Article published online: 2022-07-25

The Effects of the Hybrid Telerehabilitation Exercise Program in Inactive University Students during COVID-19 Pandemic – A Randomized Controlled Study

Die Auswirkungen eines Hybrid-Telerehabilitation-Übungsprogramms für inaktive Universitätsstudenten während der Covid-19-Pandemie – Eine randomisierte kontrollierte Studie

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Key words
Hybrid Telerehabilitation, sleep quality, depression, physical inactivity, exercise

Schlüsselwörter
Hybride Telerehabilitation, Schlafqualität, Depression, Bewegungsmangel, Bewegung

received 12.11.2021
accepted 25.05.2022
published online 25.07.2022

Bibliography
Phys Med Rehab Kuror 2023; 33: 33–40
DOI 10.1055/a-1867-4976
ISSN 0940-6689
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Georg Thieme Verlag, Rüdigerstraße 14,
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ABSTRACT

Background/Aim The need for alternative methods to prevent physical inactivity and related problems is increasing day by day due to the prevalence of physical inactivity among university students, especially in the pandemic. This study aimed to investigate the effects of a hybrid telerehabilitation exercise program on the physical inactivity, poor sleep quality and physio-mental negativities caused by the pandemic in university students.

Materials and Methods The study was completed with sixty-three physically inactive students with poor sleep quality, divided into two groups. The physiotherapist made all assessments at baseline and after the 6-week for both groups. Assessments consisted of Pittsburgh Sleep Quality Index (PSQI), Beck Depression Inventory (BDI), Short Form-12 (SF-12), and International Physical Activity Questionnaire-Short Form (IPAQ-SF). While no exercise program was applied to the control group, one session synchronous exercise training and one session control education were given to the exercise group. After two synchronous training sessions, the exercise group asynchronously continued the exercise program including indoor walking, flexibility and strengthening exercises for 6 weeks.

Results According to inter-groups analysis, PSQI ($p = 0.026$), BDI ($p = 0.037$), SF-12 Mental ($p = 0.007$), and IPAQ-sitting ($p = 0.003$) of the exercise group had significant differences compared to the control. Also, the exercise group's PSQI, BDI, SF-12, and IPAQ-sitting time were $p < 0.001$, while no change was observed in the control group in the within-group analysis ($p > 0.05$).

Conclusion Hybrid telerehabilitation exercise programs are a valuable, simple, and practical tool to improve sleep quality, prevent inactivity, develop and protect mental health among university students. Encouraging physically inactive people to engage in such methods may be one of the primary preventive approach to prevent the future negative consequences.

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ZUSAMMENFASSUNG

Einleitung/Zweck Der Bedarf an alternativen Methoden, um Probleme im Zusammenhang mit erhöhter körperlicher Inaktivität bei Universitätsstudenten während der Pandemie zu beheben, steigt von Tag zu Tag. Ziel dieser Studie war es, die Auswirkungen der hybriden Tele-Übungsintervention auf körperliche Inaktivität, und negative körperliche Auswirkungen zu untersuchen, die durch die Pandemie bei Universitätsstudenten verursacht werden.

Material und Methoden Die Studie wurde mit 63 Studenten abgeschlossen, die in zwei Gruppen aufgeteilt wurden. Alle Erhebungen wurden von Physiotherapeuten in beiden Gruppen zu Beginn und am Ende der 6. Woche vorgenommen. Die Datenerhebungen bestanden aus dem Pittsburgh Sleep Quality Index (PSQI), dem Beck Depression Inventory (BDI), dem Short Form-12 (SF-12) und dem International Physical Activity Questionnaire-Short Form (IPAQ-SF). Die Interventionsgruppe erhielt eine Sitzung synchrones Übungstraining und eine Sitzung zur Kontrolle der Übungen. In der Kontrollgruppe wurde kein Übungstraining durchgeführt. Nach zwei synchronisierten Übungssitzungen wurde in der Interventionsgruppe über 6 Wochen ein asynchrones Bewegungsprogramm mit Indoor-Walking, Beweglichkeits- und Kräftigungsübungen durchgeführt.

Ergebnisse Bei Betrachtung der Analysen zwischen den Gruppen zeigte sich ein signifikanter Unterschied zwischen der Interventionsgruppe und der Kontrollgruppe hinsichtlich PSQI ($p = 0{,}026$), BDI ($p = 0{,}037$), SF-12 Mental ($p = 0{,}007$) und IPAQ-Sitzwerte ($p = 0{,}003$). Abgesehen davon waren die PSQI, BDI, SF-12 und IPAQ-Sitzzeiten der Interventionsgruppe statistisch signifikant ($p < 0{,}001$), wohingegen in der Kontrollgruppe hinsichtlich der In-Group-Analyse ($p > 0{,}05$) keine Veränderung beobachtet.

Schlussfolgerung Hybride Telerehabilitations-Übungsprogramme sind ein nützliches, einfaches und praktisches Instrument, das dazu beitragen kann, die Schlafqualität von Universitätsstudenten zu verbessern, Inaktivität vorzubeugen und die psychische Gesundheit der Studenten zu verbessern und zu schützen. Die Ermutigung körperlich inaktiver Menschen, diese Art von Methoden anzuwenden, kann einer der primären präventiven Ansätze gegen zukünftige negative Folgen sein.

Introduction

The protective precautions taken worldwide due to the COVID-19 pandemic have caused multidimensional effects on people of all ages, and substantial changes occurred in daily lives [1]. Widely using technology-based applications, especially in education and health systems, is one of the pandemic's most innovative changes. It is anticipated that technology will be used as an alternative method in all areas of life if pandemics continue [2, 3]. Because telemedicine and telerehabilitation are already used in health services, the health system is familiar with technology-based interventions. The use of synchronous and asynchronous telerehabilitation services has dramatically increased in recent years, and its scope expanded throughout the pandemic. Thanks to this increase, telerehabilitation has been started to solve physical inactivity and health problems related to inactivity.

Precautions such as curfews and the closing of sports halls due to the pandemic have reduced the physically active time in individuals [4]. Since higher education proceeds with online systems, continuing stay home politics, many of people the deadly face of the disease and loss of loved ones due to illness, positive or negative changes caused in students' lifestyles. According to the literature, students reported decreased physical activity levels, disturbed sleep, and psychological problems in this process [5]. Physical inactivity also causes multisystemic side effects such as reduced quality of life, muscle strength and endurance, increased pain, and postural problems [6–8]. On the other hand, while it is known that exercise positively contributes to high-quality sleep, it was also reported that physically more active individuals had fewer fluctuations in mood changes due to depression [9, 10]. Quality of life defines as perceiving one's position in life-related to society, goals, expectations, standards, and interests that have decreased in all age groups [11].

Quality of life is affected by social and physical factors and many health issues. Due to decreased physical activity and pandemic precautions, university students' quality of life and social life was affected. Regular physical activity is an important intervention tool to improve human health by preventing these negativities [12, 13].

The continuity and improvement of physical and mental stability depend on physical activity. At least 150 min of physical activity per week is recommended for the protect developmental health [14]. Since the benefits of physical activity on sleep, and mental and physical health, it is essential to encourage university students to be more active. For this target, different methods can use in a wide range of applications ranging from classical exercise applications to technological approaches. Technological approaches have started to be preferred more during the COVID 19 pandemic. These methods can include face to face interventions, tele-exercise that are applied synchronous, asynchronous, or hybrid, and they can also do in their home and work environments. For this reason, our study aimed to examine the impact of a six-week home exercise program with hybrid telerehabilitation method on sleep, depression and quality of life in inactive undergraduate students, and poor sleep quality, during the COVID-19 outbreak.

Materials and Methods

Study Design

A prospective randomized controlled study was conducted between December 2020–April 2021. Sleep quality, depression, and quality of life were measured before and after the exercise program in all students. Evaluations were conducted by the Pittsburgh Sleep Quality Index (PSQI), Beck Depression Inventory (BDI), and Short Form-12 (SF-12) Quality of Life Scale, respectively, at the baseline and sixth week.

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Participants and Randomization

Students were invited to study via social media and e-mail groups. Students who met the following criteria (1) Individuals aged >18 years, (2) Pittsburg Sleep Quality Index total score >5 points (3) Have not known orthopedic, neurological, cardiovascular problems, (4) Physical activity level <600 MET-min/week according to IPAQ-Short Form, (5) Being cooperative and having internet access, (6) Who do not use telehealth applications, included in the study. Exclusion criteria were (1) Pregnancy, (2) Cancer and diabetes mellitus, (3) Active infection, (4) Acute or chronic rheumatic pain, (5) Program adherence to <85% (6) Subjects who are starting a regular physical activity program.

We assessed 86 undergraduate students and excluded 23 who did not meet the inclusion criteria. Students who voluntarily participated in the study were divided into two groups using the online randomization software (www.randomizer.org) after the first assessment (▶ **Fig. 1**). The exercise group consisted of 32 individuals, and the control group was 31 individuals. The same assessor reassessed both groups, and the students were verbally informed before the study started. Also, students gave verbal permission for recording the video conference. The University Clinical Research Ethics Committee approved the study with the XXXXXX protocol number and clinical trials number (NCT05115162) was obtained.

Exercise Intervention

An asynchronous home exercise program was performed three days a week, two sets a day, with ten repetitions for each set, and the resting period between sets was 20–40 seconds in the exercise group [15]. After the initial assessment, two synchronous exercise program education session one of session is education about the exercise program's content, and the other the session is the control of exercises and answering the questions was applied to the students. Students, in the exercise group, accessed the full content of the exercise program after the initial assessment and synchronous exercise program education session. In the initial period, exercise was not applied to the control group. At the end of the study, the same program was also presented to the control group after the second evaluation in the 6th week.

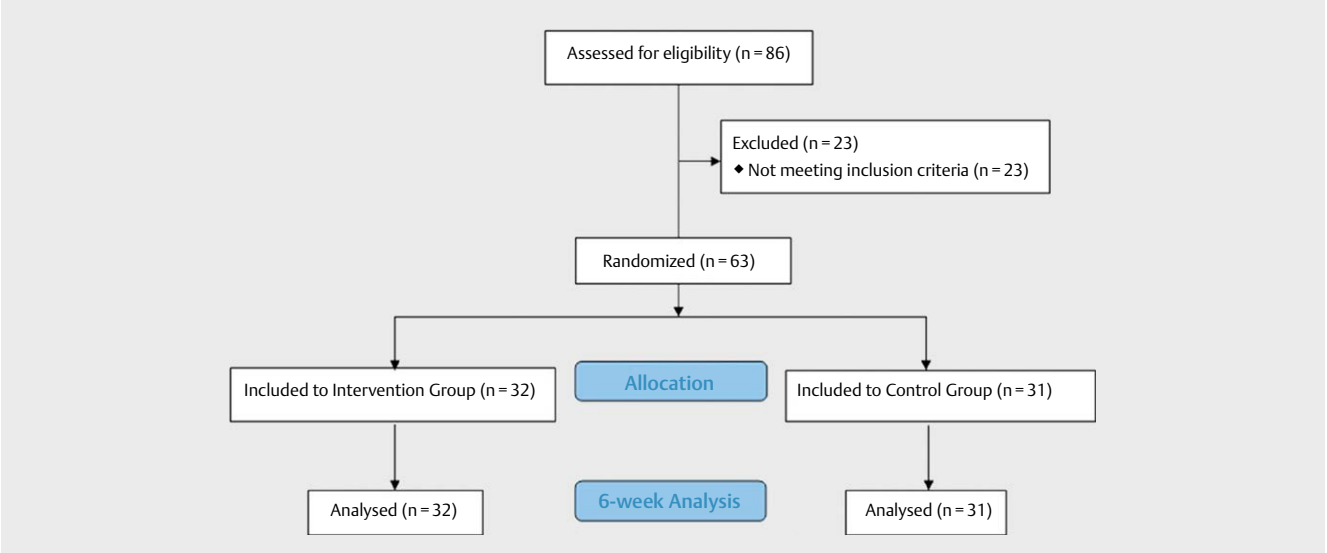
Students continued the indoor walking for at least 30 min according to the exercise program for six weeks. The exercise program consisted of 8 different exercises. These exercises included walking, flexibility, strengthening the shoulder and trunk muscles, bridge exercises, lying on the back, cycling, and squatting [16]. Students were informed that all exercises would be done at a controlled and constant pace. Each subject filled the exercise adherence checklist after every asynchronous exercise training session. The researchers checked this chart once a week via an online messaging program. Also, a message was sent to the students every day to remind them about their exercise programs. The exercise group was asked whether they were satisfied with the program or not at the end of the study.

Measurements

Sociodemographic Data Form: This form was created by the researchers and consisted of the age, weight, height, educational level, regular exercise status, smoking, musculoskeletal system pain severity, previously COVID-19 history, sleep problems.

Pittsburgh Sleep Quality Index (PSQI): The Turkish validity and reliability of the scale was conducted by Agargün et al. Nineteen questions are answered by the individual, and the individual's roommate answers five questions. The scale consists of 7 sections scored between 0 and 3. Therefore, the total scale score is between 0 and 21 and is obtained by adding the scores of these sections. A total PSQI score greater than 5 indicates poor sleep quality [17].

Beck Depression Inventory (BDI): This scale was developed to determine the level and magnitude of depressive symptoms. The scale validity and reliability study were carried out in Turkey. All items interrogate the state of mood about the last week. There is



▶ **Fig. 1** Consort Flow Diagram of Study.

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21 item on the scale, and each item is scored between 0 and 3. The total score is between 0 and 63 points and is calculated by the answers given to each section [18].

Short Form-12 (SF-12): This form contains propositions about physical function, social function, limitation due to physical problems, emotional issues, mental health, energy and fatigue, pain, and general health perception. SF-12 has two subgroups, physical and mental component summary. The physical component summary takes between 12 and 63 points, and the mental component summary takes between 16 and 71 points [19].

International Physical Activity Questionnaire-Short Form (IPAQ-SF): The short form of the scale consists of 7 questions. It provides information about the time spent on walking, moderates vigorous activities. Metabolic equivalence (MET) coefficients of walking, moderate exercise, and vigorous activities, the product of time spent with activity and days used to calculate the total score. The daily sitting score is calculated separately. According to the IPAQ-SF, physical activity levels are classified as physically inactive (< 600 MET-min/week), low physical activity level (600–3000 MET-min/week), and adequate physical activity level (health benefits) (> 3000 MET-min/week) [20].

Adherence the exercise program: After six week later from the initial and in the 6th month after the program, the attendance of the students in the program was questioned.

Statistical Analysis

The data were evaluated with qualitative and quantitative statistical methods at 80 % confidence interval and $p < 0.05$ significance level with the SPSS statistics program. Normal distribution was questioned with the Kolmogorov-Smirnov test and histogram graphics. Independent Sample T-Test and Paired Sample T-Test were used for assessment because the data showed normal distribution. The difference between measurements was used for inter-group analysis, and the changes were expressed as a percentage. Statistical Package for the Social Sciences (SPSS v11) software was used for statistical analysis.

The sample size of the study was calculated using Gpower 3.1.9.6 software. It was determined that the required sample size was 60 undergraduate students for the study when the effect size was 0.65, alpha error 5 %, and power 80 %.

Results

The adherence of the students to the program, which lasted for six weeks and was completed with 63 students, were 100 %. The mean age of all students was 21.46 ± 4.09 years. According to baseline assessment for the exercise group, BMI and IPAQ-SF total scores were 22.00 ± 3.47 kg/m^2 and 148.42 ± 91.80 MET-min/week. On the other hand, the BMI value was 22.37 ± 3.24 kg/m^2, and the control group's IPAQ-SF total score was 186.84 ± 101.34 MET-min/week. When the results are examined, age, height, weight, BMI, and IPAQ-SF scores of the students were similar in the two group ($p > 0.05$ for all parameters) (▶ **Table 1**).

▶ **Table 1** Demographic Information of the Students

Demographics	Exercise Group	Control Group	p
	Mean (SD)	Mean (SD)	
Age (year)	20.91 (2.76)	22.03 (5.10)	0.278
Height (cm)	165.59 (6.73)	168.58 (7.82)	0.326
Weight (kg)	60.75 (12.75)	63.74 (11.12)	0.109
BMI (kg/m^2)	22.00 (3.47)	22.37 (3.24)	0.660
IPAQ (MET-min-wk^{-1})	148.42 (91.80)	186.84 (101.34)	0.120

BMI: Body Mass Index, IPAQ: International Physical Activity Questionnaire, MET: Metabolic Equivalent, SD: Standard Deviation

There was some improvement in the sleep quality of both groups. This improvement was found to be better in the exercise group than in the control group (24.12 versus 10.09; $p = 0.026$) (▶ **Table 2**).

Exercise group's BDI total score decreased from 14.19 points to 10.50 points. The changing ratio was determined as 26 %. The change of control group's BDI score was 6.72 %. After six weeks of the exercise program, the BDI score led to positive improvements in favour of the exercise group (▶ **Table 2**).

Subscores of the SF-12 scale had different results. While the SF-12 mental subgroup improvements of the exercise group were more significant than the control ($p = 0.007$), SF-12 physical subgroup scores were found similar ($p = 0.380$). Data on the results are shown in ▶ **Table 2**.

The sitting times (minutes) were similar to the other results. There was an average 120-minute decrease in the exercise group, although we implemented 60 min. Students' sitting times decreased by only 23.22 min in the control group. According to these results, it is evident that there is a significant difference in the sitting times of the exercise group ($p = 0.003$). The means of sitting time are shown in ▶ **Table 2**.

According to the intra-group analysis of the exercise group, the results of the PSQI, BDI, SF-12 mental and physical sub scores, and IPAQ sitting time were changed positively ($p = 0.001$, $p = 0.001$, $p = 0.001$, $p = 0.157$, and $p = 0.001$, respectively). Also, no difference was observed in either the PSQI, BDI, SF-12 subgroups or the IPAQ sitting time in the intra-group analyzes of the control group ($p > 0.05$ for all). All scores are shown in ▶ **Table 3**.

Six months later the end of the program, when the participants were asked whether they continued to exercise, it was determined that none of them did.

Discussion

Working and academic life have changed due to the pandemic, and the need for technological methods has increased across the lock down. People have adapted to this change, and technology has more spread to all areas of life. In particular, the use of technology

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▶ **Table 2** Comparison of Sleep Quality, Emotional State, Quality of Life and Sitting Time Between Groups

Variables		Time	Exercise Group	Control Group	P *
			Mean (SD)	Mean (SD)	
PSQI		T_1	7.75 (2.30)	7.03 (2.25)	0.026
		T_2	5.88 (1.94)	6.32 (2.79)	
		ΔT_{2-1}	−1.87 (1.97)	−0.70 (2.14)	
		$\Delta_{\%}$	24.12	10.09	
BDI		T_1	14.19 (7.90)	14.42 (5.73)	0.037
		T_2	10.50 (6.54)	13.45 (5.69)	
		ΔT_{2-1}	−3.68 (5.78)	−0.96 (4.20)	
		$\Delta_{\%}$	26.00	6.72	
SF-12	Mental	T_1	36.79 (12.10)	39.95 (9.98)	0.007
		T_2	45.01 (8.67)	41.13 (10.72)	
		ΔT_{2-1}	8.21 (11.48)	1.18 (8.28)	
		$\Delta_{\%}$	−22.34	−2.95	
	Physical	T_1	52.77 (7.05)	50.29 (7.74)	0.380
		T_2	54.39 (6.00)	50.28 (7.69)	
		ΔT_{2-1}	1.62 (6.27)	−0.01 (8.17)	
		$\Delta_{\%}$	−3.06	0.019	
IPAQ	Sitting (min/week)	T_1	515.63 (160.46)	454.84 (152.40)	0.003
		T_2	395.63 (105.43)	431.61 (118.40)	
		ΔT_{2-1}	−120.00 (131.09)	−23.22 (118.67)	
		$\Delta_{\%}$	23.27	5.10	

PSQI: Pittsburg Sleep Quality Index, BDI: Beck Depression Inventory, SF-12: Short Form-12, IPAQ: International Physical Activity Questionnaire, T_1: First Assessment, T_2: Second Assessment, SD: Standard Deviation, *: Significance value of Differences of Means, Δ: Differences of Means, $\Delta_{\%}$: Percentage of Means Differences

▶ **Table 3** Comparison of Sleep Quality, Emotional State, Quality of Life and Sitting Time Within Groups

		Exercise Group			Control Group		
Variables		T_1	T_2	p	T_1	T_2	p
		Mean (SD)	Mean (SD)		Mean (SD)	Mean (SD)	
PSQI		7.75 (2.30)	5.88 (1.94)	0.001	7.03 (2.25)	6.32 (2.79)	0.076
BDI		14.19 (7.90)	10.50 (6.54)	0.001	14.42 (5.73)	13.45 (5.69)	0.210
SF-12	Mental	36.79 (12.10)	45.01 (8.67)	0.001	39.95 (9.98)	41.13 (10.72)	0.431
	Physical	52.77 (7.05)	54.39 (6.00)	0.157	50.29 (7.74)	50.28 (7.69)	1.000
IPAQ	Sitting (min/week)	515.63 (160.46)	395.63 (105.43)	0.001	454.84 (152.40)	431.61 (118.40)	0.285

PSQI: Pittsburg Sleep Quality Index, BDI: Beck Depression Inventory, SF-12: Short Form-12, IPAQ: International Physical Activity Questionnaire, T_1: First Assessment, T_2: Second Assessment, SD: Standard Deviation

in social, business, and educational life has strengthened people's familiarity with technology. We investigated the effects of hybrid telerehabilitation exercise programs on sleep quality, psychological state, and sitting time in university students who had to spend most of the day at home due to the pandemic, who had been inactive and had poor sleep quality. The 6-week asynchronous exercise

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program taught undergraduates that the synchronous telerehabilitation method improved sleep quality and depression scores. In addition to these improvements, the quality of life- mental health sub scores have also improved. Although the application was 60 min, the sitting times of the individuals in the exercise group decreased much more than this period. It can be said that exercise programs via the hybrid telerehabilitation method, encourage people to be more active.

Exercise reduces symptoms and complaints of disturbed sleep, similar to sleeping pills [21]. But, it is possible to come across studies stating that physical activity does not improve sleep quality as much as it improves in the literature [22–24]. Miller et al. stated that a medium-intensity aerobic exercise program did not affect sleep quality [25]. In another study, it was noted that the increase in physical activities of non-athletes has a positive effect on their sleep quality [26]. The main differences in these studies are related to the daily exercise time period. Exercises applied especially close to the sleeping time increase the body temperature and cause poor sleep quality [27]. The patients who were taught the World Health Organization's exercise recommendations continued these exercise programs for 12 weeks. At the end of the study, improvements were detected in sleep quality scores. It was emphasized that the improvements were caused by the positive cardiorespiratory and psychological effects of exercise [28]. A 4-week walking program with a pedometer was applied to the participants in a randomized controlled study. The control group did not perform any training, and they continued their sedentary lifestyle. At the end of the study, there was no difference in sleep quality between the groups.

In contrast, the sleep quality of the exercise group increased in the within-group comparison [29]. Physical activity is an essential tool to maintain optimal sleep quality. However, how exercise improves the quality and quality of sleep are not precise. Generally, physiological and psychological effects of exercise are mentioned. Physiological effects concentrate on body temperature. During exercise, body temperature rises and then falls. This decrease is close to the body's temperature when preparing for sleep.

For this reason, the body begins to produce signals that it is time to sleep [30]. Another theory is that exercise regulates the circadian rhythm and regulates hormones such as serotonin that affect sleep [31]. Also, exercise probably affects sleep quality positively by affecting factors such as anxiety, depression, increased energy consumption, and decreased musculoskeletal system pain [32]. In this study, we used a hybrid exercise program, containing a 6 week asynchronous exercise program after two synchronous exercise session. The sleep quality of the students increased linearly with our hybrid exercise program. We have also seen reductions in both depression scores and sitting times. Our results have related to similar physiological effects with literature, including face-to-face exercises.

Exercises are an effective method used to overcome health-related many problems and have psychological effects and physiological gains. Maintaining and improving psychological health and treating problems such as depression are the most important effects [33]. The American College of Sports Medicine (ACSM) recommends 150 min of moderate-to-vigorous-intensity exercise per week for mental health. However, the same guide also recommended that long-term physically inactive individuals start aerobic exercise programs with 15–20 min intervals, reach 30–60 min at regular intervals, and perform the resistance exercises at least two days a week, with 10–15 repetitions two sets. It also states that applying flexibility exercises for large muscle groups reduces injury risk, provides relaxation, and supports well-being [34]. A study reported a decrease in depression score in individuals who exercised at least 150 min of walking exercise per week for six months, according to the non-exercise group [35]. Studies also state that a 16-week aerobic exercise program prevents depression complaints [36]. Blough and Loprinzi reported that the moderate-intensity aerobic exercise program and 5000 steps/day had reduced depression symptoms. It is also emphasized that weekly physical inactivity may affect depression [37]. Batrakaulis and colleges reported that the 10-month exercise program for obese women positively affects psychological factors. Researchers said that this situation might be caused by improving the overall health perception of exercise [38]. The 5-week walk program applied to office workers has also positively affected the psychological health of the participants [39]. Tozzi et al. conducted a study with 44 healthy participants and have examined the changes caused by the progressive aerobic exercise program on mood with functional MRI via investigating the connections between the parahippocampal area and the motor, sensory and mood-related areas of the individuals who applied exercise. At the end of their study, no change was observed in the non-exercise group. The changes after the exercise may explain the positive effect of exercise on psychological conditions [40]. Another study reported that a 1-week sedentary lifestyle triggered depression [41]. Regular physical activity and exercise cause neurobiological adaptations. Disturbances in the limbic system, volume loss in the hippocampal formation, and a decrease in brain-derived neurotrophic factor (BDNF) are closely related to depression. Increased endorphins, serotonin, BDNF, and some growth factors and decreased cortisol production with exercise reduce depression by increasing neurogenesis [33]. In this way, exercises mimic anti-depressant drugs. Also, physical activity helps to improve depression-related symptoms by increasing self-esteem. At the end of our online exercise program, we have provided a reduction of the depression scores according to both intra- and inter-group analysis. All these studies show that hybrid model exercise programs improve depression through both physiological and psychological factors.

Extended time sitting has been recognized as an independent health risk factor. The ACSM recommends that everyone reduce sitting time and extend standing time, regardless of an individual's physical activity level [42]. According to our results, there was a significant decrease in the sitting times of the exercise group. This reduction was much more effective than the duration of the applied asynchronous exercise program. This is an indication of an increased tendency towards physical activity in our subjects. Unfortunatelly, all of the participants have reported that they have not continue after the end of the program for various reasons. In this case, it was observed that the students did not change their behavior towards exercise in the long term. This result showed that hybrid telerehabilitation exercise programs might be effective when checked for participation. Adherence to the exercise program is

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the most importing problem for this type exercise program. And the new research should be focused on this problem in the future.

Conclusion

The hybrid telerehabilitation exercise program, one of the internet-based applications, effectively improved the sleep quality and psychological status of physically inactive individuals who have poor sleep quality. The decrease in physical activity levels is gradually more associated with socioeconomic life and the pandemic. Coping with this situation has become more critical than ever. Access, adaptation and monitoring of all processes in physical activity programs given with hybrid telerehabilitation for young individuals are as easy as face-to-face programs. We anticipate that the scope of internet-based rehabilitation programs will expand and be used more widely in the future. Also, we recommend to investigating modified telerehabilitation programs, implementable according to the sleep and mental status complaints of geriatric individuals who often have to stay at home.

This study had several limitations. The study was continued for six weeks, and the effectiveness of the exercise program was evaluated, and this period may seem short. Because the exam terms may affect the students' parameters, the hybrid telerehabilitation exercise program was limited to 6 weeks. In addition long-term effects and factors affecting compliance with the exercise program are other important issues to be investigated in future studies.

Conflict of Interest

The authors declare that they have no conflict of interest.

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