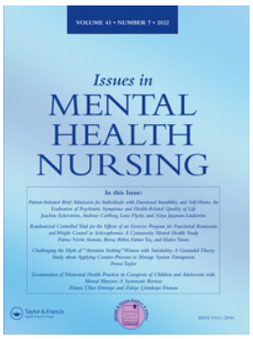

Issues in Mental Health Nursing

ISSN: (Print) (Online) Journal homepage: https://www.tandfonline.com/loi/imhn20

Randomized Controlled Trial for the Effects of an Exercise Program for Functional Remission and Weight Control in Schizophrenia: A Community Mental Health Study

Fatma Nevin Sisman, Berna Büber, Fatma Taş & Hatice Turan

To cite this article: Fatma Nevin Sisman, Berna Büber, Fatma Taş & Hatice Turan (2022) Randomized Controlled Trial for the Effects of an Exercise Program for Functional Remission and Weight Control in Schizophrenia: A Community Mental Health Study, Issues in Mental Health Nursing, 43:7, 603-612, DOI: 10.1080/01612840.2021.2024630

To link to this article: https://doi.org/10.1080/01612840.2021.2024630

Published online: 28 Jan 2022.

ISSUES IN MENTAL HEALTH NURSING
2022, VOL. 43, NO. 7, 603–612
https://doi.org/10.1080/01612840.2021.2024630

Randomized Controlled Trial for the Effects of an Exercise Program for Functional Remission and Weight Control in Schizophrenia: A Community Mental Health Study

Fatma Nevin Sisman, PhD, RN, Berna Büber, RN, Fatma Taş, RN and Hatice Turan, RN

Nursing Department, Marmara Unıversity Health Science Faculty, Basıbuyuk, Maltepe-Istanbul, Turkey

ABSTRACT

This research was conducted to determine the effect of an exercise program on functional remission and weight control in schizophrenia. This experimental study was conducted with pre-posttests and a control group at community mental health centers with 32 individuals with schizophrenia. The individuals participating in the program registered a more significant increase on the functional remission levels compared to the control group and a significant difference was found between the pretest/posttest BMI measures of the experimental group. The nurse-led exercise program is an effective plan that can be used in achieving functional remission.

Introduction

Individuals with schizophrenia experience attention deficiency and a deterioration in verbal memory, working memory and executive functions (Çelikbaş & Ergün, 2018). This adversely affects school achievement, finding and maintaining a job, forming social relationships, living independently, meeting daily needs and other modes of functioning (Çelikbaş & Ergün, 2018; Lahera et al., 2018).

Remission in schizophrenia is described as an improvement of symptoms, an increased ability to perform daily life activities despite the limitations placed by the illness, restoration of psychosocial functions and maintenance of functionality (Çam & Yalçıner, 2018; Lahera et al., 2018; Silva & Restrepo, 2019). Functional remission in individuals with schizophrenia includes gaining insight in treatment, performing daily functions, maintaining social relations, and continuing a professional life (Emiroğlu et al., 2009). Drugs used in the treatment of schizophrenia to achieve remission produce unwanted side effects that interfere with psychosocial functions and general functioning (Koshikawa et al., 2016; Lahera et al., 2018; Li et al., 2018). Because of this, nonpharmacological methods are used as a supplement to drug therapy to maintain physical and psychological functionality (Budak & Yilmaz, 2019; Ryu et al., 2020; Su et al., 2016; Takahashi et al., 2020). One of the main nonpharmacological methods employed for this purpose is exercise and physical activity (Choi et al., 2020; Ho et al., 2016; Ryu et al., 2020; Shimada et al., 2019; Takahashi et al. 2020).

The literature points to the importance of regular exercise, structured and planned to contain repetitive movements, in protecting, developing and improving health, emphasizing at the same time how necessary it is for physical, mental, emotional and functional health (Budak & Yilmaz, 2019; Kavak & Ekinci, 2016; Lök & Lök, 2016). It has been reported that when exercise is done regularly and correctly, it can be an effective tool that reduces positive and negative symptoms in the treatment of psychiatric diseases such as major depression, anxiety disorder, schizophrenia, bipolar disorder and substance addiction (Budak & Yilmaz, 2019; Kavak & Ekinci, 2016; Ryu et al., 2020; Su et al., 2016). Exercise also has a protective effect on the mental health of populations at risk for psychiatric disorders (Ho et al., 2016; Yalçıntürk, 2018). It has been found that individuals with schizophrenia who participate in exercise programs feel much better psychologically, are more adherent with drug regimens and therapeutic interventions, experience reduced anxiety (Kavak & Ekinci, 2016; Lök & Lök, 2016), and improved social functioning (Budak & Yilmaz, 2019).

Exercise programs are used to maintain functioning, and among the activities employed in these programs to increase physical movement are aerobics, yoga, physical exercise, cycling and Tai-chi (Budak & Yilmaz, 2019; Choi et al., 2020; Ho et al., 2016; Kavak & Ekinci, 2016; Ryu et al., 2020; Shimada et al., 2019; Su et al., 2016; Takahashi et al., 2020). A review of the outcomes of such programs show that patients who participate in these activities display increased participation in social activities (Shimada et al., 2019; Takahashi et al., 2020; Yoon et al., 2016), can manage positive and negative symptoms better (Budak & Yilmaz, 2019; Ryu et al., 2020; Su et al., 2016; Takahashi et al., 2020), comply with treatment (Budak & Yilmaz, 2019),

CONTACT Fatma Nevin Sisman fatma.sisman@marmara.edu.tr; nevin4083@yahoo.com Marmara Universitesi, Basibuyuk Kampusu, Hemsirelik Bolumu, Basıbuyuk, Maltepe-Istanbul, Turkey.

experience enhancements in their daily life activities and in their quality of life (Dauwan et al., 2016; Ho et al., 2016; Shimada et al., 2019; Yoon et al., 2016) as compared to individuals who do not participate in such programs.

Although the type of exercise implemented in these programs can vary, the common goal is to increase physical activity and encourage individuals to actively engage in life (Budak & Yilmaz, 2019; Ryu et al., 2020; Su et al., 2016; Takahashi et al., 2020). There are meta-analyses that show that individuals with schizophrenia become more and more sedentary over the course of their illness and after drug therapy (Vancampfort et al., 2017). It is reported that exercise can be therapeutic in increasing the daily life activities of these individuals, raising the quality of their lives, and helping them to regain their physical health and functionality (Dauwan et al., 2016; Ryu et al., 2020; Stubbs et al., 2018).

There are also studies that indicate that exercise may be effective in developing social functioning, a sign that can be taken to mean that negative symptoms of the illness have receded (Kavak & Ekinci, 2016). Studies reveal that exercise programs contribute to the formation of social support networks between individuals with the illness. Individuals who participate in these programs can be supported by strengthening their social functioning by means of developing social interactions (Shimada et al., 2019; Yoon et al., 2016). At the same time, implementing these exercises in groups is also said to perhaps be effective in achieving socialization (Takahashi et al., 2020; Yoon et al., 2016). Group exercise programs are reported to help individuals support each other and improve their interpersonal relations (Shimada et al., 2019; Takahashi et al., 2020; Yoon et al., 2016), thus achieving important headway in performing daily life activities and raising the level of their quality of life (Ho et al., 2016; Shimada et al., 2019).

In researching the neurobiological foundation of development and change in the functioning of individuals with schizophrenia through exercise, it has been found that there is an enhance in brain volume after exercising (Malchow et al., 2016; van der Stouwe et al., 2018). Due to this enhance in brain volume, individuals with schizophrenia are better able to live a high-quality and independent life, finding the opportunity to maintain their physical and psychological functionality (Dauwan et al., 2016; Firth et al., 2016). It is seen that exercise has promising results in functional remission thanks to this mechanism of action on cognitive and social functions (Shimada et al., 2019; Takahashi et al., 2020).

Also, exercise programs provide an opportunity for weight control. In particular, individuals with schizophrenia begin to gain weight through their use of antipsychotic drugs (Magni, et al., 2017; Speyer et al., 2019). The prevalence of obesity among persons with schizophrenia varies between 40%-60%, at a mean rate of 58.5%. This rate is 30% higher than the rate of obesity in the general population (Annamalai et al., 2017). More than one study has been published recently that recommends the implementation of programs such as aerobics, physical exercise or Tai-chi to increase levels of physical activity and to achieve weight control in individuals with schizophrenia (Ho et al., 2016; Magni, et al., 2017; Speyer et al., 2019).

Aim

This research was conducted to determine the effect of an exercise program on functional remission and weight control in individuals with schizophrenia.

Study hypotheses

H 1. Posttest functional remission scores are higher than pretest scores in the exercise program group.

H 2. The post-program BMI levels of the exercise program group are lower than prior to the program.

H 3. There is no significant difference between the levels of functional remission in the pretest-posttest scores of the control group.

H 4. There is no significant difference between the levels of BMI in the pretest-posttest scores of the control group.

Materials and methods

Research design and setting

This experimental randomized study, conducted in pretest-posttest with control group design took place at two Community Mental Health Centers (CMHC) in Istanbul over the period March–May 2019. The Centers offer patients with severe mental disorders (schizophrenia, bipolar, etc.) rehabilitation services. Various psychosocial intervention programs are undertaken to return patients back to the community and to enable them to adapt to social life. The Centers employ psychiatrists, nurses, psychologists, social workers, occupational therapists as well as art, music and gym teachers who lead programs in their respective fields. The CMHC buildings contain a gymnasium, a botanical garden, lounges, art, handicrafts and music workshops, and therapy rooms. The exercise program that was planned for the study was conducted in the fully equipped gymnasium of the CMHC building.

Ethical considerations

The University Ethics Committee's Ethics Permission (No. 09.2019.200) and the approval of the institution, as well as the patient's, guardian's and physician's consent were obtained. All procedures performed in study been performed in accordance with the ethical standards laid down in an appropriate version of the Declaration of Helsinki (as revised in Brazil 2013). The CONSORT statement was used as a checklist for reporting how this trial was conducted. Permission was also requested and obtained from Emiroğlu for the use of FROGS.

Participants

The universe of the study consisted of individuals diagnosed with schizophrenia who were registered at the CMHC (N:

625). The sampling size for the study was determined with a power analysis performed on the PS version 3.0 package program. For this, the functional remission score Kavak and Ekinci (2016) reported (13.36 ± 3.38) in their study was taken as a given; with the expectation of a 2-point variation, and at the levels of 0.05 alpha (Type 1 probability of error) and 0.90 beta (Type 2 probability of error), sample size was determined to be 15. Considering that patients might stop attending half-way through the program, it was decided that each group would consist of 16 participants.

Patients deemed to be suitable for the program were identified along with the CMHC doctors and nurses, and the approval of the treatment team was obtained. Those to participate in the research were expected to match the following criteria: (1) regular attendance at the CMHC, (2) undergoing stable drug therapy for the last 1 month, (3) having no major health issue that would prevent their participation in the exercise program (cardiac, neurological, musculoskeletal system diagnoses), (4) no pacemaker, (5) a resting heart rate of 60-100/min, and (6) have a blood pressure reading of 80/120 mmHg.

Those who matched the criteria, had a rehabilitation program included in their treatment, did not have any issue that would prevent them from participating in a group activity and were willing to join the exercise program were asked for their written consent. At the same time, the consent of the patients' legal guardians was obtained for their participation in the program and they were provided information about its content. They were also informed that refusing to participate in the program would not affect treatment and care. The individuals to participate in the program were randomly assigned to an experimental and a control group (with computer-generated random numbers) by a research assistant not involved in the study.

Those who had previously participated in an exercise program (in the last 3 months), those who did not have their doctor's approval and those who did not wish to participate were excluded from the study (n = 504). These persons were referred to the other rehabilitation programs conducted at the CMHCs.

Instruments

An 8-question sociodemographic form drawn up by the researchers, the Functional Remission of General Schizophrenia (FROGS) Scale, a precise weighing scale and a measuring tape for height/weight measurements were used as data collection instruments.

Sociodemographic form is an 8-question form for collecting data on the individual's personal characteristics (age, gender, education, civil status, who they live with, BMI, age at which diagnosed, and number of hospitalizations).

The validity and reliability studies of this functional remission of general schizophrenia scale (FROGS) were carried out by Emiroğlu et al., 2009; the reliability coefficient was found to be 0.93. The scale is a 5-point Likert-type of instrument consisting of 19 statements and four sub-dimensions (social functioning, health and treatment, daily life skills, and professional functioning). There are five rating levels for each item on the scale. The first level refers to the lowest level of remission while the fifth level refers to an ideal level of functioning. Higher scores on the scale correspond to higher levels of functioning (Emiroğlu et al., 2009).

The researchers took height (m) and weight (kg) measurements in a meeting room before and after the program with the same precise scale and the same measuring tape. Following the measurements, the individuals' body mass index/BMIs (kg/m^2) were calculated.

Data collection

The researchers collected the data via face-to-face interviews in a meeting room at the CMHC. Data were collected from both the experimental and control groups twice-in a pretest before the program and as a posttest following the program.

Intervention: The exercise program

The exercise program was created based on the physical activities and exercising programs reported to be applied to psychiatric patients in the literature for achieving functional remission and weight control in individuals with chronic mental illness (Ryu et al., 2020; Shimada et al., 2019; Stubbs et al., 2018; Su et al., 2016; Vogel et al., 2019; Yoon et al., 2016). A trainer well-experienced in working with individuals with schizophrenia in the areas of physical education and sports was consulted before the program was given its final form. Prior to the application of the program, the researchers gained some experience by participating in various sports and exercise programs. One of the researchers was a group therapist and was experienced in group management.

To increase the motivation of the program participants, individual goals were defined at the start of each session and the individuals were encouraged to share their personal difficulties. The exercise program started off with warm-ups and extension/stretching movements, continued with light weight-lifting and ended with cool-off movements, the session lasting for a total of 45 minutes. At the end of each session, the patients were urged to share their experiences to make an assessment of the day. The content of the program can be seen in Table 1. The program was held at the CMHC, supervised by the researchers and the trainer, in groups of 7-10 on 3 days of the week for a total of 8 weeks. The individuals' heart rates were measured before and after each exercise session. A consultation with the trainer and healthcare team working at the CMHCs was planned to aid in resolving potential problems that could be encountered during the course of the program.

Pretest and posttest data were collected from the control group without the implementation of an exercise program. At the end of the study, the control group was given the opportunity to participate in one session of the exercise program. The plan for the study can be seen in Figure 1.

Table 1. The content of the exercise program.

Type of exercise	Time	Tools	Purpose
Individual goals were defined	15 min	–	To increase motivation and encourage participation.
Extension/stretching movements	10 min	–	Warm-up
Walking	10 min	Treadmill/walking in the garden	Warm-up
Cycling	5 min	Indoor bike/foot movements on the floor	Fat burning
Light weight-lifting	10 min	Dumbbell/weight lifting	Muscle building
Walking	5 min	Treadmill/walking in the garden	Cool-off
Extension/stretching movements	5 min	–	Cool-off
Experience sharing	15 min	–	Discussion on the achievement of the day.

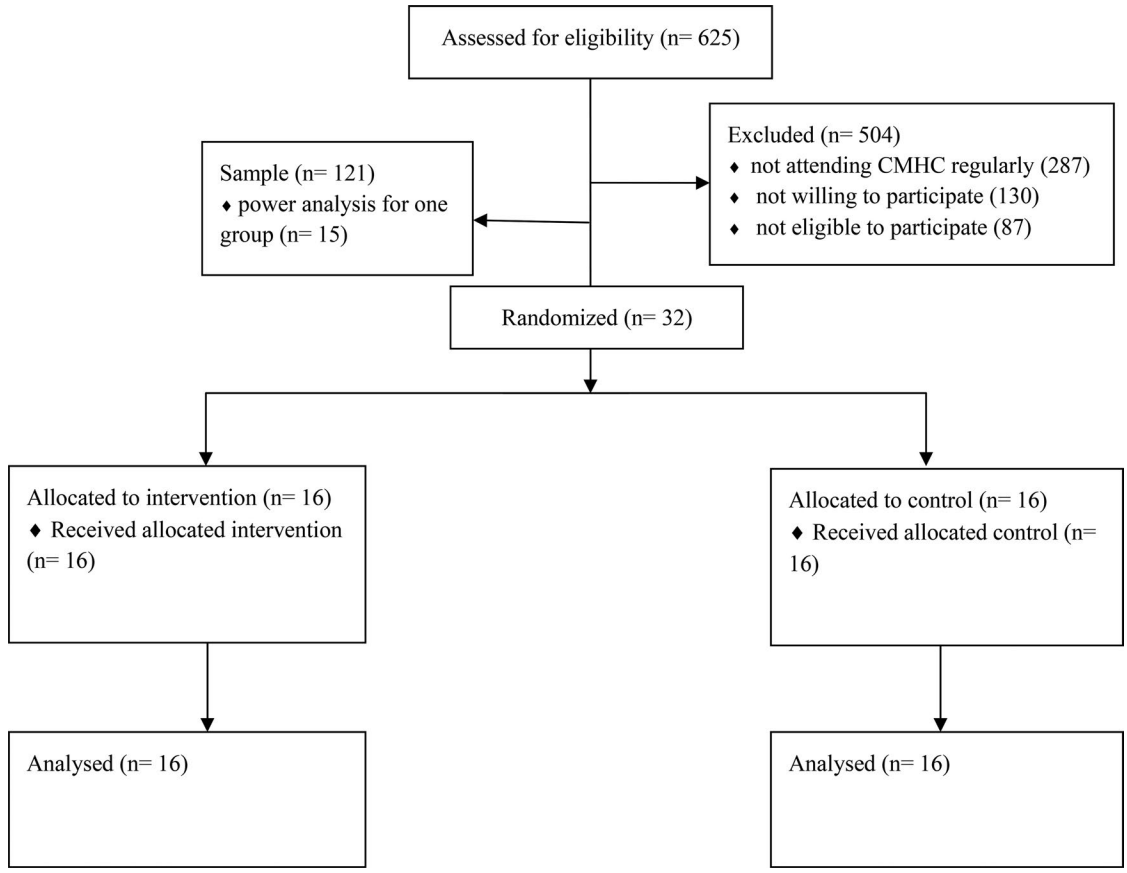

Figure 1. Flow diagram of research.

Statistical analysis

The IBM SPSS Statistics for Windows 21 package program was used for the analysis of the data, with descriptive statistics (numbers, percentages, means, standard deviation) being used for descriptive variables, the chi-square test used to compare the data of the experimental and control groups, and the Mann-Whitney U and Wilcoxon tests to compare pretest-posttest scores of the experimental and control groups. The level of significance was accepted to be $p < 0.05$.

Results

In the review of the individual characteristics of the study participants (N: 32), it was found that mean age was 43.62 ± 9.47, mean BMI was 32.03 ± 6.41, age at diagnosis was 23.78 ± 8.73, and the mean number of hospitalizations was 4.56 ± 4.38. Of the patients, 59.3% were women, 84.37% were single, 84.37% lived with their families and 40.60% were middle school graduates.

In the comparison of the individual characteristics of the experimental and control groups, it was observed that the two groups were similar in terms of their personal features ($p > 0.05$) (Table 2). The comparison of the FROGS scale and subscale scores of the experimental and control groups prior to the program showed no significant difference between the two groups ($p > 0.05$) (Table 3).

A significant difference was seen in the comparison of the pretest and posttest scores of the experimental group in terms of the FROGS scale and the social functioning, health, daily life skills subscales (Z=-3.414, $p = 0.00$; Z=-3.443, $p = 0.00$; Z=-3.473, $p = 0.01$; Z=-3.622, $p = 0.00$, respectively.).

Table 2. The comparison of the individual characteristics of the patients in the experimental and control groups (N = 32).

Variables		Experimental		Control		Statistic	
		N	%	N	%	X^{2*}	p
Gender	Female	9	56.25	10	62.5	4,800	0.280
	Male	7	43.75	6	37.5		
Marital status	Married	3	18.75	2	12.5	0.237	0.626
	Single	13	81.25	14	87.5		
Lives with whom	Alone	3	18.75	2	12.5	3.154	0.369
	Lived with family	13	81.25	14	87.5		
Graduation status	Primary school	3	18.75	4	25.0	6.701	0.153
	Middle school	4	25.0	9	56.25		
	High school	9	56.25	3	18.75		

Variables	Experimental		Control		Statistic	
	Mean ± SD	Min-max	Mean ± SD	Min-max	Z**	p
Age	43.12 ± 9.46	25–58	44.12 ± 9.48	28–60	−0.189	0.85
BMI	33.73 ± 6.61	25.36–45.11	30.34 ± 6.22	20.72–42.73	−1.244	0.21
Age at diagnosis	24.75 ± 10.96	10.00–48.00	22.81 ± 6.50	15.00–36.00	−0.019	0.98
Number of hospitalization	4.12 ± 4.51	0.00–16.00	5.00 ± 4.25	0.00–12.00	−0.570	0.56

*X^2 = Chi-Square Test.
**Z = Mann-Whitney U Test; BMI = Body Mass Index.

Table 3. The comparison of the FROGS and sub-scales scores of the patients in the experimental and control groups (experimental group n = 16, control group n = 16).

Scale	Group	Pretest		Posttest		Statistic	
		Mean ± Sd	Min-max	Mean ± Sd	Min-max	**Z***	p
FROGS scale	Experimental	61.18 ± 15.3	25.00–81.00	66.18 ± 14.89	28.00–83.00	−3.414	**0.00**
	Control	61.31 ± 8.73	41.00–78.00	60.62 ± 8.40	41.00–78.00	−1.063	0.28
		Z**= −0.302; p = 0.76		Z**= −1.981; **p = 0.04**			
Social functioning	Experimental	20.93 ± 6.00	8.00–29.00	23.12 ± 5.47	10.00–29.00	−3.443	**0.00**
	Control	20.93 ± 4.58	14.00–29.00	20.50 ± 4.09	14.00–28.00	−1.403	0.16
		Z** = −0.359; p = 0.71		Z** = −1.968; **p = 0.04**			
Health and treatment	Experimental	13.12 ± 3.64	5.00–19.00	15.31 ± 3.99	5.00–20.00	−3.473	**0.01**
	Control	13.43 ± 2.70	9.00–17.00	13.75 ± 2.20	9.00–17.00	−.850	0.39
		Z** = 0.00; p = 1.00		Z** = −2.094; **p = 0.03**			
Daily life	Experimental	20.81 ± 4.53	10.00–27.00	24.00 ± 4.01	15.00–29.00	−3.622	**0.00**
	Control	21.81 ± 4.15	14.00–29.00	21.37 ± 4.22	14.00–29.00	−1.933	0.06
		Z** = −0.227; p = 0.82		Z** = −1.967; **p = 0.04**			
Professional functioning	Experimental	5.93 ± 1.91	2.00–9.00	6.56 ± 1.82	2.00–9.00	−1.903	0.06
	Control	5.12 ± 1.25	2.00–7.00	5.00 ± 1.21	2.00–7.00	−1.414	0.15
		Z** = −1.470; p = 1.42		Z** = −2.880; p = 0.06			

*Z = Wilcoxon Signed-Rank Test.
**Z = Mann-Whitney U Test.

No significant difference was found between the pretest/posttest scores on the professional functional subscale of the experimental group (Z=-1.903; p = 0.06).

A significant difference was found when the posttest FROGS scale, social functioning, health, daily life skills subscale scores of the experimental and control group were compared (Z=-1.981, p = 0.04; Z=-1.968, p = 0.04; Z=-2.094, p = 0.03; Z=-1.967 p = 0.04, respectively). There was no difference in the professional functional subscale posttest scores (p > 0.05) (Table 3). The FROGS scale, social functioning, health, daily life skills subscale scores of the experimental group were higher than those of the controls (Table 3). No significant difference was found between the pretest-posttest scores of the control group on the FROGS scale and its subscales (p > 0.05) (Table 3).

A significant difference was found between the pretest/posttest BMI measures of the experimental group (Z=-3.294, p = 0.001). The posttest BMI of the experimental group was lower than in the pretest. A significant difference could not be found between the pretest/posttest BMI measures of the control group (Z=-0.094, p = 0.925). No significant difference could be found between the posttest BMI measures of the experimental and control groups (p > 0.05) (Table 4).

Discussion

Our study offers our findings on the effect of an 8-week exercise program on the functional remission and weight control of 32 individuals with schizophrenia. It can be said that following the exercise program, the individuals with schizophrenia achieved an improvement in their functional remission and a loss of weight.

Effect of the exercise program on functional remission

It is reported that exercise not only enhances physical well-being and improves psychological wellness in individuals

Table 4. The comparison of BMI of the patients in the experimental and control groups (experimental group n = 16, control group n = 16).

		Pretest		Posttest		Statistic	
Scale	Group	Mean ± Sd	Min-max	Mean ± Sd	Min-max	Z*	p
BMI	Experimental	33.73 ± 6.61	25.36–45.11	32.67 ± 9.17	23.50–41.85	−3.294	**0.001**
	Control	30.34 ± 6.22	20.72–42.73	30.35 ± 6.14	20.64–42.85	−0.094	0.925
		Z** = −1.244; p = 0.214		Z** = −1.131; p = 0.258			

*Z = Wilcoxon Signed-Rank Test.
**Z = Mann-Whitney U Test.
BMI = Body Mass Index.

with schizophrenia but also reduces the need for care, at the same time increasing functionality (Dauwan et al., 2016; Ryu et al., 2020; Stubbs et al., 2018). Studies conducted using different types of exercising methods reveal that exercise programs improve quality of life in the domains of physical health, emotional roles, energy, general perception of health, social functioning and mental health in intervention groups (Dauwan et al., 2016; Kavak & Ekinci, 2016; Pieters et al., 2019). Results show that exercise is effective in raising the level of functional remission.

One reason there is an improvement in the level of functional remission after an exercise program is because individual goals are set out for the activity, offering patients motivation. In the nurse-led exercise program, the patients received individual attention, becoming individually motivated and receiving feedback. Their daily individualized goals were determined, they were helped when needed, their knowledge about exercising was enhanced, their questions answered and they were motivated to overcome their fear of falling. Sports trainers were asked to supervise whenever necessary. It is reported in the literature that exercise programs provide participating patients with effective motivation and feedback (Choi et al., 2020; Firth et al., 2016), and it is suggested that motivational techniques and individualized goals should be set up during these sessions (Firth et al., 2016).

An indication that patients have improved their functioning is the finding that no one has been absent at sessions and no one has dropped out of the program. It is asserted in the literature that low dropout rates in psychosocial intervention therapy programs demonstrate that patients have gained improved functioning (Choi et al., 2020; Ho et al., 2016; Shimada et al., 2019). The fact that there were no dropouts in our exercise program showed that the individuals were able to tolerate the program, indicating further that the program could be an important component of future studies and therapies.

Social functioning

Individuals with schizophrenia generally live a more inactive life compared to their healthy counterparts, and their motivation to participate in activities is low (Vancampfort et al., 2017). Low motivation adversely affects social functioning, independent functioning and social life, causing psychosocial functioning disorders (Firth et al., 2016; Takahashi et al., 2020). There are various exercise applications reported in the literature that are designed to achieve increased activity, and it is said that after such exercise programs, an increase can be seen in social adaptation and participation in social activities (Takahashi et al., 2020; Yoon et al., 2016). Similarly, it was seen in this study that individuals assisted one another during the program and interacted with others through talking and observing. This was behavior that was noted by the researchers working with the patients in the program sessions.

Additionally, it can be said that increased social functioning was observed as a result of the exercise program as a result of the motivating discussions held with the patients prior to the start of the program, the planning of individualized goals, the patients' active and physical participation in the program, the increased activity the program offered and because the application was a group enterprise. In particular, with their participation in the group activities, the individuals displayed socialization, cooperation and interpersonal learning; these therapeutic factors may be considered to have created a social environment that affected the patients' functionality. Feelings of belonging to a group, being a part of the community, or being with people who have come together for mutual goals may also have improved functioning (Pieters et al., 2019). The group activities may have given patients the opportunity to interact with others and to expand upon their interpersonal relations by talking with each other and engaging in a cooperative effort.

Furthermore, based on some studies that have reported that exercise has an impact on negative symptoms (Budak & Yilmaz, 2019; Ho et al., 2016; Ryu et al., 2020; Sabe et al., 2020; Vogel et al., 2019), it can be suggested that exercise has been successful in reducing social isolation and withdrawal from the community as well as in decreasing introverted behavior and increasing social functioning.

Health and treatment

An increase was achieved in the health subscale of the FROGS scale following the program. The scale's health and treatment subscale measures the level of adaptation individuals show toward their treatment as well as their ability to cope with the effects of their disease and the therapy (Emiroğlu et al., 2009).

The individuals in the program did not display any kind of absenteeism due to the disease or its treatment, and all of them actively participated in the activities. Being able to move about physically and engage in physical activity may have been factors that energized and motivated the participants (Pieters et al., 2019). This can be regarded as a sign of health. All of these factors may have contributed to the increase in the health subscale scores. In fact, researchers

report in the literature than exercise programs improve quality of life, physical health, the perception of general health and also increase levels of mental health (Dauwan et al., 2016; Yarborough et al., 2016). At the same time, it is asserted that both positive and negative symptoms and signs of disease decrease as compared to control groups (Budak & Yilmaz, 2019; Choi et al., 2020; Ho et al., 2016; Ryu et al., 2020; Su et al., 2016; Takahashi et al., 2020). The increase in scores in the health subscale can be interpreted as being an indication that by participating in the exercise program, the patients gained clinical insight and better complied with their treatment. In this context, Budak & Yılmaz (2019) reported a similar result in their research using a yoga program.

It has also been observed that many patients do not want to take their medications because of physical and psychosocial side effects and because of this, there are increases in both negative and positive symptoms (Koshikawa et al., 2016; Lahera et al., 2018; Li et al., 2018). It is therefore important that alternative methods are integrated into the treatment to support a reduction in disease symptoms. We believe that exercise programs can provide this support. Accordingly, the increases noted in the health and social functioning subscales in our study can be offered as evidence of the effectiveness of exercise programs.

Daily life

Significant improvement was seen in the daily life skills of exercise program participants. The individuals make active use of their body, extremities and multiple muscle groups, and are able to develop their fine motor skills. This causes improvements in their daily life activities as well as in their quality of life (Dauwan et al., 2016). It can be said consequently that this may have the effect of improving the state of their daily life skills. Studies on physical exercise, cycling and Tai-chi programs designed for individuals with schizophrenia have indicated that significant improvements were noted in the individuals' daily life activities and in the quality of their lives (Ho et al., 2016; Shimada et al., 2019; Yoon et al., 2016).

Research also shows that exercise improves cognitive symptoms (Ryu et al., 2020; Sabe et al., 2020; Shimada et al., 2019; Su et al., 2016; Vogel et al., 2019). In this study, we saw that the patients actively used the cognitive skills of concentration and focusing and they were able to continue with the task at hand. The patients succeeded in attending all of the sessions until the end of the program without dropping out, thus exhibiting a definitive improvement in their skills. The program thus may have contributed to enhancing the daily life skills involved in starting and persevering with a task. This in turn may have been responsible for an increase in the daily life skills subscale scores.

Professional functioning

There was no difference in the professional functional subscale scores in the study or control groups after the program. Findings of other studies on exercise programs conducted with individuals with schizophrenia similarly showed that significant differences were found in all subscales except in the professional functioning domain (Gevrek, 2017). In the literature, indicators of professional functionality are defined as job search or return to work/school, ability to work, employment, and professional integration. The fact that the individual is actively doing her/his job or going to school indicates that she/he has professional functionality (Emiroğlu et al., 2009). Based on these results, it may be said that since individuals who attend the CMHCs and participate in psychosocial programs spend the whole day at the center, they have no time to pursue an active professional career. It is because of this that it has been found that exercise programs do not have a visible effect on the professional functioning of individuals with schizophrenia. It might be recommended that other psychosocial programs geared to increase professional functioning are gradually developed and implemented and that counseling in this aspect of life is offered to individuals. Furthermore, in the effort to achieve improvements in professional functioning, it would also be useful to provide the necessary guidance and follow-up to involve individuals applying to the CMHCs in handicrafts, art workshops and other psychosocial activities where they can actively participate.

Effect of the exercise program on weight control

We found that although the experimental group had displayed a difference between pretest and posttest BMI measurements, no significant difference could be seen between the experimental and control groups in their posttest measurements. It can therefore be said that the program implemented in our study had only a partial effect on weight control. This result may have been a consequence of the short term of 8 weeks that the program was implemented. It is seen in the literature that the duration of studies on weight management varies between 12 and 24 weeks (Magni et al., 2017; Speyer et al., 2019). This is why there needs to be longer term studies focused on weight control. It is recommended that programs intended for weight management cover a longer period of time.

The exercise program used in this study produced the results that the individuals in the study group displayed a reduction of 1.06 kg/m^2 in their BMI following the program, while those who did not participate showed a BMI gain of 0.01 kg/m^2. The literature reveals that various exercise programs applied to individuals with schizophrenia resulted in a drop in the patients' weight and mean BMI figures (Magni et al., 2017; Speyer et al., 2019). At the same time, it has been reported that individuals could control their weight as a result of the regular physical activity they engaged in as a part of the exercise program, thus improving perceived health and achieving health-related self-efficacy. These positive outcomes, it is emphasized, had a positive effect on many aspects of the patients' lives (Yarborough et al., 2016). Due to these benefits, we believe that such programs should be incorporated into integrative therapy applied in the field of mental health.

Study limitations

The cardiovascular risks of the patients were not evaluated for the study, but only their medical history and medical records. Those with no problem in their daily follow-ups in terms of blood pressure and pulse rate and who had no cardiological history were taken into the study. A cardiovascular risk evaluation is recommended for future studies. Future studies may also include total cholesterol, triglyceride and glucose levels measured before and after the implementation of the program.

An eight-session program was employed in our study. Six sessions can be considered too short for a program of this kind. Another limitation of the study was that a follow-up test was not applied at the end of the program to compare the variables with the results of the posttest. It can be suggested that studies to be conducted in the future work with follow-up measurements to assess the long-term effectiveness of the program.

Relevance for clinical practice

This nurse-led intervention is, to the best of our knowledge, the first study to examine the effect of exercise on functional remission in schizophrenia. From this aspect, the study presents the literature with new knowledge. It is seen that exercise is effective in providing patients with social, physical and health benefits, enabling patients to achieve functionality, maintain their lives and manage their illness at the same time. As members of the health team and as those entrusted with planning the care of their patients, nurses assume responsibilities at the CMHCs as healthcare professionals. This is why nurses can lead the way in integrating and implementing functionality-increasing programs into the routine medical treatment programs that are organized at the CMHCs.

Conclusion

This was a randomized and controlled study to examine the effect of an exercise program on the functional remission and weight control of individuals with schizophrenia. Improvements were recorded in the patients' health and in their social and daily functioning. Following the program, it was seen that the individuals displayed drops in their BMI measures. Our recommendation is that exercise programs are included in the treatment schedule at the time a pharmacological plan is being set up for the patient so as to prevent weight gain, loss of functioning and social isolation.

Acknowledgment

The authors acknowledge the cooperation of the Community Mental Health Center workers and patients who participated in this study.

Funding

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

Ethics approval statement

The University Ethics Committee's Ethics Permission (No. 09.2019.200) and the approval of the institution, as well as the patient's, guardian's and physician's consent were obtained. All procedures performed in study been performed in accordance with the ethical standards laid down in an appropriate version of the Declaration of Helsinki (as revised in Brazil 2013). The CONSORT statement was used as a checklist for reporting how this trial was conducted. Permission was also requested and obtained from Emiroğlu for the use of FROGS.

Patient consent for publication statement

Those who matched the criteria, had a rehabilitation program included in their treatment, did not have any issue that would prevent them from participating in a group activity and were willing to join the exercise program were asked for their written consent. At the same time, the consent of the patients' legal guardians was obtained for their participation in the program and they were provided information about its content. They were also informed that refusing to participate in the program would not affect treatment and care.

Author contributions

All authors had made substantial contributions to all of the following: (1) the conception and design of the study, or acquisition of data, or analysis and interpretation of data, (2) drafting the article or revising it critically for important intellectual content, (3) final approval of the version to be submitted. All authors are in agreement with the manuscript.

Disclosure statement

The authors confirm that there are no relevant financial or non-financial competing interests to report.

ORCID

Fatma Nevin Sisman http://orcid.org/0000-0001-9543-6875
Berna Büber http://orcid.org/0000-0002-2243-4980
Fatma Taş http://orcid.org/0000-0003-4930-0357
Hatice Turan http://orcid.org/0000-0003-4387-0412

References

Annamalai, A., Kosir, U., & Tek, C. (2017). Prevalence of obesity and diabetes in patients with schizophrenia. *World Journal of Diabetes*, *8*(8), 390–396. https://doi.org/10.4239/wjd.v8.i8.390

Budak, F. K., & Yilmaz, E. (2019). The effect of yoga on clinical insight and medication adherence in patients with schizophrenia - A randomized controlled trial. *European Journal of Integrative Medicine*, *30*, 100949. https://doi.org/10.1016/j.eujim.2019.100949

Çam, O., & Yalçıner, N. (2018). Mental illness and recovery. *Journal of Psychiatric Nursing*, *9*(1), 55–60. https://doi.org/10.14744/phd.2017.49469

Çelikbaş, Z., & Ergün, S. (2018). The relationship between neurocognitive dysfunction and functionality in schizophrenia. *Journal of Contemporary Medicine*, *8*(2), 183–187. https://doi.org/10.16899/gopctd.424417

Choi, J., Taylor, B., Fiszdon, J. M., Kurtz, M. M., Tek, C., Dewberry, M. J., Haber, L. C., Shagan, D., Assaf, M., & Pearlson, G. D. (2020).

The synergistic benefits of physical and cognitive exercise in schizophrenia: Promoting motivation to enhance community effectiveness. *Schizophrenia Research. Cognition*, *19*, 100147. https://doi.org/10.1016/j.scog.2019.100147

Dauwan, M., Begemann, M. J., Heringa, S. M., & Sommer, I. E. (2016). Exercise improves clinical symptoms, quality of life, global functioning, and depression in schizophrenia: A systematic review and meta-analysis. *Schizophrenia Bulletin*, *42*(3), 588–599. https://doi.org/10.1093/schbul/sbv164

Emiroğlu, B., Karadayı, G., Aydemir, Ö., & Üçok, A. (2009). Validation of the Turkish version of the "functional remission of general schizophrenia" (FROGS) scale. *Archives of Neuropsychiatry*, *46*(supp), 15–24.

Firth, J., Rosenbaum, S., Stubbs, B., Gorczynski, P., Yung, A. R., & Vancampfort, D. (2016). Motivating factors and barriers towards exercise in severe mental illness: A systematic review and meta-analysis. *Psychological Medicine*, *46*(14), 2869–2881. https://doi.org/10.1017/S0033291716001732

Firth, J., Stubbs, B., Rosenbaum, S., Vancampfort, D., Malchow, B., Schuch, F., Elliott, R., Nuechterlein, K. H., & Yung, A. R. (2016). Aerobic exercise improves cognitive functioning in people with schizophrenia: A systematic review and meta-analysis. *Schizophrenia Bulletin*, *43*(3), sbw115–556. https://doi.org/10.1093/schbul/sbw115

Gevrek, E. H. (2017). *The effect of physical exercise to positive negative symptoms and depression level of schizophrenic patients* [Master's thesis]. Institute of Social Sciences, Uskudar University. https://tez.yok.gov.tr/UlusalTezMerkezi/tezDetay.jsp?id=AzrCQ3jKPiQ8d13kc0LdRA&no=DTrFRupmB0lXtnnEI39CRA

Ho, R. T. H., Fong, T. C. T., Wan, A. H. Y., Au-Yeung, F. S. W., Wong, C. P. K., Ng, W. Y. H., Cheung, I. K. M., Lo, P. H. Y., Ng, S. M., Chan, C. L. W., & Chen, E. Y. H. (2016). A randomized controlled trial on the psychophysiological effects of physical exercise and Tai-chi in patients with chronic schizophrenia. *Schizophrenia Research*, *171*(1–3), 42–49. https://doi.org/10.1016/j.schres.2016.01.038

Kavak, F., & Ekinci, M. (2016). The effect of yoga on functional recovery level in schizophrenic patients. *Archives of Psychiatric Nursing*, *30*(6), 761–767. https://doi.org/10.1016/j.apnu.2016.07.010

Koshikawa, Y., Takekita, Y., Kato, M., Sakai, S., Onohara, A., Sunada, N., Nishida, K., Yoshimura, M., Fabbri, C., Serretti, A., & Kinoshita, T. (2016). The comparative effects of risperidone long-acting injection and paliperidone palmitate on social functioning in schizophrenia: A 6-month, open-label, randomized controlled pilot trial. *Neuropsychobiology*, *73*(1), 35–42. https://doi.org/10.1159/000442209

Lahera, G., Gálvez, J. L., Sánchez, P., Martínez-Roig, M., Pérez-Fuster, J. V., García-Portilla, P., Herrera, B., & Roca, M. (2018). Functional recovery in patients with schizophrenia: Recommendations from a panel of experts. *BMC Psychiatry*, *18*(1), 176. https://doi.org/10.1186/s12888-018-1755-2

Li, J., Shen, J., Wu, G., Tan, Y., Sun, Y., Keller, E., Jiang, Y., & Wu, J. (2018). Mindful exercise versus non-mindful exercise for schizophrenia: A systematic review and meta-analysis of randomized controlled trials. *Complementary Therapies in Clinical Practice*, *32*, 17–24. https://doi.org/10.1016/j.ctcp.2018.04.003

Lök, S., & Lök, N. (2016). Efficiency of physical exercise programs on chronic psychiatric patients: A systematic review. *Current Approaches in Psychiatry*, *8*(4), 354–366. https://doi.org/10.18863/pgy.253440

Magni, L. R., Ferrari, C., Rossi, G., Staffieri, E., Uberti, A., Lamonaca, D., Boggian, I., Merlin, S., Primerano, G., Mombrini, A., Poli, R., Saviotti, F. M., Caldera, M. T., Zanotti, L., & Rossi, R. (2017). Superwellness program: A cognitive-behavioral therapy-based group intervention to reduce weight gain in patients treated with antipsychotic drugs. *Revista Brasileira de psiquiatria (Sao Paulo, Brazil: 1999)*, *39*(3), 244–251. https://doi.org/10.1590/1516-4446-2016-1993

Malchow, B., Keeser, D., Keller, K., Hasan, A., Rauchmann, B. S., Kimura, H., Schneider-Axmann, T., Dechent, P., Gruber, O., Ertl-Wagner, B., Honer, W. G., Hillmer-Vogel, U., Schmitt, A., Wobrock, T., Niklas, A., & Falkai, P. (2016). Effects of endurance training on brain structures in chronic schizophrenia patients and healthy controls. *Schizophrenia Research*, *173*(3), 182–191. https://doi.org/10.1016/j.schres.2015.01.005

Pieters, H. C., Ayala, L., Schneider, A., Wicks, N., Levine-Dickman, A., & Clinton, S. (2019). Gardening on a psychiatric inpatient unit: Cultivating recovery. *Archives of Psychiatric Nursing*, *33*(1), 57–64. https://doi.org/10.1016/j.apnu.2018.10.001

Ryu, J., Jung, J. H., Kim, J., Kim, C. H., Lee, H. B., Kim, D. H., Lee, S. K., Shin, J. H., & Roh, D. (2020). Outdoor cycling improves clinical symptoms, cognition and objectively measured physical activity in patients with schizophrenia: A randomized controlled trial. *Journal of Psychiatric Research*, *120*, 144–153. https://doi.org/10.1016/j.jpsychires.2019.10.015

Sabe, M., Kaiser, S., & Sentissi, O. (2020). Physical exercise for negative symptoms of schizophrenia: Systematic review of randomized controlled trials and meta-analysis. *General Hospital Psychiatry*, *62*, 13–20. https://doi.org/10.1016/j.genhosppsych.2019.11.002

Shimada, T., Ito, S., Makabe, A., Yamanushi, A., Takenaka, A., & Kobayashi, M. (2019). Aerobic exercise and cognitive functioning in schizophrenia: A pilot randomized controlled trial. *Psychiatry Research*, *282*, 112638. https://doi.org/10.1016/j.psychres.2019.112638

Silva, M. A., & Restrepo, D. (2019). Functional recovery in schizophrenia. *Revista Colombiana de Psiquiatría (English Ed.)*, *48*(4), 252–260. https://doi.org/10.1016/j.rcpeng.2017.08.004

Speyer, H., Jakobsen, A. S., Westergaard, C., Nørgaard, H., Jørgensen, K. B., Pisinger, C., Krogh, J., Hjorthøj, C., Nordentoft, M., Gluud, C., & Correll, C. U. (2019). Lifestyle interventions for weight management in people with serious mental illness: A systematic review with meta-analysis, trial sequential analysis, and meta-regression analysis exploring the mediators and moderators of treatment effects. *Psychotherapy and Psychosomatics*, *88*(6), 350–362. https://doi.org/10.1159/000502293

Stubbs, B., Vancampfort, D., Hallgren, M., Firth, J., Veronese, N., Solmi, M., Brand, S., Cordes, J., Malchow, B., Gerber, M., Schmitt, A., Correll, C. U., De Hert, M., Gaughran, F., Schneider, F., Kinnafick, F., Falkai, P., Möller, H. J., & Kahl, K. G. (2018). EPA guidance on physical activity as a treatment for severe mental illness: A meta-review of the evidence and Position Statement from the European Psychiatric Association (EPA), supported by the International Organization of Physical Therapists in Mental Health (IOPTMH). *European Psychiatry*, *54*, 124–144. https://doi.org/10.1016/j.eurpsy.2018.07.004

Su, C. Y., Wang, P. W., Lin, Y. J., Tang, T. C., Liu, M. F., & Chen, M. D. (2016). The effects of aerobic exercise on cognition in schizophrenia: A 3-month follow-up study. *Psychiatry Research*, *244*, 394–402. https://doi.org/10.1016/j.psychres.2016.08.011

Takahashi, S., Keeser, D., Rauchmann, B. S., Schneider-Axmann, T., Keller-Varady, K., Maurus, I., Dechent, P., Wobrock, T., Hasan, A., Schmitt, A., Ertl-Wagner, B., Malchow, B., & Falkai, P. (2020). Effect of aerobic exercise combined with cognitive remediation on cortical thickness and prediction of social adaptation in patients with schizophrenia. *Schizophrenia Research*, *216*, 397–407. https://doi.org/10.1016/j.schres.2019.11.004

van der Stouwe, E., van Busschbach, J. T., de Vries, B., Cahn, W., Aleman, A., & Pijnenborg, G. (2018). Neural correlates of exercise training in individuals with schizophrenia and in healthy individuals: A systematic review. *NeuroImage Clinical*, *19*, 287–301. https://doi.org/10.1016/j.nicl.2018.04.018

Vancampfort, D., Firth, J., Schuch, F. B., Rosenbaum, S., Mugisha, J., Hallgren, M., Probst, M., Ward, P. B., Gaughran, F., De Hert, M., Carvalho, A. F., & Stubbs, B. (2017). Sedentary behavior and physical activity levels in people with schizophrenia, bipolar disorder and major depressive disorder: A global systematic review and meta-analysis. *World Psychiatry*, *16*(3), 308–315. https://doi.org/10.1002/wps.20458

Vogel, J. S., Gaag, M., Slofstra, C., Knegtering, H., Bruins, J., & Castelein, S. (2019). The effect of mind-body and aerobic exercise on negative symptoms in schizophrenia: A meta-analysis. *Psychiatry Research*, *279*, 295–305. https://doi.org/10.1016/j.psychres.2019.03.012

Yalçıntürk, A. A. (2018). Supporting physical evercise ın psychiatric patients: Pender's health promotion model. *Journal of Nursing Science*, *1*(1), 33–37.

Yarborough, B. J., Leo, M. C., Yarborough, M. T., Stumbo, S., Janoff, S. L., Perrin, N. A., & Green, C. A. (2016). Improvement in body image, perceived health, and health-related self-efficacy among people with serious mental illness: The STRIDE Study. *Psychiatric Services (Washington, D.C.)*, *67*(3), 296–301. https://doi.org/10.1176/appi.ps.201400535

Yoon, S., Ryu, J. K., Kim, C. H., Chang, J. G., Lee, H. B., Kim, D. H., & Roh, D. (2016). Preliminary effectiveness and sustainability of group aerobic exercise program in patients with schizophrenia. *The Journal of nervous and mental disease*, *204*(9), 644–650. https://doi.org/10.1097/NMD.0000000000000534