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The Relationship Between the Physical Activity Level and Fear of Falling Among Community-Dwelling Individuals Aged 60 Years and Older

Toplumda Yaşayan 60 Yaş ve Üzeri Bireylerde Fiziksel Aktivite Düzeyi ile Düşme Korkusu Arasındaki İlişki

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ABSTRACT Objective: Physiological changes associated with aging lead to an increased risk of falling, loss of independence in daily activities, and fear of falling. This study aimed to examine the relationship between physical activity level and fear of falling (FOF) in working community-dwelling elderly aged 60 years and older. **Material and Methods:** The study included 42 academicians (mean age=67.38±4.726 years) aged 60-79. The physical activity levels of the participants were assessed using the Physical Activity Scale for the Elderly (PASE). The Tinetti Falls Activity Scale, Activities-Specific Balance Confidence Scale, and Visual Analog Scale (VAS) were used to assess the fear of falling. **Results:** The findings obtained from our study showed that there was no statistically significant relationship between the total score and subscores of the PASE and the total scores of the Tinetti Falls Efficacy Scale, Activities-Specific Balance Confidence Scale, and VAS (p>0.05). The participants' mean PASE score was 112.88±54.5. **Conclusion:** The findings obtained from our study show that there is no significant relationship between physical activity level and FOF in working elderly individuals living in the community. Future studies to be conducted in older adults with different physical activity levels may contribute to a more comprehensive understanding of the determinants of fear of falling. With the aging of the global population, determining the factors affecting the FOF is of great importance in terms of developing strategies to increase the quality of life of older adults and preserve their independence.

Keywords: Falling; physical activity; elderly

ÖZET Amaç: Yaşlanmayla ilişkili fizyolojik değişiklikler, düşme riskinin artmasına, günlük aktivitelerde bağımsızlık kaybı ve düşme korkusu gibi sonuçlara yol açmaktadır. Bu çalışma, toplumda yaşayan, çalışmakta olan 60 yaş ve üzeri bireylerde fiziksel aktivite düzeyi ile düşme korkusu arasındaki ilişkiyi incelemeyi amaçlamaktadır. **Gereç ve Yöntemler:** Çalışmaya, öğretim elemanı olarak görev yapan 60-79 yaş aralığındaki 42 birey (ortalama yaş=67,38±4,726 yıl) dâhil edilmiştir. Katılımcıların fiziksel aktivite düzeyleri Yaşlılar için Fiziksel Aktivite Ölçeği kullanılarak değerlendirilmiştir. Düşme korkusunun değerlendirilmesinde Tinetti Düşme Etkinlik Ölçeği, Aktiviteye Özgü Denge Güveni Ölçeği ve Görsel Analog Skala [Visual Analog Scale (VAS)] kullanılmıştır. **Bulgular:** Çalışmamızdan elde edilen bulgular, Yaşlılar için Fiziksel Aktivite Ölçeği toplam puanı ve alt boyutlarının puanları ile Tinetti Düşme Etkinlik Ölçeği, Aktiviteye Özgü Denge Güveni Ölçeği ve VAS toplam puanları arasında istatistiksel olarak anlamlı bir ilişki olmadığını göstermiştir (p>0,05). Katılımcıların Yaşlılar için Fiziksel Aktivite Ölçeği skor ortalaması 112,88±54,5'tir. **Sonuç:** Çalışmamızdan elde edilen bulgular, toplumda yaşayan çalışan yaşlı bireylerde fiziksel aktivite düzeyi ve düşme korkusu arasında anlamlı bir ilişki olmadığını göstermektedir. Farklı fiziksel aktivite düzeyine sahip yaşlı yetişkinlerde ileride yapılacak çalışmalar, düşme korkusunun belirleyicilerinin daha kapsamlı bir şekilde anlaşılmasına katkı sağlayabilir. Küresel nüfusun yaşlanmasıyla birlikte, düşme korkusunu etkileyen faktörlerin belirlenmesi, yaşlı yetişkinlerin yaşam kalitesini artırmaya ve bağımsızlıklarını korumaya yönelik stratejilerin geliştirilmesi açısından büyük önem taşımaktadır.

Anahtar Kelimeler: Düşme; fiziksel aktivite; yaşlı

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The pace of population aging is accelerating more rapidly than in previous decades.[1] Although life expectancy is rising worldwide, aging is often accompanied by physiological changes that increase the risk of disability and functional deterioration in older adults.[2-4] Age-related physiological changes lead to a decrease in physical activity levels and simultaneously contribute to an increase in fall risk factors.[5-7]

Falls are among the leading causes of mortality and morbidity in older adults.[7,8] Each year, a considerable number of older adults experience falls, which can lead to outcomes such as fractures or other injuries, reduced independence in daily activities, depression, diminished self-confidence, and fear of falling (FOF).[2,7] FOF can be defined as a decline in an individual's confidence in their own balance during the performance of various tasks to prevent falling, and it is frequently reported by older adults, regardless of whether they have a history of falling.[9,10] The decline in postural control associated with aging, along with accompanying vestibular disorders, contributes to both an increased risk of falling and a heightened.[11-13]

FOF, which limits the willingness to move, is considered a serious problem that prevents participation in communities.[14] Therefore, investigating factors that may be associated with FOF, such as physical activity level, is important for developing appropriate intervention methods. Otolaryngologists, other referring physicians, and audiologists play a critical role in identifying fall risk factors and developing vestibular rehabilitation programs aimed at reducing both the risk and FOF.[15,16]

The literature presents inconsistent findings regarding the relationship between FOF and physical activity. While some studies suggested a weak negative correlation, a cross-sectional study conducted by Aoyagi et al. showed that FOF did not significantly predict self-reported levels of physical activity.[17-19] This study aimed to examine the relationship between physical activity levels and FOF in community-dwelling and employed adults aged 60 years and older.

MATERIAL AND METHODS

This study was approved by the Baskent University Institutional Review Board and Ethics Committee (date: December 12, 2018; no: KA18/397) and supported by the Baskent University Research Fund. The research was conducted in line with the ethical principles of the Declaration of Helsinki.

PARTICIPANTS

The study included 42 older individuals aged between 60 and 79 years (mean = 67.38 years, SD = 4.726) who were employed as academic staff at Baskent University. Informed consent was obtained from each participant through the "Informed Voluntary Consent Form". Inclusion criteria required participants to voluntarily participate in the study, be aged 60 years or older, and possess the cognitive capacity and cooperation necessary to complete the questionnaires. Conversely, individuals with a history of medication use that could increase fall risk (such as antipsychotics, antidepressants, antiparkinsonian agents, or hypnotic sedatives) and/or negatively affect vestibular and balance function were excluded. Additionally, individuals with any visual, vestibular, neurological, psychiatric, orthopedic, or cognitive impairments, those using walking aids, and those with a previous history of falling were also excluded from the study.

DATA COLLECTION TOOLS

To assess the physical activity levels of participants who met the inclusion criteria, the "Physical Activity Scale for the Elderly (PASE)" was used. To evaluate FOF, the "Tinetti Falls Efficacy Scale (FES)," the "Visual Analog Scale (VAS)", and the "Activities-specific Balance Confidence Scale (ABC)" were administered. The questionnaires were applied individually to each participant through face-to-face interviews conducted by the responsible researchers. The relationship between physical activity levels and FOF in community-dwelling older adults was examined using different scales designed to assess FOF.

Physical Activity Scale for the Elderly

To assess the physical activity levels of the participants, the PASE, whose Turkish validity and reliability were established by Ayvat et al., was used. The Cronbach's alpha coefficient of the scale was found to be 0.71. The PASE is a questionnaire consisting of 10 main questions and 15 sub-items. It evaluates the

frequency, intensity, and duration of various activities performed during the previous week. The scores for each activity were calculated by multiplying the frequency by the duration, and the total physical activity score was obtained by summing these values. Higher total scores reflect greater levels of physical activity.[20]

Tinetti Falls Efficacy Scale

FES is a 10-item scale that evaluates the impact of FOF on an individual's sense of confidence during daily activities. The items included getting in and out of bed, sitting down and standing up from a chair, bathing or showering, dressing and undressing, reaching into a cabinet, walking around the neighborhood, answering the door or telephone, preparing meals without lifting heavy objects, and doing light shopping. The scale includes questions such as "How confident do you feel while bathing or showering?" and "How confident do you feel while performing light housework?" For each item, individuals select a score between 1 (least confident) and 10 (most confident), resulting in a total score ranging from 10 (high FOF) to 100 (low FOF). Erdem and Emel conducted the Turkish adaptation, reporting a Cronbach's alpha of 0.89.[21]

Visual Analog Scale

The VAS was used to determine the severity of the participants' FOF in daily life. On this scale, individuals were asked to mark a point along a 10-cm line that best represented their FOF, with "0: not afraid of falling at all" and "10: extremely afraid of falling" as anchors. As the numerical value marked by the participant increases, the level of FOF also increases.

Activities-specific Balance Confidence Scale

Ayhan et al. conducted a Turkish validity and reliability study of the ABC, which was used to assess FOF. In their study, Ayhan et al. reported a Cronbach's alpha coefficient of 0.96. This scale evaluates how confident participants feel during daily activities through questions such as "How confident do you feel while walking inside the house?" and "How confident do you feel while going up and down stairs?" The questionnaire consists of 16 items, and participants mark their confidence level for each activity on a scale from 0% (no confidence at all) to 100% (complete confidence), resulting in a total score. A higher score indicates greater balance confidence and lower FOF.[22]

STATISTICAL ANALYSIS

In our study, the sample size was determined using the G*Power 3.1 (Heinrich Heine University Düsseldorf, Germany). Based on a previous study, the required sample size was calculated to be 38, using an effect size of 0.44, an alpha level of 0.05, and a power of 0.80 (1-β).[19]

Statistical analyses were performed using IBM SPSS Statistics 20.0 (IBM Corp., Armonk, NY, USA). Normality was assessed with the Shapiro-Wilk test and variance homogeneity with Levene's test. Descriptive data are presented as mean±SD or median (minimum-maximum), along with frequencies and percentages. Spearman correlation was used due to non-normal distributions, with $p<0.05$ indicating significance.

RESULTS

Descriptive statistics for the participants are presented in Table 1 and Table 2. The participants' total PASE score, the subscale scores of PASE-namely leisure activities and household activities-as well as FES, ABC, and VAS scores are presented in Table 3. The work-related activity subscale score of PASE was recorded as 21 for all participants, as all were academic staff employed at the same university.

No statistically significant relationship was found between the participants' total PASE score and the FES, ABC, and VAS scores ($p>0.05$). Similarly, no statistically significant relationship was observed between the PASE subscale scores-leisure activities and household activities-and the FES, ABC, and VAS scores ($p>0.05$) (Table 4).

DISCUSSION

This study examined the relationship between physical activity level and FOF in community-dwelling and employed individuals aged 60 years and older. The findings indicated no statistically significant relationship between the self-reported physical activity level and FOF among community-dwelling, working individuals aged 60 and above.

TABLE 1: Descriptive statistics of the participants

		n	%
Gender	Female	15	35.7
	Male	27	64.3
Marital status	Married	38	90.5
	Single	4	9.5
Chronic diseases	Hypertension	11	26.2
	Diabetes	4	9.5
	Autoimmune disease	1	2.4
	Endocrine disorder	1	2.4
	Hypertension+Diabetes	7	16.7
	Hypertension+Endocrine disorder	2	4.8
	None	16	38.1
Number of chronic diseases	0	16	38.1
	1	17	40.5
	2	9	21.4
Medication use	0	10	23.8
	1	16	38.1
	2	9	21.4
	3	5	11.9
	4	2	4.8
Smoking status	Yes	5	11.9
	No	37	88.1
Alcohol consumption	Regular use	4	9.5
	Social use	24	57.1
	None	14	33.3

TABLE 2: Descriptive statistics for continuous variables

Variable	Minimum	Maximum	$\bar{X}$	SD
Height (cm)	150	192	169.62	9.22
Weight (kg)	55	115	76.50	14.18

SD: Standard Deviation

TABLE 3: Descriptive statistics of participants' total score on the PASE, PASE leisure activities and household activities scores, FES, ABC, and VAS scores

	$\bar{X}$±SD	Minimum-maximum
PASE total score	112.88±54.5	29.6-249.2
PASE leisure activities	45.4±40.3	2.20-147.2
PASE household activities	48.21±33.3	0-136
PASE work activities	21±0	21-21
FES score	93.17±8.2	70-100
ABC score	1391.9±188.4	850-1600
VAS score	2.43±2.8	0-9

PASE: Physical Activity Scale for the Elderly; FES: Falls Efficacy Scale; ABC: Activity-Specific Balance Confidence Scale; VAS: Visual Analog Scale; SD: Standard Deviation

TABLE 4: The relationship between participants' PASE total score, PASE leisure and household activity scores, and FES, ABC, and VAS scores

	FES score		ABC score		VAS score	
	r value	p value	r value	p value	r value	p value
PASE total score	0.083	0.603	0.224	0.153	-0.010	0.948
PASE leisure activities	0.081	0.610	0.187	0.235	0.054	0.733
PASE household activities	0.105	0.509	0.156	0.323	-0.068	0.670

PASE: Physical Activity Scale for the Elderly; FES: Falls Efficacy Scale; ABC: Activity-Specific Balance Confidence Scale; VAS: Visual Analog Scale; r: Pearson correlation coefficient

Previous research has shown inconsistent findings on the association between FOF and physical activity in older adults.[19,23,24] Tinetti et al. found that greater confidence in avoiding falls was linked to higher physical activity.[19,23] Deshpande et al. noted that older adults with FOF had lower physical activity levels, which could limit their ability to conduct daily living activities.[24] However, Aoyagi et al. found no link between FOF and self-reported physical activity in older adults, supporting this findings.[19]

The level/intensity of physical activity can be assessed using either self-reported measures or objective assessments. Objective measurements allow for the reliable real-time evaluation of physical activity level and intensity, whereas self-reported physical activity questionnaires assess individuals' perceptions of their own activity levels.[18,25] Accelerometer-based studies, pedometer studies based on daily step counts, and studies using combined sensor technologies provide objective measurements of physical activity level and intensity.[26-29] In the present study, similar to the study by Aoyagi et al., physical activity level was assessed using the PASE based on participants' self-reports.[19] A possible explanation for these findings is the measurement tool used to assess the physical activity level. Future studies that combine both self-reported and objective assessments may produce more reliable and comprehensive results.

Scheffer et al. suggested that FOF may reduce physical activity and emphasized that this relationship is particularly pronounced among older adults with sedentary lifestyles.[10] In the Turkish population, several studies have examined the physical activity levels and variables potentially associated with these

levels, such as FOF.[30,31] In a study by Güneş, the mean total PASE score was reported as 84.5±47.9 among community-dwelling older adults, compared to 61.2±38.4 among those residing in nursing homes.[31] In another study, Duray and Genç reported a median PASE score of 88.68 among their participants.[30]

In the present study, the participants' mean total PASE score (112.88±54.5) was found to be considerably higher compared to the scores reported in similar studies in the literature. One possible explanation for this finding is that the participants in the current study were community-dwelling, actively employed, and possessed higher levels of education, all of which are factors previously associated with increased physical activity. For instance, Chad et al. reported that not living in a nursing home and having a higher level of education were associated with greater physical activity levels. Moreover, variability in physical activity levels among different study populations may also account for the observed differences. Prior studies on FOF and physical activity have mainly involved nursing home residents and community-dwelling older adults, which may limit comparability. Another factor to consider is marital status. Chad et al. found that older adults who were married or living with a partner had significantly higher levels of physical activity than those who were single, widowed, or divorced.[32] These findings suggest that marriage may positively influence physical activity through mechanisms such as social support, increased motivation, and more frequent engagement in daily activities. In our study, 38 participants (90.5%) were married individuals, which may also have contributed to their elevated physical activity levels.

Previous studies have emphasized that FOF is not only associated with physical activity levels but also with past fall experiences as well as psychosocial and environmental factors.[10,23] In this study, the participants shared similar socioeconomic and occupational backgrounds and had no history of falling. A review of the literature reveals that various scales have been employed to assess FOF in older adults.[19,33-35] In this study, various scales were used to assess FOF during both indoor and outdoor activities, as well as the individual's perceived degree of fear. The FES primarily evaluates FOF during routine household activities such as getting in and out of bed, bathing, or showering, and reaching into cupboards; however, it includes only a limited number of items related to FOF during outdoor activities. The ABC scale assesses balance confidence and FOF not only during indoor activities but also during outdoor activities such as walking around the house, climbing stairs, getting in and out of a vehicle, walking uphill, walking in crowds, and walking on icy sidewalks. Due to their occupations, the participants in this study were frequently present in various outdoor environments such as workplaces, streets, and social settings. The items in the ABC scale provide a more comprehensive assessment of FOF in these outdoor contexts. By employing multiple scales, this study aimed to evaluate FOF during both indoor and outdoor activities. Future research is recommended to adopt a holistic approach to assessing FOF in community-dwelling individuals during both indoor and outdoor activities and to develop appropriate interventions accordingly.

A limitation of this study is that the participants physical parameters, medication use, and chronic health conditions were excluded from the analyses. Additionally, the fact that all participants in the study had high levels of physical activity represents another limitation. Future studies are recommended to investigate the FOF among individuals with varying levels of physical activity.

CONCLUSION

This study demonstrates that there is no significant association between self-reported physical activity levels and FOF among community-dwelling, employed individuals aged 60 years and older. As the global population continues to age, identifying the factors that influence FOF is of critical importance for developing strategies aimed at improving the quality of life and maintaining the independence of older adults. Further research is needed to explore physical activity levels and other potential factors influencing FOF, in order to inform the planning of effective interventions to reduce FOF among older individuals.

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Conflict of Interest

No conflicts of interest between the authors and / or family members of the scientific and medical committee members or members of the potential conflicts of interest, counseling, expertise, working conditions, share holding and similar situations in any firm.

Authorship Contributions

***Idea/Concept:** Anı Parabakan Polat; **Design:** Anı Parabakan Polat; **Control/Supervision:** Evren Hızal, Anı Parabakan Polat; **Data Collection and/or Processing:** Büşra Çakmak; **Analysis and/or Interpretation:** Anı Parabakan Polat, Rumeysa Nur Akbaş; **Literature Review:** Anı Parabakan Polat, Büşra Çakmak; **Writing the Article:** Anı Parabakan Polat, Büşra Çakmak, Rumeysa Nur Akbaş; **Critical Review:** Evren Hızal, Anı Parabakan Polat, Büşra Çakmak, Rumeysa Nur Akbaş; **References and Fundings:** Anı Parabakan Polat, Büşra Çakmak, Rumeysa Nur Akbaş; **Materials:** Anı Parabakan Polat, Büşra Çakmak, Rumeysa Nur Akbaş.*

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