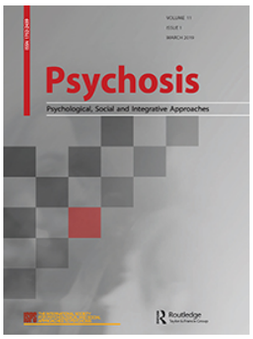

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A longitudinal study about the impact of an inclusive sports program in people with a diagnosis of schizophrenia

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ABSTRACT

The present study analyzes the impact of an Inclusive Sports and Physical Activity Program which lasted 14 months on a sample of people with a diagnosis schizophrenia. 30 people took part in the study. An initial evaluation was conducted after 7 months and a final evaluation was carried out at the end of the program. In addition, a follow-up evaluation was conducted 1 year after the program had ended. The sample was divided into two groups based on attendance (those who participated regularly, and those who attended occasionally). Results showed statistically significant improvements in the functional aerobic capacity of both groups, but to a greater degree for the individuals who attended regularly. In terms of body composition, statistically significant improvements were only observed among the group with regular attendance. Regarding motor skills, only balance was improved (in both groups). A general decline in the physical variables assessed was observed in the follow-up, however, this decline was less pronounced among the group of individuals that attended the program regularly than for the group with lower attendance. The results confirm the effectiveness of this type of intervention, particularly when carried out regularly, and show the need to promote inclusive programs in people with a diagnosis of schizophrenia that favor adherence to these types of programs.

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Schizophrenia; physical activity; sports; mental health; physical health; inclusion

Introduction

At present, one of the main problems facing individuals diagnosed with schizophrenia is their poor physical health (De Rosa et al., 2017; Leone, Lalande, Thériault, Kalinova, & Fortin, 2015). For example, the mortality rate is up to three times higher than for the general population, and their life expectancy is between 15 and 30 years lower (De Hert, Schreurs, Vancampfort, & Van Winkel, 2009; Thornicroft, 2011; Walker, McGee, & Druss, 2015).

This is largely due to a greater comorbidity with somatic diseases, linked to risk factors such as sedentary lifestyle, obesity, high-caloric diets, consumption of alcohol and other toxic substances, tobacco dependence, and the use of antipsychotic medication (Firth et al., 2016; Moore, Shiers, Daly, Mitchell, & Gaughran, 2015; Vancampfort et al., 2015). In this sense, current evidence shows that people with a diagnosis of schizophrenia do much less physical activity than the rest of the general population and also spend more time sitting or lying down in the daytime (Biddle, 2016; Stubbs et al., 2016; Vancampfort et al., 2017).

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In recent years, numerous studies have been carried out to analyze the results of interventions using physical exercise with this population (Stubbs, Chen, Chung, & Ku, 2017; Vancampfort et al., 2017). For example, in a systematic review (Verhaeghe, De Maeseneer, Maes, Van Heeringen, & Annemans, 2011), 11 of the 14 interventions based on physical activity and eating habits proved to be effective in terms of reducing weight and body mass index (BMI) among overweight and obese individuals diagnosed with schizophrenia. However, other reviews found that exercise interventions had no significant effect on BMI but could improve physical condition and other cardiometabolic risk factors (Firth, Cotter, Elliott, French, & Yung, 2015). These data suggest that exercise interventions are dependent on various factors; such as frequency, session and intervention duration, exercise modalities performed, and intensity.

There are also different motivational factors and barriers linked to physical activity among people diagnosed with schizophrenia. Some of these issues include physical aspects, such as obesity and poor physical condition, psychological factors, such as negative symptoms related to their mental illness, stress, depression and disinterest in physical activity, and socio-contextual factors, such as lack of social support, lack of financial means or difficulty accessing sports facilities. Thus, it can be concluded that individuals with a diagnoses of schizophrenia need more proactive support in a variety of ways (institutional, professional, family, social, economic, etc.) to facilitate their participation in physical activity and sports on a regular basis (De Hert et al., 2011; Firth et al., 2016).

The research studies cited above confirm the need to implement exercise programs aiming to improve the health of this population. However, few studies analyze these kinds of programs for an extended period of time. Most of them had an intervention period between 3 and 6 months or even less, and very few studies had an intervention period of 12 months or more. The same occurred with the follow-up, which in all cases was less than 6 months after the end of the intervention. (Brown, Goetz, & Hamera, 2011; Bruins et al., 2014; Carter-Morris & Faulkner, 2003; Daumit et al., 2013: Poulin et al., 2007; Skrinar, Huxley, Hutchinson, Menninger, & Glew, 2005). Moreover, not one study was found which presented an inclusive approach, that is, with the participation of students or volunteers.

The absence of such studies led to the main objective of the current study, which was to evaluate the effect of a physical activity program with people with a diagnosis of schizophrenia, carried out during 14 months and with a follow up of 1 year, in a wide series of variables (i.e. body composition, physical condition and functional aerobic capacity). The program was developed in a public sport facilities and featured the involvement of an important number of students who helped to make the activities inclusive.

Methods

Participants

Initially, 32 people volunteered to participate in the program, however, two of them were unable to take part due to doctor recommendations based on cardiological anomalies detected during ECG tests. Thus, the sample consisted of 30 individuals, 22 of whom were men (73%) and 8 were women (27%). Ages in the group ranged from 27 to 61 (M = 46.64; SD = 9.24). All the participants had a diagnosis of schizophrenia. Table 1 shows the sociodemographic characteristics of the sample. As regards medication, only one person was not taking any type of psychiatric medication, the rest of participants were taking some type of antipsychotic at the start of the program.

Materials

AFISAL-INEFC test battery to evaluate healthy physical conditions in adults

(Rodríguez, Valenzuela, Gusi, Nacher, & Gallardo, 1998). The following variables were measured using the AFISAL-INEFC test battery: weight (W), BMI, waist-hip ratio (WHR), body fat (BF), total skinfolds or adiposity (SF) (pectoral, abdominal and front thigh for men; triceps, iliac crest and front thigh for women), maximum two-hand pressure strength (TPS) by means of manual dynamometry

Table 1. Sociodemographic characteristics of participants.

Category	N (%)
Sex	
Men	22 (73.3%)
Women	8 (26.7%)
Marital status	
Single	23 (76.6%)
Separated/Divorced	7 (23.4%)
Education level	
Incompleted Primary education	12 (40%)
Primary Education	6 (20%)
Secondary Education	12 (40%)
University studies	0 (0%)
Medical background	
Diabetes	6 (20%)
Obesity	7 (23.3%)
Tobacco dependence	14 (46.6%)
Others	11 (36.6%)

(maximum and isometric strength of finger flexor muscles). Lower body strength (LBS) was also assessed using a force plate in two tests. The first measured participants' vertical jump and the second evaluated their static balance by standing on one foot with eyes closed for 1 min. The number of times they lost their balance (both feet touched ground) was counted. If they lost balance 15 times in the first 30 s, they were given a zero and the test was stopped. The last variable related to physical fitness which was assessed was the trunk flexibility test, which was carried out using a sit and reach box. This test evaluates the overall flexibility of the lower back and hamstring muscles.

Six minute walk test

(6MWT) is a submaximal test that measures functional fitness capacity. This test was carried out in accordance with the guidelines of the American Thoracic Society (2002). The test consisted of walking as fast as possible along a 25-m hallway, back and forth, as many times as possible in 6 min. The 6MWT evaluated the following variables: maximum oxygen uptake (max. VO2), distance walked (DW), theoretical percentage of meters walked (TPMW), initial and final heart rate (HR), initial and final oxygen saturation levels in blood (SaO2), blood pressure (BP) at the start, end, and after 5 min recovery time, and dyspnea and fatigue (Borg Scale). It must be mentioned that a practice trial was held with all the participants prior to conducting the first evaluation measurement (pretest). This was done to compensate for possible biases caused by the effect of practice (results tend to stabilize after two or three applications of the 6MWT) (Troosters, Gosselink, & Decramer, 1999).

Attendance register

An attendance register was kept to make a note of which participants attended each session.

Procedure

The protocol was approved by the Research Ethics Committee of the University of Almería, Spain. All participants gave written informed consent in accordance with the Declaration of Helsinki.

The first evaluation was conducted before initiating the exercise program (pretest) using the tools previously mentioned. The second evaluation was carried out seven months after the program had begun (posttest 1), the third just after the program had ended; 14 months after starting (posttest 2), and, finally, a follow-up evaluation was carried out 1 year after the program had ended.

The Inclusive Sport and Exercise Program (hereafter ISEP) was held 3 days a week. Each session lasted an hour and a half, conducted over the course of 14 months of intervention. It must be noted that the time in the hour and a half session also included the welcoming of the participants, attendance register, warm-up, stretching, feedback and the group goodbye. As a result, the time actually dedicated to physical activity and sport was approximately 1 h.

As for the activities carried out during ISEP, there were five distinct type of groups: (1) rhythm and music based activities (aerobics, salsa and bachata dancing, etc.); (2) group exercises and traditional games favoring cohesion group, such as those cited in Gómez-Calvache (2012, p. (3) skills and obstacle courses; and (4) sports activities adapted to the participants (football, basketball, handball, rugby, kin-ball, athletics, volleyball, badminton, baseball and hockey) and (5) hiking.

All activities were adapted to the participants in terms of the intensity of the sport (low-medium intensity) and the rules (allowing all participants to take part throughout the entire game). Also, mixed teams were made including both students and mental health patients in order to create a truly inclusive experience.

The sessions were divided into three phases. The first phase included an initial warm-up (static/dynamic and general/specific exercises) and games, lasting a total of 20 to 25 min (10 min warm-up; 10–15 min games). The games chosen for this phase were popular, traditional games that were both dynamic and fun. These activities also served to facilitate cohesion group and to foster a sense of unity. The second main phase, lasting 30–35 min, represented the moderate intensity portion of the session. During this time, a variety of musical activities, obstacle courses and sports activities were carried out, similar to those mentioned above. Finally, the third phase, or "cool-down", consisted of stretching, light exercises and relaxation exercises (10 min), followed by a discussion period (5 min) which was a time to share and receive feedback of the session.

To conduct the sessions and to ensure that the program was inclusive, eight students from the University of Almeria's Schools of Psychology and Education collaborated and participated as part of the group. These students, along with the main researcher of the present study, were responsible for making the activities as fun and entertaining as possible. The program itself was also part of the internship program included in the students' fourth-year course studies. Four were female and four were male.

Data analysis

In so much as the assumption of normality in data distribution were not fulfilled in most cases, non-parametric tests were utilized. Statistical analyses were carried out using the Friedman test for related samples (measures in pretest, posttest 1, posttest 2, and the follow-up 1 year after ISEP). As a complement to the Friedman test, and to determine in which groups differences appeared, we conducted a post hoc analysis using the Wilcoxon signed rank test for each pair. The *r* statistic was used to calculate the effect size.

Results

Once the program had ended, the participants were divided into two groups according to their attendance because, as mentioned in the introduction and as various studies state, regular physical fitness activity is necessary in order for an exercise program to be effective. Additionally, some differences (such as weight and BMI) are not significant if we consider the entire sample. However, some statistically significant changes are observed if we differentiate those who participated in the program regularly or occasionally.

Thus, on one hand, the group that attended regularly (hereafter R.G.) consisted of 13 people in the sample who attended more than 50% of the ISEP sessions. Eleven of these individuals were men and two were women, and their ages ranged from 27 to 61 (M = 43.23; SD = 11.24). On the other hand, the group that attended occasionally (hereafter O.G.) consisted of 17 people in the

sample who attended 50% or less of the ISFP sessions. Eleven were men and six were women, and their ages ranged from 42 to 61 (M = 49.5; SD = 5.74). The average attendance of R.G. was 76.7% of all sessions. (SD = 14.51), while this figure was 24.3% for O.G. (SD = 14.84%). There were no significant differences in the sociodemographic characteristics of the two groups.

The results obtained in the four evaluations carried out are displayed below. Table 2 shows the body composition results in pretest, T1 (seven months), T2 (14 months) and 1-year follow-up. With regard to the first two variables (weight and BMI) a consistent decrease is observed in R.G., and these results became significant on a statistical level at 14 months (T2), remaining so until the 1-year follow-up. However, O.G. displayed no changes.

Regarding the Waist-Hips Ratio (WHR), no statistically significant changes are observed. In contrast, a statistically significant decrease is seen for total skin folds at 14 months of intervention in R.G. but not in O.G. The same distribution was obtained for BF, for which a statistically significant decrease is observed in T2 in R.G. but not in O.G.

Table 3 displays the results of physical condition. With regard to static balance standing on one foot with eyes closed, a general improvement is observed (statistically significant in T1 and T2) for all participants in both groups separately (regular and occasional). However, in the follow-up test no improvement is observed at all.

RegardingTPS, trunk flexibility and LBS, no significant improvements are observed. However, at 14 months a decrease in pressure strength is observed in R.G. and inferior performance in LBS is observed for O.G.

Table 4 shows the results of functional aerobic capacity (6MWT). With respect toDW, a statistically significant improvement is observed after seven months of intervention for the entire sample, both for R.G. and O.G. However, at 14 months, this aspect was only significant for R.G. By the time of the follow-up evaluation, this improvement had been lost.

Similar results can be observed in maximum oxygen uptake (0.1 and 1.14 ml/kg/min), for which a statistically significant increase is observed at T1 (R.G. and O.G.) and T2 (only R.G). The same is observed for TPMS except in T2, in which a statistically significant improvement is observed for the entire sample but not for R.G. or O.G. separately. However, there is

Table 2. Body composition results from AFISAL-INEFC test battery in pre-test, T1 (7 months), T2 (14 months), and follow-up (24 months) for entire sample (*N* = 30), Regular group (*N* = 13) and Occasional group (*N* = 17).

		Total group			Regular group					Occasional group				
		Friedman			Friedman			Wilcoxon		Friedman			Wilcoxon	
		M	X^2	*p*	*M*	X^2	*p*	*P*	*r*	*M*	X^2	*p*	*P*	*r*
Weight	Pre	81.48	6,237	.101	81.56	7,089	.069			81.42	3,387	.336		
	T1	80.50			79.69			.131	−.297	81.12			.484	−.120
	T2	79.35			**77.24***			**.019**	**−.460**	80.97			.289	−.182
	Fol	80.10			**77.91***			**.036**	**−.412**	81.78			.619	−.085
BMI	Pre	28.74	7,062	.070	29.00	5,906	.116			28.55	5,067	.167		
	T1	28.40			28.28			.099	−.324	28.49			.691	−.068
	T2	27.92			**27.43***			**.019**	**−.462**	28.29			.185	−.227
	Fol	28.33			**27.88***			**.046**	**−.391**	28.67			.670	−.073
HWR	Pre	.97	3,831	.280	0.97	4,925	.177			0.97	9,551	.023		
	T1	.98			0.98			.167	−.273	0.97			.776	−.049
	T2	.96			0.97			.753	−.062	0.95			.255	−.195
	Fol	.98			0.95			.277	−.214	1.00			.059	−.324
∑ Skin folds	Pre	61.15	11,459	.009	62.76	11,129	.011			59.92	5,340	.149		
	T1	59.54			59.26			.155	−.280	59.75			.953	−.010
	T2	**55.34***			**51.86***			**.016**	**−.474**	58.00			.943	−.012
	Fol	62.98			62.16			.937	−.015	63.60			.076	−.305
% Fat	Pre	24.98	9,298	.026	24.26	9,378	.025			25.53	4,491	.213		
	T1	24.42			22.99			.136	−.293	25.50			.972	−.006
	T2	**23.15***			**20.60***			**.046**	**−.391**	25.09			.868	−.028
	Fol	25.82			24.24			.972	−.007	27.03			.061	−.321

*statistically significant changes (p = <.005) with respect to the initial evaluation.

Table 3. Physical fitness results from AFISAL-INEFC test battery in pre-test, T1 (7 months), T2 (14 months), and follow-up (24 months) for entire sample (N = 30), Regular group (N = 13) and Occasional group (N = 17).

		Total group			Regular group					Occasional group				
		Friedman			Friedman			Wilcoxon		Friedman			Wilcoxon	
		M	X^2	*p*	*M*	X^2	*p*	*P*	*r*	*M*	X^2	*p*	*P*	*r*
Two-hand Pressure Strength	Pre	63.21	3,482	.323	69.38	4,263	.234			58.48	1,166	.761		
	T1	63.86			70.19			.264	−.219	59.02			.441	−.132
	T2	60.52			**65.15***			**.049**	**−.386**	56.98			.660	−.075
	Fol	62.93			68.15			.610	−.100	58.94			.670	*−.073*
Balance	Pre	8.93	17,619	.001	10.53	8,322	.040			7.70	17,586	.001		
	T1	**3.36***			**4.84***			**.033**	**−.419**	**2.23***			**.010**	**−.444**
	T2	**4.13***			**4.61***			**.007**	**−.528**	**1.70***			**.021**	**−.397**
	Fol	5.10			7.30			.208	−.248	5.47			.476	−.122
Flexibility	Pre	-5.67	2,988	.393	-5.34	6,823	.078			-5.91	17,586	.001		
	T1	-5.55			-4.50			.258	−.222	-6.35			.689	−.069
	T2	-5.03			-5.42			−.432	−.154	-4.73			-.637	−.081
	Fol	-4.47			-3.53			.075	−.350	-5.17			.789	−.046
Lower Body Strength	Pre	28.52	6,761	.080	29.87	0,809	.847			27.57	12,401	.006		
	T1	28.34			29.64			.859	−.035	27.42			.657	−.076
	T2	27.71			30.25			.965	−.009	**25.90***			**.023**	**−.390**
	Fol	28.03			30.95			.916	−.021	25.96			−.078	−.302

*statistically significant changes (p = <.005)

a considerable change in both cases based on the results of the size effect (r = −.350 and r = −.250, respectively).

There is also a statistically significant improvement for percentage theoretical HR at 14 months (only for the entire sample), but these increases are lost in the follow-up evaluation. Final pulse oximetry also improved in T2, but only in R.G., but these effects had been lost in the follow-up. As for the score on the Borg scale (fatigue), statistically significant improvements are observed in R. G. at 7 and 14 months, but, again, these are gone by the follow-up.

Positive changes which are observed in T1 and T2, and which are also maintained in the follow-up are the initial diastolic and systolic BP and, the systolic (R.G. and O.G.) and diastolic (R.G. and O. G.) BP at 5 min recovery time (5 min REC). As for the final diastolic and systolic BP, a statistically significant improvement is only observed in T2, but neither in T1 nor the follow-up.

With regard to heart-rate (both at the start and end) and initial pulse oximetry, no statistically significant change is observed. There is, however, a moderate improvement in terms of effect sizes (Table 4).

Discussion

The results show that the intervention was effective in improving the overall physical health of the participants in the study. These findings are in keeping with those obtained in other recent works in the same field (Biddle, 2016; Leone et al., 2015; Rosenbaum, Tiedemann, & Ward, 2014; Stubbs et al., 2016; Vancampfort et al., 2017).

The results show a considerable number of statistically significant improvements in 7 and 14 months of intervention. The results reveal the importance of regular attendance and participation in these types of programs. The group of people that attended with greater frequency over the course of the program improved in all variables related to body composition (except for WHR), substantially reducing weight, BMI, BF and total skinfolds by the end of the program (T2) with respect to the pretest measurements. In contrast, the group that attended occasionally progressed through the program without obtaining any significant changes.

Table 4. Functional aerobic capacity from AFISAL-INEFC test battery in pretest, T1 (7 months), T2 (14 months), and Follow-up (24 months) for entire sample (N = 30), Regular group (N = 13) and Occasional group (N = 17).

		Total group			Regular group				Occasional group			
		M	X^2	*p*	*M*	X^2	*p*	*r*	*M*	X^2	*p*	*r*
Distance Walked (meters)	Pre	558.00	9,551	.023	570.61	12.634	.005		548.35	2.250	.522	
	T1	**575.16***			**593.15***			−.431	**561.41***			−.361
	T2	**579.66***			**606.15***			−.460	559.41			−.133
	Fol	561.66			584.92			−.185	543.88			−.086
% Theoretical Meters Walked	Pre	93.40	8,629	.035	95.51	6.143	.105		91.78	3.805	.283	
	T1	**97.87***			**102.33***			−.489	**94.45***			−.360
	T2	**98.32***			101.40			−.350	95.97			−.248
	Fol	96.26			98.56			−.247	94.50			−.071
Max. uptake VO2 (0,1ml/kg/min)	Pre	12.81	10,598	.014	13.03	11.926	.008		12.64	2.500	.475	
	T1	**13.14***			**13.48***			−.432	**12.88***			−.378
	T2	**13.18***			**13.62***			−.460	12.84			−.156
	Fol	12.89			13.27			−.171	12.59			−.053
Max. uptake VO2 (1,15ml/kg/min)	Pre	17.44	9,147	.027	17.76	10.500	.015		17.19	2.396	.494	
	T1	**17.94***			**18.46***			−.454	**17.54***			−.346
	T2	**17.96***			**18.58***			−.432	17.47			−.138
	Fol	17.54			18.13			−.193	17.09			−.078
Initial HR	Pre	83.23	926	.819	85.00	2.554	.466		81.88	2.676	.444	
	T1	83.93			85.46			−.165	82.76			−.024
	T2	81.10			81.69			−.151	80.64			−.067
	Fol	83.40			82.38			−.247	84.17			−.111
Final HR	Pre	128.93	3,569	.312	136.38	2.734	.435		123.23	1.676	.642	
	T1	129.80			133.46			−.087	127.00			−.228
	T2	126.33			128.53			−.262	124.64			−.073
	Fol	126.80			129.46			−.199	124.76			−.039
% Max. Theoretical HR	Pre	69.97	14,018	.003	71.56	4.055	.256		68.75	10.788	.013	
	T1	66.82			68.53			−.308	65.51			−.189
	T2	**65.12***			65.86			−.075	64.56			−.231
	Fol	73.84			73.87			−.185	73.81			−.293
Initial Pulse Oximetry	Pre	96.43	3,827	.281	96.76	5.621	.132		96.17	4.893	.180	
	T1	96.63			96.84			−.324	96.47			−.111
	T2	96.30			96.07			−.131	96.47			−.151
	Fol	95.93			96.30			−.313	95.64			−.161
Final Pulse Oximetry	Pre	97.33	13,246	.003	97.92	16.154	.001		96.88	4.292	.232	
	T1	97.10			97.46			−.141	96.82			−.091
	T2	**96.40***			**96.07***			−.541	96.76			−.228
	Fol	97.00			97.23			−.212	96.82			−.062
Final Borg Dyspnea	Pre	1.63	3,471	.325	1.30	0.593	.898		1.88	4.875	.181	
	T1	1.66			1.23			.000	2.00			−.092
	T2	0.36			0.38			−.220	**0.35***			−.339
	Fol	0.83			0.92			−.050	0.76			−.193
Final Borg Fatigue	Pre	1.76	6,263	.099	2.30	8.811	.032		1.35	1.061	.787	
	T1	1.26			**0.80***			−.423	1.61			.000
	T2	0.63			**0.61***			−.481	0.64			−.176
	Fol	1.43			1.07			−.307	1.70			−.097
Initial Systolic BP	Pre	112.00	55,217	.000	112.69	24.111	.000		111.47	0.583	.900	
	T1	110.83			110.38			−.153	111.17			−.047
	T2	**81.10***			**96.53***			−.608	108.82			−.154
	Fol	**107.33***			**103.84***			−.521	110.00			−.063
Initial Diastolic BP	Pre	72.83	32,317	.000	72.69	29.009	.000		72.94	7.805	.050	
	T1	71.16			71.53			−.097	70.88			−.146
	T2	**64.00***			**60.00***			−.604	**67.05***			−.399
	Fol	**64.66***			**60.76***			−.595	**67.64***			−.392
Final Systolic BP	Pre	131.30	12,549	.006	131.15	13.160	.004		131.41	2.744	.433	
	T1	131.00			132.30			−.017	130.00			−.098
	T2	**119.63***			**116.15***			−.529	**122.29***			−.353
	Fol	124.30			121.53			−.242	126.41			−.115
Final Diastolic BP	Pre	68.00	14,010	.003	69.23	11.588	.009		67.05	3.853	.278	
	T1	65.33			66.15			−.271	64.70			−.259

(*Continued*)

Table 4. (Continued).

		Total group			Regular group				Occasional group			
		M	X^2	*p*	*M*	X^2	*p*	*r*	*M*	X^2	*p*	*r*
	T2	**63.16***			**61.15***			−.417	64.70			−.270
	Fol	65.00			64.61			−.328	65.29			−.171
Systolic BP 5 min REC	Pre	118.50	23,403	.000	119.23	16.422	.001		117.94	8.536	.036	
	T1	116.16			113.46			−.184	118.23			−.037
	T2	**107.66***			**105.00***			−.585	**109.70***			−.335
	Fol	**108.00***			**106.15***			−.536	**109.41***			−.367
Diastolic BP 5 min REC	Pre	68.33	8,517	.036	66.53	5.741	.125		69.68	2.290	.514	
	T1	65.50			63.84			−.221	67.18			−.310
	T2	**64.50***			**62.69***			−.437	**66.25***			−.357
	Fol	**63,66***			**62.69***			−.097	**64.68***			−.384

*statistically significant changes (p = <.005)

Similar results have been observed in others longitudinal studies on exercise intervention with people with schizophrenia, where reduced their weight, BMI and WHR both after 3 months of intervention and (to a greater extent) after 6 months (Bruins et al., 2014). However, no significant differences were found between the groups in terms of percentage of BF following the intervention. On the other hand, in a different longitudinal study lasting 16 weeks, also focusing on people with schizophrenia, significant improvements in percentage of BF were observed subsequent to the intervention in comparison to the control group. The results of this study also revealed significant reductions in weight and BMI. Similarly, other longitudinal studies with more than 1 year of intervention also found a significant reduction in both weight and waist circumference in the experimental group compared to the control group (Daumit et al., 2013; Poulin et al., 2007).

In contrast, changes are not as evident for variables related to physical condition. Specifically, the most notable examples are the two strength variables (lower body and two-hand pressure), for which not only are improvements not observed, but the results actually worsened. These results could possibly due to the type of activities that were performed, which consisted of basically light to moderate aerobic activities aimed primarily at weight loss and improving aerobic capacity. This means that practically no anaerobic activity was carried out, aimed at gaining strength or muscular mass, through vigorous activities, since it was not the main objective of the program.

The variables related to functional aerobic capacity, evaluated with the 6MWT, also displayed improvements. As in the cases of weight, BMI, percentage ofBF, and skinfolds, a general and progressive improvement is observed during the intervention phase, albeit greater at the end for nearly all the variables evaluated (DW, oximetry, oxygen uptake, blood pressure, etc.) In addition, both the most considerable and largest number of improvements are observed among the people who attended more regularly.

Similar results were obtained in previous longitudinal studies (Beebe, Tian, Morris, Goodwin, Allen, Kuldau, 2005; Marzolini, Jensen, & Melville, 2009; Vancampfort et al., 2011). In the study by Beebe et al. (2005), weight loss and reductions in BF and BMI were also accompanied by a significant increase in physical aptitude (measured by means of the 6MWT). Moreover, as BMI progressively decreased, the DW by the participants increased. These results are in keeping with prior studies which determined that patients with schizophrenia that were obese covered a significantly shorter distance than patients that were either overweight or at normal weight (Vancampfort et al., 2011).

As for the 1 year follow-up measurement, there is a change in trend with respect to the intervention phase because of the results in the follow-up are generally worse than those obtained in both post-intervention evaluations. More specifically, a considerable decrease was observed in the significant physical improvements achieved in both groups. However, the participants that attended more regularly during the intervention phase (regular group) worsened to a lesser extent;

a smaller number of statistically significant changes were observed compared to the participants in the occasional group.

Thus, the general results of this study confirm the effectiveness of this type of intervention, particularly when carried out regularly. In the case of the present study, an important factor for success could be the collaboration of a considerable number of university students (eight in total). Although we find no works in the literature conducted in the sports field which include university students and individuals with schizophrenia, it was observed that volunteers in general have always played a key role in the inclusion of people with disabilities (Carter, Hughes, Copeland, & Breen, 2001).

In future studies, we believe it would be highly useful to evaluate the inclusion effect of the intervention, for example by conducting interviews. The mental health patients participating could be individually interviewed to see how they feel and to determine their motivations for doing physical exercise and the benefits of taking part in an inclusive program. In fact, the University of Almeria recently started a pioneering program among Spanish universities, offering inclusive physical fitness courses in which half the participants are university students and the other half come from mental health clinics in the province of Almeria. We believe this type of experience could be established at other schools and education centers.

Also of great importance is the need to offer a varied sports activity program, such as the one described in this study, which can reach a higher number of participants by providing appealing and novel exercise options to users.

Among the limitations of this study, it must be noted that there was no control group and the sample was relatively small, making it necessary to apply nonparametric tests. Furthermore, other external factors which may have influenced the results were not systematically followed, such as physical exercise the participants might have done outside the program or their eating habits.

Disclosure statement

No potential conflict of interest was reported by the authors.

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