Spor Bilimleri Araştırmaları Dergisi
Journal of Sport Sciences Research
Vol: 8, Issue: 3, October 2023
E-ISSN: 2548-0723
URL: http://www.dergipark.org.tr/jssr

The Investigation of the Effect of 8-Week Walking Football Activity on Life Satisfaction and Heart Rate Variability in Elderly Men

Ülküm ERDOĞAN YÜCE[1*], Özcan SAYGIN[2]
[1]Muğla Sıtkı Koçman University, Health Sciences Institute, Muğla.
[2]Muğla Sıtkı Koçman University, Sports Science Faculty, Muğla.

Research Article **DOI: 10.25307/jssr.127193**
Received: 27.03.2023 Accepted: 27.08.2023 Online Published: 31.10.2023

Abstract

The aim of the study was to examine the effect of walking football applied to elderly male sedentary individuals on life satisfaction and heart rate variability. 22 male volunteers whose physical activity level was determined by International Physical Activity Questionnaire (IPAQ) were included to this study. Volunteers were divided into 11 exercise groups and 11 control groups by random sampling. While the control group had no activity participation, the exercise group performed a 20-minute warm-up, they played 60 minutes of walking football, and they performed a 10-minute cool down. This was done 2 days a week across an 8-week period. In the study, the Life Satisfaction Scale (LSS) was used in the exercise and control groups, Heart Rate (HR), Heart Rate Variability (HRV), heart-mind coherence, maximum heart-mind coherence measurements were applied with the Heartmath-Inner Balance device. “Paired t test” was used for analyzing pretest-posttest differences in variables while "Independent t test" was used for analyzing differences between the groups. Findings show that there was a significant difference between the exercise group’s HRV, heart-mind coherence, maximum heart-mind coherence, and pre-post test measurements of the LSS results ($p<0.05$), although there was no significant difference in the HR variable ($p>0.05$). No significant difference was found between the pre-test and post-tests mean comparison of all variables of the control group ($p>0.05$). According to the results, it can be concluded that walking football has a positive effect on life satisfaction, HRV, heart-mind coherence, and maximum heart-mind coherence in older adults.
Keywords: Senior adult, Heart rate variability, Life satisfaction, Walking football

İleri Yaş Erkeklerde 8 Haftalık Yürüyüş Futbolu Etkinliğinin Yaşam Doyumu ve Kalp Atım Hızı Değişkenliği Üzerine Etkisinin İncelenmesi

Öz

Bu çalışmanın amacı, ileri yaş erkek sedanter bireylere uygulanan yürüyüş futbolunun, yaşam doyumu ve kalp atım hızı değişkenliğine etkisini incelemektir. Çalışmaya Uluslararası Fiziksel Aktivite Düzeyi Anketi (UFAA) uygulanarak, fiziksel inaktivitesi tespit edilen gönüllü 22 erkek katılmıştır. Tesadüfi örneklem yolu ile seçilmiş inaktif olduğu tespit edilen gönüllülerin, 11’i kontrol, 11’i deney grubu olacak şekilde ayrılmıştır. Deney grubuna 8 hafta boyunca, haftada 2 gün 20 dk., ısınma, 60 dakika yürüyüş futbolu ve 10 dakika soğuma olacak şeklinde 90 dakika uygulanan etkinlik, kontrol grubuna uygulanmamıştır. Araştırmaya deney ve kontrol grubuna Yaşam Doyumu Ölçeği (YDÖ) uygulatılarak başlanmıştır. Heartmath-İnner Balance cihazı ile Kalp Atım Hızı (KAH), Kalp Atım Hızı Değişkenliği (KAHD), kalp-zihin uyum, maksimum kalp-zihin uyum ölçümleri gerçekleştirilmiştir. Çalışmanın analizinde çalışma öncesi ve sonrası farkın olup olmadığı grup içi “Paired t testi”; gruplar arası farkın olup olmadığı ise “Independent t testi” kullanılarak belirlenmiştir. Analiz bulgularına göre, deney grubunun KAHD, kalp-zihin uyum, maksimum kalp-zihin uyum, YDÖ sonuçları ön-son test ölçümleri arasında anlamlı bir farklılık görülürken ($p<0,05$), KAH değişkeninde, anlamlı bir farklılık olmadığı görülmüştür ($p>0,05$). Kontrol grubu tüm değişkenlerinin ön-son test karşılaştırmasında ise anlamlı bir farka rastlanmamıştır ($p>0,05$). Sonuç olarak, yürüyüş futbolunun, ileri yaş yetişkinlerde yaşam doyumu, KAHD, kalp-zihin uyum, maksimum kalp-zihin uyuma olumlu etki ettiği söylenebilir.
Anahtar Kelimeler: İleri yaş yetişkin, Kalp atım hızı değişkenliği, Yaşam doyumu, Yürüyüş futbolu

[*] **Corresponding Author:** Ülküm ERDOĞAN YÜCE, **E-mail:** ulkumyuce34@gmail.com

INTRODUCTION

It is a fact that life expectancy increases with the advancement of technology and the innovations of science in the field of health. As life expectancy increases, it becomes important for individuals to lead a more comfortable life and to continue their daily lives in a healthy and active manner. Advancing age not only causes physical disabilities but also can cause non-communicable diseases in the organism (World Health Organization, 2012). At the same time, many metabolic changes occur with the aging process (Zorba & Saygın, 2009). Environmental factors and individual differences also play an important role in this period (World Health Organization, 2012). The increase in the elderly population, especially in our country, creates a need for research on this age group.

WHO (World Health Organization) defines the age scale as middle age between the ages of 45-64, old age between the ages of 65-74, very old age between the ages of 75-89, while the age of 90 and over is considered as advanced old age. Physical activity is important and necessary for increasing functionality, prolonging life expectancy and maintaining a comfortable and peaceful life at these ages (Loadman, 2019). In addition, there are studies on the effect of exercise on balance and fear of falling to increase quality of life (İrez, 2014). It is thought that walking football, which includes physical activity that older adults can tolerate and whose foundations were laid in England, started to be implemented rapidly in Europe and Australia, is also beneficial in terms of group movement, well-being and socialization (Loadman, 2019). Walking football is an emerging modified sport gaining recognition globally (Corepal et al., 2020). Walking football is a type of football which was first introduced in the UK in 1932 for players aged 65+. It was aimed at both providing greater exercise and social communication opportunities. Nowadays, it is rapidly gaining worldwide popularity, particularly in Europe and Australia (Strijcker & Calder, 2017).

It is an activity that can be performed by people who, regardless of gender, have more physical difficulties due to advanced age. It can be played on an indoor or outdoor field and it has a smaller size than a football field. In walking football, participants are only allowed to walk throughout the match and one foot is always in contact with the ground. In order to avoid injuries during this sport, no physical contact or interference is allowed between the players and the ball must not be above head height. The intensity of this sport depends on the duration of each match session and the age of the volunteers (Zainudin et al., 2021).

According to the "Rating of Perceived Exertion scale" (RPE), which is determined by the intensity of the exercise applied in walking soccer, which is determined according to the degree of strain of the body, it is an aerobic exercise that will speed up the breathing of each participant without impairing their speech and make them sweat after 10 minutes.

Adults over 55 are less likely to participate in exercise, despite research suggesting that older adults gain health benefits when participating in physical activity. There have only been a few studies done that focus on the long-term maintenance of activity participation in older adults, particularly in “adapted sports” such as walking football. It is predicted that individuals with chronic diseases and disabilities can also benefit from this sport and get rid of inactivity (Reddy et al., 2017). The literature shows that exercise and physical activity have a positive

effect on increasing the living standards of the individual physically, physiologically and psychologically (Özdil & Aktaş, 2016).

Our study examined the effect of walking football applied to elderly sedentary male individuals in our country on life satisfaction and heart rate variability. This study will contribute to the literature considering that there is no activity that has been applied before in our country, the number of scientific studies in this field, and the increase in the physical activity levels of older adults, and the support it will provide in psychological terms as well as physical benefits.

METHOD

Research Model

The study was applied to the exercise group as 20 minute warm-ups, 60 minutes walking football and 10-minute cool down exercises, two days a week across an 8-week period. Participants were made physically ready by having warm-up exercises before the study. Two teams of five athletes all played during ten minute periods with 5 minute rests. In the study, the exercise intensity was decided according to the "Rating of Perceived Exertion Scale" (RPE). In the walking football event, within the rules, care has been taken to ensure that the ball does not exceed the height of the athlete's heads, one of their feet is always in contact with the ground, they are not close to each other so they do not interfere with each other, and they are only allowed to walk. While paying attention to following the rules, it was also important for the older adults to enjoy playing the game. At the end of the activity, stretching exercises were done and it was completed with breathing exercises. While the experimental group was exercising, no activity was performed by the control group.

Research Groups

The 22 individuals who were determined to be inactive and took the Physical Activity Level Questionnaire (IPAQ) participated in the study voluntarily. The volunteers selected by random sampling were divided into two groups, 11 in the control group and 11 in the experimental group. The necessary information was given to the participants and their permission was obtained.

Ethical Approval

Muğla Sıtkı Koçman University Medical and Health Sciences Ethics Committee-2 (Sports-Health), Decision number: 2022/110.

Data Collection Tools

International Physical Activity Questionnaire (Short form-IPAQ) is a measurement tool used to determine the physical activity levels and inactivity status of adults. The international validity and reliability study of the questionnaire was carried out by Craig et al., (2003). Öztürk et al., (2005) performed the Turkish validity and reliability study as a criterion in IPAQ-S, it is important to do physical activities for at least 10 minutes at a time. In this

survey, duration of vigorous physical activity, duration of moderate physical activity, duration of walking and sitting during one day across the last 7 days were questioned. According to this Questionnaire, the total weekly physical activity level (MET/hour/week) is classified as low ($x \leq 600$ MET-minutes/week), medium and high ($x \geq 600$-3000 MET-minutes/week (Craig et al., 2003).

Life Satisfaction Scale (LSS): This scale was developed by Neugarten et al., in 1961 in order to understand the perspective of elderly individuals in various aspects of life and how they perceive themselves and their environment (Neugarten et al., 1961). It is easy to use, it consists of 20 short, practical and single-point scale questions. The answers received by using the "yes" or "no" options in the statements were evaluated over 20 points. A high score was interpreted as a high life satisfaction. While each item reflects a score of "1" in the life satisfaction scale, some of the statements (3, 5, 7, 10, 14, 17, 18, 20) should be answered with "no". The adaptation of the scale in Turkey, internal reliability, content and construct validity studies were carried out by Karataş (1988). The reliability coefficient of the scale was determined as .93 (Özer & Özsoy-Karabulut, 2003).

Inner Balance (Heart Mathematics and Mind Coherence device): The "Inner Balance" Heart Mathematics and Mind Coherence device used in the research was used for heart rate (HR), heart rate variability (HRV), heart-mind and maximum heart-mind coherence measurements. This device, which gives feedback to the person about their body systems, is important in terms of teaching the individual how to change these systems later (Moss & Andrasik, 2008). This technology was invented to increase emotional well-being. It offers the opportunity to control heart rate variability for psychological adjustment.

It conveys information about the coherence and situation between the mind, emotions and body with scientific data. This device is used for measuring how our emotional state affects the nervous system and heart rhythm. It is known that this device, which is used on athletes in the field of sports and has an effect on increasing performance, is also recommended by psychologists in terms of being fit in the stress and intensity of daily life (HeartMath Institude, n.d.).

Collection of Data

In order to obtain the physical activity levels of individuals before starting the study, IPAQ-short form was used, after determining physical activity levels, a total of 22 participants were selected randomly from inactive participants. They divided into experimental (11) and control groups (11). As a pre-post test, HR, HRV, heart-mind coherence and maximum heart-mind coherence measurements, the Life Satisfaction Scale (LSS) and the "Inner Balance" Heart Mathematics and Mind Matching device measurements were taken and recorded.

Analysis of Data

SPSS (version 20) program was used in the analysis of the data. The Shapiro-Wilk test was applied to determine whether the data showed a normal distribution. Independent t-test analysis was used for intergroup comparison and paired t-tests were used for pre-post-test comparisons. $p<0.05$ was accepted as statistically significant.

RESULTS

The mean age, LSS, HR, heart-mind coherence, maximum heart-mind coherence pre-test and post-test results of the exercise and control groups are presented in the tables below.

Table 1. Demographic information of the participants

Age	N	M ± SD
Experimental Group	11	68.18 ± 8.40
Control Group	11	67,64 ± 5,14

According to Table 1, the mean age of the exercise group is 68.18 ± 8.40, and the control group is 67.64 ± 5.14.

Table 2. Normal distribution analysis (Shapiro-wilk test) results of experimental and control groups

Variables	Groups	Statistics	N	p
HR (min)	Experimental	0,915	11	,278
	Control	0,972	11	,908
Heart-Mind Coherence (ms)	Experimental	0,919	11	,314
	Control	0,951	11	,651
Max. Heart-Mind Coherence(ms)	Experimental	0,891	11	,143
	Control	0,928	11	,395
LSS	Experimental	0,938	11	,502
	Control	0,930	11	,409

According to Table 2, it is seen that the variables show normal distribution of Shapiro-Wilk test results of the experiment and control groups.

Table 3. Experiment and control groups pre-test independent t-test results

Variables	Experimental Group		Control Group		
	M ±SD	N	M ± SD	t	p
HR (min)	70,27±9,44	11	71,72±6,82	-,414	,683
Heart-Mind Coherence (ms)	1,30±0,70	11	1,03±0,38	2,96	,275
Max. Heart-Mind Coherence (ms)	3,88±1,21	11	3,26±0,88	1,36	0,18
LSS	14,50±1,44	11	14,36 ±2,20	,686	,500

***p<0.05, **p<0.01**

In Table 3, it was found that there is no significant difference between the pre-test independent t-test results of the participants in the experiment and control groups, HR, heart-mind coherence, maximum heart-mind coherence, and LSS pre-test measurements (p>0.05).

Table 4. Experimental group pre-post test paired t-test results

Variables	Pre-test (M±SD)	N	Post-test (M±SD)	t	p
HR (min)	70,27±9,44	11	69,90±9,14	,098	,924
Heart-Mind Coherence (ms)	1,30±0,70	11	2,20±0,815	-3,57	,005**
Max. Heart-Mind Coherence(ms)	3,88±1,21	11	5,03±1,90	-4,26	,002**
LSS	14,90±1,44	11	18,90 ±1,04	-9,38	,000**

***p<0.05, **p<0.01**

In Table 4, a significant difference was found between the pre-test and post-test results of heart-mind coherence, maximum heart-mind coherence, life satisfaction scale means scores of the participants in the experimental group (p<0.01). No significant difference was found between the HR pre and post-test mean scores of the exercise group (p>0.05).

Table 5. Pre-post test paired t-test results of control group

Variables	Pre-test (M±SD)	N	Post-test (M±SD)	t	p
HR (min)	71,72±6,82	11	72,18±7,83	,-219	,831
Heart-Mind Coherence (ms)	1,03±0,38	11	1,260±0,67	-1,11	,290
Max. Heart-Mind Coherence (ms)	3,26±0,88	11	3,32 ±1,03	,-294	,775
LSS	14,36±2,20	11	15,27±1,55	-1,24	,242

According to the paired t-test results in Table 5, it is seen that there is no significant difference between the pre-test and post-test mean scores of the participants in the experimental and control groups in terms of HR, heart-mind coherence, maximum heart-mind coherence, life satisfaction scale (p>0.05).

Figure 1. Figure view of the control group pre-post test HRV, Heart-Mind Coherence (Avg. Coherence), Maximum Heart-Mind Coherence (Coherence Over Time) measurements

It was observed that there was no significant change in the pre-post test HRV measurement results of the control group participants presented in Figure 1. In the pre-test, hearth-mind coherence changed from 0.8 ms to 1.1 ms, and maximum hearth-mind coherence changed from 2.1 ms to 2.7 ms, and it was seen that these results were not statistically significant. In addition, it was seen that there was no difference between the pre-post test in the HRV graphical view, and the ups and downs continued in the post test as inconsistent and sharp lines.

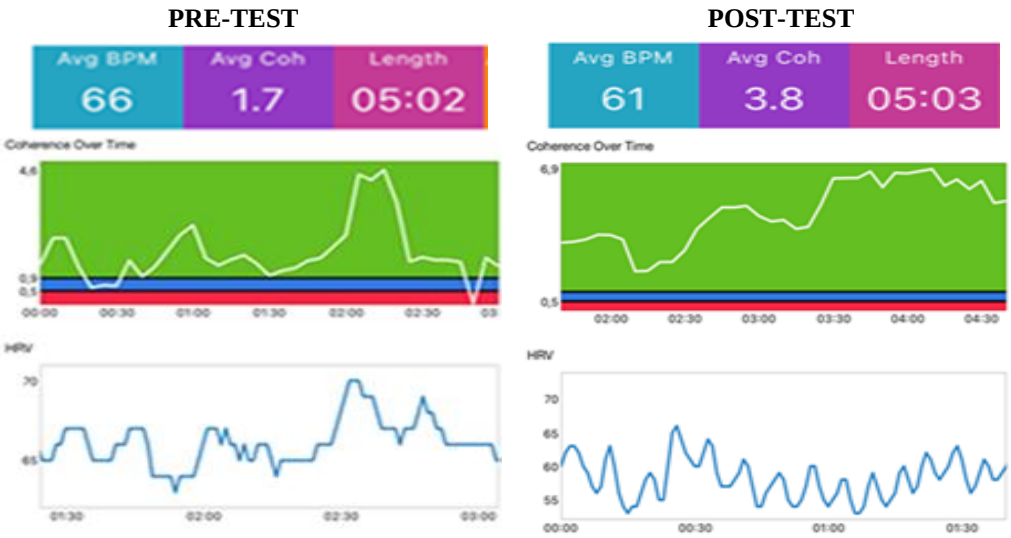

Figure 2. Figure view of the experimental group pre-post test HRV, Heart-Mind Coherence (Avg.Coherence), Maximum Heart-Mind Coherence (Coherence Over Time) measurements

A statistically significant change was found as a result of the pre-post test HRV measurement of the participants in the experimental group presented in Figure 2. In the pre-test measurement, hearth-mind coherence changed from 1.7 ms to 3.8 ms, maximum hearth-mind coherence changed from 4.5 ms to 6.9 ms, and it was concluded that these results were statistically significant. In addition, a significant change was observed between the pre-post-test in the HRV graphical view, and it was observed that there were soft and harmonious ups and downs, unlike the pre-test.

DISCUSSION and CONCLUSION

It is very important for older adults to be able to continue exercising, despite losing their mental and physical strength as a natural result of aging. Especially today, with the prolongation of life expectancy, having a healthy body and mind has become valuable. It is thought that walking football played by older adults for the first time, has positive effects on life satisfaction and physiological measurements that give feedback about the autonomic nervous system.

According to the results of the study, no significant difference was found between the experimental and control groups in HR, pre-post test results ($p>0.05$). While the HR value in the experimental group was 71.72 min/s in the pre-test, the post-test measurement differed as 69.90 min/sec. A significant difference was observed between the pre-post test of the experimental group in terms of heart-mind coherence and maximum heart-mind coherence ($p<0.01$). These results indicate consistency in the increase in the heart-mind coherence with the walking football practice of the experimental group participants. No significant difference was found between the control group and the pre-post test. As a matter of fact, while the mean heart-mind coherence score of the control group was 1.03 ms in the pre-test and 1.26 ms in the post-test, the value of the experimental group, which was 1.30 ms before the study, increased to 2.20 ms after the walking football study protocol. Likewise, the pre-test result,

which was 3.88 in the experimental group for the maximum heart-mind coherence measurement, increased to 5.03 ms after in the post-test. The value that was 3.26 ms in the control group resulted in 3.32 ms in the post-test. Unlike the pre-test measurement of the HRV shown in the graph, a more balanced and consistent situation is observed in the post-test measurement of the experiment group participants. A sharp and inconsistent graphic image is observed in the HRV post-test measurement of the control group participants, and there is no change between the pre-post-test. As a result of the Life Satisfaction Scale (LSS) applied to the participants, the pre-test value of the experimental group participants was 14.90 points and the post-test value was 18.90 points, showing a statistically significant difference ($p<0.01$). While this situation was expressed as 14.36 points in the pre-test and 15.27 points in the post-test in the control group, there was no statistically significant difference ($p>0.05$). This result suggests that the study protocol increased the life satisfaction of the experimental group participants.

The fact that elderly individuals frequently remember the negative moments they experienced in the past and feel anxious and regretful prevents them from enjoying the present time, and this reduces their level of life satisfaction (Lehr, 1994). Akandere (2003) determined that there was a significant increase in life satisfaction for the elderly living in nursing homes after physical activity was performed. In addition, in a study they conducted on nursing home residents, Zorba et al., (2004) concluded that the elderly who engage in regular physical activity have positive improvements in physical fitness and some physiological values. For this reason, it is necessary to increase the exercise programs that the elderly can participate in to both enjoy and get rid of inactivity, so that they will be more comfortable in daily life and their quality of life will improve. Kankaya and Karadakovan (2017) stated that if elderly individuals can easily do daily activities such as walking, climbing stairs and moving from one place to another it increases their life satisfaction and well-being. Saygin (2015), who applied a six-month walking exercise program to elderly individuals three times a week, concluded that long-term walking exercises increased the physical functions of elderly individuals.

In the study conducted by Aydıner-Boylu and Günay (2017), in which the effect of daily living activities on the life satisfaction and quality of life of elderly individuals is the subject, life satisfaction was found to be high in the elderly who can do their daily work independently. This means that individuals can continue their lives happily as long as they do not experience any physical restrictions. The elderly should be supported to carry out their daily work and to live without any physical loss with the physical activities recommended to them. Many studies in this area have concluded that the relationship between physical activity and life satisfaction is high, in a positive sense, in parallel with our study. Cho and Cheon (2023) stated in their study that participating in exercise or physical activity has a positive effect on the life satisfaction levels of older adults.

Elderly individuals are more prone to experiencing loneliness and social isolation (Akdemir, 2003) because a person who has worked hard for many years in his business life sees himself in an unplanned, unscheduled and void after retirement. This naturally affects the joy of life negatively. Walking football can be an important opportunity for this age group in terms of

sharing together, increasing the motivation to participate in sports, and some participants doing the sport they have done in the past.

Having the opportunity to play for a longer period of time by complying with certain rules with this activity will reinforce team friendship and create a more social elderly profile. In addition, it is thought that coming together through this study will make them feel better both physically and psychologically. In their study, Reddy et al., (2017) concluded that walking soccer can be a low-impact but original, enjoyable and moderately demanding form of exercise that can be sustainable for older adults, providing the active participation of older players. In addition, McEwan et al., (2019) stated that it is a cost-effective, feasible physical activity for men aged 50 and over, as a result of their study with overweight, inactive, and hypertensive elderly people in which they practiced walking football for 8 weeks. Barbosa et al., (2021) who practice walking soccer in middle-aged and elderly men with Type 2 diabetes stated that this study may have the potential to be effective in improving glycemic control and cardiovascular risk factor. In their study emphasizing the health benefits of walking football, Arnold et al., (2015) found a decrease in whole body mass, increase in lean body mass and decrease in body mass index after the 12-week program.

In the walking football study protocol, which we limited to male individuals only for 8 weeks, two days a week, we determined a significant difference in HRV, heart-mind coherence and achieving high life satisfaction results with maximum heart-mind coherence shows that walking football is beneficial for older adults. White et al., (2021) stated in their study that walking football does not limit them in any way, in terms of skill or knowledge deficiencies in elderly individuals who do not have any football experience. This seems to be important in terms of making it easier for older adults to adapt to a new activity. It is thought that our study is important in terms of introducing and disseminating walking football, which is frequently practiced in Europe, in our country, and being an option that will contribute to the movement of male and female older adults.

As a result, it is seen that walking football has a positive effect on life satisfaction, HRV, heart-mind coherence, maximum heart-mind coherence in older adults. It is thought that the findings obtained from the study will contribute significantly to the research in terms of increasing the physical activity programs to be applied to older adults. This research was carried out within certain limitations. For future studies, it may be recommended to organize more comprehensive studies using different measuring devices and scales, as well as arranging elderly female or male-female participants.

Conflicts of Interest: The authors of the article had no personal or financial conflicts of interest within the scope of the study.

Authors' Contribution: Research Design- ÜEY, ÖS Data Collection- ÜEY Statistical analysis- ÜEY Article preparation- ÜEY, ÖS

Ethical Approval

Ethics Committee: Muğla Sıtkı Koçman University Medical and Health Sciences Ethics Committee 2 Sports-Health Decision
Date: 05.09.2022
Protocol number: 110

REFERENCES

Akandere, M. (2003). Huzurevinde kalan yaşlılarda fiziksel aktivitelerin yaşam doyum düzeylerine etkisi. *Selçuk Üniversitesi Sosyal Bilimler Enstitüsü Dergisi*, (18), 1-9.

Akdemir, N. (2003). *Yaşlılık ve sorunları iç hastalıkları ve hemşirelik bakımı* (1. Baskı). Akademisyen.

Aydıner-Boylu, A., & Günay, G. (2017). Life satisfaction and quality of life among the elderly: Moderating effect of activities of daily living. *Turkish Journal of Geriatrics*, *20*(1), 61-69.

Arnold, J. T., Bruce-low, S., & Sammut, L. (2015). The impact of 12 weeks walking football on health and fitness in males over 50 years of age. *BMJ Open Sport & Exercise Medicine*, *1*(1), Article e000048. https://doi.org/10.1136/bmjsem-2015-000048

Barbosa, A., Brito, J., Figueiredo, P., Seabra, A., & Mendes, R. (2021). Effectiveness of a walking football program for middle-aged and older men with type 2 diabetes: Protocol for a randomized controlled trial. *JMIR Research Protocols*, *10*(11), Article e28554. https://doi.org/10.2196/28554

Cho, D., & Cheon, W. (2023). Older adults' advance aging and life satisfaction levels: Effects of lifestyles and health capabilities. *Behavioral Sciences*, *13*(4), 293. http://dx.doi.org/10.3390/bs13040293

Corepal, R., Zhang, J. Y., Grover, S., Hubball, H., & Ashe, M. C. (2020). Walking soccer: A systematic review of a modified sport. *Scandinavian Journal of Medicine & Science in Sports*, *30* (12), 2282–2290. https://doi.org/10.1111/sms.13772

Craig, C. L., Marshall, A. L., Sjostrom, M., Bauman, AE., Booth, ML., Ainsworth, BE., Pratt, M., Ekelund, U., Yngve, A., Sallis, JF., & Oja, P. (2003). International physical activity questionnaire: 12-country reliability and validity. *Medicine and Science in Sports and Exercise*, *35*(8), 1381-95. https://doi.org/10.1249/01.MSS.0000078924.61453.FB

HeartMath Institude (n.d.). *İnner Balance coherence*. Scientific foundation of the HeartMath System. Date of access: March 15, 2023. https://www.heartmath.org/store/products/inner-balance

İrez, G. B. (2014). The effects of different exercises on balance, fear and risk of falling among adults aged 65 and over. *Anthropologist, 18*(1), 129-134. https://doi.org/10.31901/24566802.2014/18.01.12

Kankaya, H., & Karadakovan, A. (2017). Yaşlı bireylerde günlük yaşam aktivite düzeylerinin yaşam kalitesi ve yaşam doyumuna etkisi. *Gümüşhane Üniversitesi Sağlık Bilimleri Dergisi*, *6*(4), 21-29.

Karataş, S.C. (1988). *Yaşlılarda yaşam doyumunu etkileyen etmenler*. Yüksek Lisans Tezi, Hacettepe Üniversitesi, Sosyal Bilimler Enstitüsü, Ankara.

Lehr, U. (1994). *Yaşlanmanın psikolojisi*. (N. Eryar, Trans.). Bilimsel ve Teknik.

Loadman, A. (2019). "He's running, ref!" An ethnographic study of walking football. *Soccer & Society*, *20* (4), 675–692. https://doi.org/10.1080/14660970.2017.1396451

Moss, D., & Andrasik, F. (2008). Evidence-based practice in biofeedback and neurofeedback. In Yucha C.B. Montgomery D. (Eds). *Biofeedback and neurofeedback*. Association for Applied Psychophysiology and Biofeedback.

McEwan, G., Buchan, D., Cowan, D., Arthur, R., Sanderson, M., & Macrae, E. (2019). Recruiting older men to walking football: A pilot feasibility study. *National Library of Medicine*, *15*(3), 206-214. https://doi.org/10.1016/j.explore.2018.12.001

Neugarten, B.L., Havighurst, R.J., & Tobin, S.S. (1961). The measurement of life satisfaction. *Journal of Gerontology*, (16), 134-143. https://doi.org/10.1093/geronj/16.2.134

Özdil, G., & Aktaş, S. (2016). Fiziksel aktivite ve Dünya Sağlık Örgütünün bakış açısı. *Turkish Journal of Sport and Exercise 18*(2), 113-116.

Özer, M., & Özsoy- Karabulut, Ö. (2003). Yaşlılarda yaşam doyumu. *Geriatri, 6* (2), 72-74.

Öztürk, M. (2005). *Üniversitede eğitim-öğretim gören öğrencilerde Uluslararası Fiziksel Aktivite Anketinin geçerliliği ve güvenirliği ve fiziksel aktivite düzeylerinin belirlenmesi.* Yayımlanmamış Yüksek Lisans tezi, Hacettepe Üniversitesi Sağlık Bilimleri Enstitüsü, Fizik Tedavi ve Rehabilitasyon Programı, Ankara.

Reddy, P., Dias, I., Holland, C., Campbell, N., Nagar, L., Krustrup, P., & Hubbal, I., Connolly, H. (2017). Walking football as sustainable exercise for older adults – A pilot investigation. *Sports and Exercises Medicine and Health,* (17), 638-645. https://doi.org/10.1080/17461391.2017.1298671

Saygin, Ö. (2015). Long-term walking exercise may affect some physical functions in the elderly. *Studies on Ethno-Medicine*. *9*(3), 379-384.

Strijcker, D.D., & Calder, R. (2017). Impact of endurance exercise training in the fasted state on muscle biochemistry and metabolism in healthy subjects: Can these effects be of particular clinical benefit to type 2 diabetes mellitus and insulin-resistant patients. *Sports Medicine*, (47), 415–28. https://doi.org/10.1007/s40279-016-0594-x

Zainudin, S. B., Salle, D.D.A., & Aziz, A. R. (2021). Walking football during ramadan fasting for cardiometabolic and psychological health benefits to the physically challenged and aged populations. *Frontiers in Nutrition,* (8), Article e779863. https://doi.org/10.3389/fnut.2021.779863

Zorba, E., Babayiğit-İrez, G., Saygın, Ö., İrez, G., & Karacabey, K. (2004). 65-85 yaş arasındaki yaşlılarda 10 haftalık antrenman programının bazı fiziksel uygunluk parametrelerine etkisinin araştırılması. *Fırat Üniversitesi Sağlık Bilimleri Dergisi, 18*(4), 229-234.

Zorba, E., & Saygın, Ö. (2009). *Physical activity and physical fitness*. Inceler ofset.

White, R. L., McInerney, A., Young, C., Elston, R., Dogramaci, S. N., Fitzsimons, L., Neguyen T., Abela, B., Almosewy, Y., Taylor, N., Steel K.A., Rossi, T., George E.S., Bennie, A. (2021). *Understanding participant experiences of walking football in Australia.* Western Sydney University.

World Health Organization (WHO). (2012, October 12). Global health and aging. https://www.nia.nih.gov/news/nia-and-who-release-global-health-and-aging-report