the mediation effect of musculoskeletal pain. *BMC Health Services Research*, *24*(468), 1-13. https://doi.org/10.1186/s12913-024-10908-1.

Clark, B., Chatterjee, K., Martin, A., & Davis, A. (2020). How commuting affects subjective wellbeing. *Transportation*, *47*(6), 2777-2805. https://doi.org/10.1007/s11116-019-09983-9.

Cohen, S., Kamarck, T., & Mermelstein, R. (1983). A global measure of perceived stress. *Journal of Health and Social Behavior*, *24*(4), 385-396. https://doi.org/10.2307/2136404.

Eskin, M., Harlak, H., Demirkıran, F., & Dereboy, Ç. (2013). Algılanan stres ölçeğinin Türkçeye uyarlanması: güvenirlik ve geçerlik analizi [Adaptation of the Perceived Stress Scale into Turkish: reliability and validity analysis]. *Yeni Symposium Journal*, *51*(3), 132-140.

Ettema, D., Friman, M., Gärling, T., Olsson, L. E., & Fujii, S. (2012). How in-vehicle activities affect work commuters' satisfaction with public transport. *Journal of Transport Geography*, *24*, 215-222. https://doi.org/10.1016/j.jtrangeo.2012.02.007.

George, D., & Mallery, P. (2010). *SPSS for Windows step by step: a simple guide and reference* (10th ed.). Boston: Pearson.

Günal, A., Pekçetin, S., Demirtürk, F., Şenol, H., Håkansson, C., & Wagman, P. (2019). Validity and reliability of the Turkish Occupational Balance Questionnaire (OBQ11-T). *Scandinavian Journal of Occupational Therapy*, *27*(7), 493-499. https://doi.org/10.1080/11038128.2019.1673479.

Håkansson, C., Wagman, P., & Hagell, P. (2020). Construct validity of a revised version of the Occupational Balance Questionnaire. *Scandinavian Journal of Occupational Therapy*, *27*(6), 441-449. https://doi.org/10.1080/11038128.2019.1660801.

Hansson, E., Mattisson, K., Björk, J., Östergren, P.-O., & Jakobsson, K. (2011). Relationship between commuting and health outcomes in a cross-sectional population survey in southern Sweden. *BMC Public Health*, *11*(834), 1-14. https://doi.org/10.1186/1471-2458-11-834.

Harris, K. M., Gaffey, A. E., Schwartz, J. E., Krantz, D. S., & Burg, M. M. (2023). The perceived stress scale as a measure of stress: decomposing score variance in longitudinal behavioral medicine studies. *Annals of Behavioral Medicine: a Publication of the Society of Behavioral Medicine*, *57*(10), 846-854. https://doi.org/10.1093/abm/kaad015.

Mao, Z., Ettema, D., & Dijst, M. (2016). Commuting trip satisfaction in Beijing: exploring the influence of multimodal behavior and modal flexibility. *Transportation Research Part A, Policy and Practice*, *94*, 592-603. https://doi.org/10.1016/j.tra.2016.10.017.

Morin, C. M., Belleville, G., Bélanger, L., & Ivers, H. (2011). The Insomnia Severity Index: psychometric indicators to detect insomnia cases and evaluate treatment response. *Sleep*, *34*(5), 601-608. https://doi.org/10.1093/sleep/34.5.601.

Norgate, S. H., Cooper-Ryan, A. M., Lavin, S., Stonier, C., & Cooper, C. L. (2020). The impact of public transport on the health of work commuters: a systematic review. *Health Psychology Review*, *14*(2), 325-344. https://doi.org/10.1080/17437199.2019.1618723.

Park, S., Lee, H. J., Jeon, B.-J., Yoo, E.-Y., Kim, J.-B., & Park, J.-H. (2021). Effects of occupational balance on subjective health, quality of life, and health-related variables in community-dwelling older adults: a structural equation modeling approach. *PLoS One*, *16*(2), 1-15. https://doi.org/10.1371/journal.pone.0246887.

Romero-Ayuso, D., Jara-Urzúa, A., Acevedo, M. L., & Triviño-Juárez, J. M. (2024). Occupational balance in the Chilean healthy population and its relationship with self-efficacy and quality of life. *British Journal of Occupational Therapy*, *32*, e3642. https://doi.org/10.1590/2526-8910.ctoao27983642.

Ryu, H., Ju, S., Lee, H. E., & Cho, S. S. (2024). Commuting time, working time, and their link to insomnia symptoms among Korean employees: a cross-sectional study. *Sleep Health*, *10*(4), 434-440. https://doi.org/10.1016/j.sleh.2024.05.004.

Sogbe, E., Susilawati, S., & Pin, T. C. (2024). Scaling up public transport usage: a systematic literature review of service quality, satisfaction and attitude towards bus transport systems in developing countries. *Public Transport*, *17*(1), 1-44. https://doi.org/10.1007/s12469-024-00367-6.

STATISTA. (2025). *Worldwide number of public transport users from 2017 to 2023 with a forecast through 2029.* Retrieved in 2025, February 3, from https://www.statista.com/statistics/1413707/global-public-transport-users-forecast/

Wagman, P., & Håkansson, C. (2014). Introducing the Occupational Balance Questionnaire (OBQ). *Scandinavian Journal of Occupational Therapy*, *21*(3), 227-231. https://doi.org/10.3109/11038128.2014.900571.

Yaman, H., & Bilsel, B. A. (2025). The relationship between young adults' time use, occupational diversity, and occupational balance. *Work: a Journal of Prevention, Assessment, and Rehabilitation*, *80*(4), 1625-1633. https://doi.org/10.1177/10519815241292425.

Author's Contributions
Gökay Çakiroğlu was responsible for problem identification and conceptualization, actively participated in the discussion of results, writing and revising the article. Hülya Yaman Dağdelen performed the analysis, actively participated in the discussion of results, writing and revising the article. All authors approved the final version of the text.

Data Availability
The data that support the findings of this study are available from the corresponding author, upon reasonable request.

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