

A pilot randomized controlled trial of aquatic-based activities in a group occupational therapy program for adults living with serious mental illness in Spain

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Abstract

Although aquatic-based interventions are increasingly used in the psychiatric rehabilitation services, the effects of this type of community program as an adjuvant therapy for psychosocial problems of people with serious mental illness (SMI) have been under-explored. This research evaluated the feasibility and outcomes of an occupational therapy program consisting of aquatic-based activities (AA-OT program) in the community in Spain. This study is the first randomized controlled trial (RCT) on this topic. This pilot trial was conducted with a sample of 16 adults with SMI who were randomly allocated to the AA-OT program plus treatment as usual or treatment as usual alone (eight in each group). The AA-OT program included activation of daily living skills, warm-up, group activities/tasks, and relaxation. It consisted of two sessions per week over 12 weeks. Outcomes were evaluated at week 0 and 12. A total of 14 participants (87.5%) completed the trial. No adverse events or side-effects were noted. Comparisons between the two groups on change scores showed that participants in the intervention group showed significant improvements in several outcome measures: psychosocial problems (HoNOS), two health-related quality of life scales (SF-36: Physical Functioning and Mental Health), and performance of social activities (Activity and Social Relations scale). Satisfaction with the program was high. In conclusion, the results support the feasibility and potential benefits of this occupational therapy program. 12 weeks of aquatic-based activities in a group intervention may enhance the outcomes of psychiatric rehabilitation improving the severity of psychosocial problems, patient-reported health status, and social relations. This community-based program may be beneficial as a non-pharmacologic method in the illness management and recovery of people with SMI. The findings from this pilot trial need to be confirmed in a large, fully-powered RCT.

Keywords

Mental disorders, occupational therapy, psychiatric rehabilitation, psychosocial functioning, randomized controlled trial

1 INTRODUCTION

Serious mental illness (SMI) is a major health and social problem. This concept refers to ‘a mental, behavioral, or emotional disorder resulting in serious functional impairment, which substantially interferes with or limits one or more major life activities’ (National Institute of Mental Health, 2020). The literature has described SMI based on the following points: the presence in a person of a severe psychiatric disorder; a relatively long duration of illness (at least 2 years); the mental disorder compromises social and interpersonal functioning; and the complex mental health problems require intensive psychiatric rehabilitation services (Anthony & Farkas, 2009; Parabiaghi et al., 2006; Schinnar et al., 1990). Psychosocial rehabilitation contributes to the achievement of the principles of the recovery approach, characterized by the development of new goals and meanings in the person's life, beyond the effects of a SMI (Farkas, 2007). Occupational therapy (OT) plays a key role on everyday life activities such as activities of daily living, leisure, or social participation. Its primary objective is to promote the highest possible level of functioning and participation in community living by encouraging the skills of the individuals (American Occupational Therapy Association, 2014).

Interventions such as aquatic-based programs are used as complementary treatment methods within OT programs for people living with mental illness. This multicomponent program uses the aquatic-based activity in a recreational and group social context. It is a community-based treatment approach. In people with SMI, the main objective is to optimize the daily functioning and well-being, through the acquisition and improvement of psychosocial skills, the promotion of basic and instrumental daily life habits, and the participation in meaningful activities. Previous studies have concluded that the aquatic-based interventions improve various domains of well-being (e.g., happiness, anxiety, and self-esteem) in people with disabilities and in groups with a chronic health condition (Aidar et al., 2018; Berlin et al., 2003; Da Silva et al., 2017; Driver et al., 2006; Hejazi et al., 2012; Neville et al., 2014; Silva et al., 2019; Tomas-Carus et al., 2008). Despite these positive findings, however, research on the effects of the aquatic-based programs among people with SMI is very scarce (Evans, 2017; Smith et al., 2007). Although aquatic-based interventions are increasingly used in the mental health services, the effects of this type of programs as an adjuvant therapy for clinical and social problems of people with SMI have been under-explored. The lack of randomized controlled trials on this topic is one of the key limitations. Accordingly, more research is needed to provide an evidence-based practice. We have developed a community OT program for adults living with a SMI consisting of aquatic-based activities (AA-OT program). This pilot trial evaluated the feasibility and outcomes of this OT program.

2 METHODS

This study was a pilot randomized clinical trial (RCT) that employed a parallel design, using an experimental and a control group and a pre-test and post-test. Participants were randomly allocated to the AA-OT program (Table 1) plus treatment as usual or treatment as usual alone, following simple randomization procedure. For allocation of the participants, a computer-generated list of random numbers was used. The randomization was conducted in a 1:1 ratio. A statistician not involved in the research generated the allocation schedule. The allocation sequence was concealed in sealed and opaque envelopes. Corresponding envelopes were opened only after the enrolled participants completed all baseline assessments and it was time to allocate the group. Whereas patients and therapist allocated to the intervention group were aware of the allocated arm, the outcome assessor was kept blinded to the allocation. The study was carried out in accordance with the Declaration of Helsinki and approved by the regional ethics committee (Research Ethics Committee of Balearic Islands). After receiving a detailed explanation of the study, all research participants provided written informed consent.

TABLE 1. Overview of the sessions of the aquatic-based occupational therapy program

Domain	Space/Time	Description
1 Activation of daily living skills	Pool changing area 30 min	Community mobility <ul style="list-style-type: none"> • Advice on the use of public transportation (bus) • Schedule, location of bus stations, orientation, and managing cash • Problem-solving skills; advice Medication routines <ul style="list-style-type: none"> • Supervision and advice Daily life habits: development of routines and re-education <ul style="list-style-type: none"> • Needs assessment: preserved abilities, patterns of daily living, priorities • Good habits; principles of health and hygiene Engagement in ADL occupations <ul style="list-style-type: none"> • Activity adaptation • Advice on task simplification • Practical skills training Dressing, toileting and toilet hygiene, showering, and grooming
2 Light warm-up (Halliwick method)	Aquatic environment 6 min	Mental adjustment to the aquatic environment (2 min) <ul style="list-style-type: none"> • Adjustment to the properties of water: buoyancy, flow, and waves • Water-based movements: slow walks • Moving the body parts: mobility exercises Stretching exercise (2 min) <ul style="list-style-type: none"> • Neck, trunk, arm, and leg stretches Rotation activities: sagittal, transversal, and combined rotations (2 min)
3 Group activities/tasks	Aquatic environment 20 min	12 types of group activities/tasks with different materials <ul style="list-style-type: none"> • Social interaction activities • Dynamics of group • Turn-taking games (e.g., relay-race) • Games and playful occupations
4 Relaxation (Ai-Chi method)	Aquatic environment 10 min	An Ai-Chi sequence <ul style="list-style-type: none"> • Breathing control • 7 slow movements of the 19 that comprise the Ai-Chi method
5 Group feedback	Space outside the pool 4 min	Constructive group feedback <ul style="list-style-type: none"> • Exchange of experiences • Group selection of activities for the next session • Suggestions • What can be changed / areas that require further improvement
6 Activation of daily living skills	Pool changing area 20 min	Medication routines: supervision and advice <ul style="list-style-type: none"> • Engagement in ADL occupations • Training in ADL skills • Toileting and toilet hygiene • Showering • Dressing • Grooming

Note. Pool sessions-2×/week for 90 min for 12 weeks.
ADL is the basic activities of daily living.

Subjects were adults with SMI who were receiving psychiatric rehabilitation services. The participating settings were five local mental health services belonging to the public health system in the island of Mallorca, Balearic Islands (Spain): three inpatient units at the psychiatric hospital of Palma, one day hospital, and one community rehabilitation unit. These services provide multidisciplinary therapeutic care and psychiatric rehabilitation to patients with SMI, through mental health teams. The teams consist of several health professionals (psychiatrists, psychologists, nurses, and occupational therapists), who carry out a periodic follow-up and participate in a coordinated way in the intervention that the patient receives. All units serve a diverse population of individuals living in urban and rural environments. Each patient receives individualized and comprehensive mental health care.

2.1 Participants

Inclusion criteria for participation in this study were: (a) 18 years of age or older; (b) a diagnosis of SMI made by a psychiatrist; (c) at least two years from diagnosis of mental illness; (d) swimming skills; (e) willingness and capability to give informed consent to participate in this research, according to the clinical judgment of the treating psychiatrist; and (f) possessing the mental capacity to understand and follow intervention procedures (as judged by the treating psychiatrist). Exclusion criteria for participation were: (a) diagnosis of substance use disorder in active phase; (b) any documented incident of violence or aggression in the previous six months; (c) known history of water phobia; (d) incontinence; (e) thermoregulatory disorder; (f) infectious diseases (e.g., ear infection); (g) unstable blood pressure (uncontrolled hypertension); and (h) severe decompensated comorbidities (heart or lung conditions). Exclusion criteria were assessed from reviewing the medical records of the participants.

The sample size estimate was 12 subjects per group, in accordance with the argued recommendation of Julious (2005) for pilot trials. However, given that one of the key characteristics of the OT program was its group nature, it was necessary to adjust the sample size to the limited dimensions of the community therapeutic pool used for the experimental intervention, in order to allow the development of the group methodology activities. Consequently, a target of 16 participants (eight in each group) was sought. Recruitment started at the same time in the five study units and continued until this number of participants was obtained. The recruitment lasted one month and took place between September and October 2015. Participants were recruited through referrals from the attending psychiatrists at the psychiatric medical facilities where the study was conducted. Upon referral, participants completed the baseline assessment. Table 2 shows the descriptive information collected at baseline.

TABLE 2. Baseline characteristics of study sample

	Experimental group (<i>n</i> = 8)		Control group (<i>n</i> = 8)		<i>p</i> -value
	Median	Q1–Q3	Median	Q1–Q3	
Age (year)	35	29.5–37.7	43	27–49.5	0.436
Duration of mental illness (year)	9.5	6–19.7	16	9.2–19.7	0.606
No. of psychiatric hospital admissions	4	2–16.2	6	2.2–17.7	0.574
Gender	N	%	N	%	
Male	4	50	6	75	0.608
Marital status					
Never married	8	100	6	75	0.467
Education level reached					
Primary	7	87.5	7	87.5	1
Secondary education or University	1	12.5	1	12.5	
Children					
No	7	87.5	4	50	0.282
Living status					
Alone	2	25	1	12.5	0.522
Living with others	6	75	7	87.5	
Living area					
Highly urban (city of Palma)	4	50	5	62.5	1
Semiurban (size <60,000 inhabitants)/rural	4	50	3	37.5ç	
Income					
<600 €	5	62.5	5	62.5	1

2.2 Interventions

2.2.1 Aquatic-based activities in a group OT program

Participants in the experimental group took part in an aquatic-based OT program for a period of 12 weeks. The program was conducted by a single occupational therapist with extensive experience of working with people with SMI in groups; the therapist participated in training that included water safety, emergency procedures, hydrodynamic principles, and therapeutic techniques for use in the water (Halliwick and Ai-Chi methods). An OT assistant provided assistance during the sessions. The aquatic activities were conducted in an accessible therapeutic pool of warm water measuring 6 × 3 m and 120 cm deep (Sant Joan de Déu Hospital, Palma, Spain). Water temperature was maintained between 33 and 34°C. Participants took a shower with a water temperature of 35°C before entering the pool. The OT program consisted of two sessions per week, each session lasting about 90 min: (a) about 30 min of initial activation of daily living skills; (b) 6 min of light warm-up; (c) about 20 min of group activities/tasks; (d) 10 min for relaxation; (e) 4 min to group feedback, and (f) about 20 min of post-intervention activation of daily living skills. Lifeguards and pool safety equipment were available during the sessions, as well as assistive equipment to facilitate participation. Throughout the session, social interaction was emphasized. The therapist intervened as mediator and facilitator, also encouraging the active participation of subjects in the activities. Behavioral strategies of modelling and reinforcement were used.

Activation of daily living skills

Participating in activities in the aquatic medium requires performing various basic and instrumental activities of daily living, such as mobility through the community to go to the pool, dressing (selecting adequate garments and accessories, preparing a bag/backpack and changing clothes before and after going into the water), toileting, showering, hair drying, or personal grooming. Repeating these activities in each session facilitated the acquisition of routines of engagement with the community. The participants travelled to the pool using public transport (bus) without human help. A session prior to the beginning of the intervention was programmed in order to supervise the preparation for this activity. This included planning related to aspects such as selection of transport lines, timetables, or paying for the trip. In all sessions, compliance with timetables was monitored and the difficulties encountered in the use of public

transport were analyzed with the participant. In the pool locker room, the therapist and assistant supervised the previously mentioned activities. This occurred in each session before and after the aquatic-based activities were performed. Where necessary, they provided guidance and trained the participant on a case-by-case basis to motivate them to develop routines and achieve the highest possible degree of independence.

Aquatic activities

The activities in the aquatic environment consisted of the following: warm-up, group activities/tasks, and relaxation. All those participating in the program were habituated to the water environment through warm-up periods at each session. The warm-up period included low-intensity aerobic exercises focused on mental adjustment to the aquatic environment (walking and mobility exercises), flexibility and stretching, and rotations in the water; the exercises followed the Halliwick method (Lambeck & Gamper, 2009; Lambeck & Stanat, 2000; McMillan, 1978). Regarding the aquatic-based group activities/tasks, playful activities were incorporated to ensure a fun and enjoyable experience and promote adherence. The focus during the activities/tasks was on the process rather than on the results. Group activity encouraged the use of cognitive and social skills. A semi-standardized approach was followed. The activities were simple and interactive, and the involvement of the participants in the selection thereof was promoted to encourage their motivation and interest. In the initial sessions, the therapist presented the repertoire of group activities (therapist-directed sessions). Subsequently, the therapist encouraged the participants to reach a group consensus on the activities they wanted to include in each session, in order that the participants can choose how to structure this session time; this group decision was made at the end of each session. During the relaxation, the participants performed aquatic exercises based on the Ai-Chi method (Sova, 2009). The Ai-Chi method combines the tai chi concepts with aquatic therapy techniques and consists of 16 movements (katas) in a specific order. Relaxation is induced by the focus on the deep breathing and by the wide and slow movements of arms, legs, and trunk. Lastly, immediately after leaving the water, the participants exchanged their experiences and observations/suggestions about the session implemented in a brief group meeting for constructive feedback, with the mediation of the therapist.

2.2.2 Treatment as usual

All participants received standard therapeutic care (treatment as usual). During the study period, participants continued their regular activities in their rehabilitation units. All participants were attending psychiatric rehabilitation services, where social skills training, unstandardized psychoeducation, group meetings, group activities such as recreation and sports, and other psychosocial treatment were provided for 5 hr/day, 5 days per week. The staff in the participating centers included a psychiatrist, who prescribed pharmacotherapy, and practitioners from a broad range of professions (psychology, mental health nursing, and OT). All clinicians were specialized in treating people with SMI.

2.3 Outcomes

The severity of psychosocial problems was the primary outcome, and this variable was measured by the 12-item Spanish version of the Health of the Nation Outcome Scales (HoNOS; Uriarte et al., 1999). Health-related quality of life (HRQOL) and performance in the domain of social activities were assessed as secondary outcomes. HRQOL was assessed using the Spanish version of the 36-Item Short Form Health Survey questionnaire (SF-36; Alonso et al., 1995). The Activity and Social Relations scale of the Spanish version of the Basic Everyday Living Skills (BELS; Jiménez et al., 2000) was used to measure changes in the domain of performance of social activities. Outcomes were evaluated at week 0 and 12: measurement took place immediately before randomization (T0, baseline assessment) and 12 weeks after randomization (T1). All assessments were carried out by an independent assessor with experience and training in the psychological assessment of SMI. The HoNOS and BELS scales were completed by the assessor based on the information provided by the treating clinician (psychiatrist).

Primary outcome

The HoNOS (Wing et al., 1998) takes a more multifaceted approach to the evaluation of health and social care outcomes for working-age adults (18–65 years) with mental illness. This widely used instrument has demonstrated adequate reliability, validity, and sensitivity to change (McClelland et al., 2000; Pirkis et al., 2005; Wing et al., 1998). It was used to measure psychosocial problems in the domains (subscales) of Behavior (items 1–3), Impairment (4–5), Symptoms (6–8), and Social (9–12). Each item is rated on the Likert scale of 0 (no problem) to 4 (severe to very severe problem).

Secondary outcomes

The SF-36 is a very popular measure of patient-reported health status (Ware & Sherbourne, 1992). Its 36 questions comprise eight health scales: Physical Functioning, Role-physical, Bodily Pain, General Health, Vitality, Social Functioning, Role-emotional, and Mental Health. Items are scored by a Likert scale. Scores for the SF-36 scales range between 0 and 100, with higher scores indicating a better HRQOL. Validity and reliability of the instrument is well-documented (Vilagut et al., 2005). The BELS, which has adequate psychometric properties in people with SMI, was developed as a measure to assess daily living skills, including self-care, domestic chores, activity within the community and social relations (Jiménez et al., 2000; Leff et al., 1996). The Activity and Social Relations scale consists of five items. Regarding the current performance domain, each item was rated on a 5-point Likert scale (0–4): 0 represents the lack of performance of the social activity or the need for daily supervision, and 4 a normal level of performance. The five items are summed, and a total score ranging from 0 to 20 is obtained.

Lastly, after completing the OT program, the experimental group participants were asked to rate their degree of satisfaction with the program on a scale from 0 (very dissatisfied) to 10 (very satisfied).

2.4 Statistical analysis

All characteristics assessed at baseline were compared between intervention and control participants. We compared the groups on the demographic and clinical characteristics using unpaired t tests, Mann–Whitney U-tests, Fisher's exact tests, and chi-square analyses. Non-parametric Mann–Whitney U-tests were conducted to compare the groups on the outcome measures.

The primary analysis concerned differences in outcomes between the groups. Data were analysed on an intention-to-treat basis. The data analysis was based on the last observation carried forward method. The application of this method is based on the assumption that participants receiving the OT intervention improve gradually from the start of the study until the end, and therefore, carrying forward an intermediate value is a conservative estimate of the patient's outcome trajectory (Liu, 2016). This method is probably not harmful for drawing reliable conclusions since the patient's condition is not expected to deteriorate during the short study period. The study population is characterized by being young and tends to be homogeneous in individual health characteristics. Non-parametric statistics were used since the instruments produced ordinal data. Change scores were calculated as the difference between a later and a previous measurement (i.e., the T1 score minus the baseline score). The inferential statistics used to test differences in change scores between the intervention and control group were the Mann–Whitney U-test. The effect size (r) [ES(r)] was calculated by dividing the Z of the Mann–Whitney U -tests by the square root of the total number of observations. An ES(r) of 0.10 constitutes a small effect, 0.30 medium effect, and 0.50 large effect (Cohen, 1988). In addition, the Wilcoxon signed-rank test, performed on the respective groups separately (within-group changes), was used to shed further light on findings regarding change scores. The level for a statistically significant p -value was set at $p < 0.05$. Statistical data analysis was conducted using the IBM SPSS version 23 software.

3 RESULTS

3.1 Patient flow and baseline characteristics

The treating psychiatrists identified a total of 18 possible participants and all were contacted. Of the 18 patients contacted, one patient did not meet the inclusion criteria, and one patient declined to participate. The remaining 16 patients were eligible and consented to participate. Figure 1 shows a flow diagram of the participants through the study. Following completion of the baseline assessments, 16 participants were randomly assigned, eight to the control group and eight to the experimental condition. Fourteen (87.5%) participants completed the trial. Of the eight experimental subjects, seven (87.5%) completed all 24 sessions of the intervention and one (16%) dropped out after completing seven sessions because of medical reasons (episode of acute psychotic symptoms). One control subject left the research; the reason for drop-out was that this subject simply did not want to continue participating.

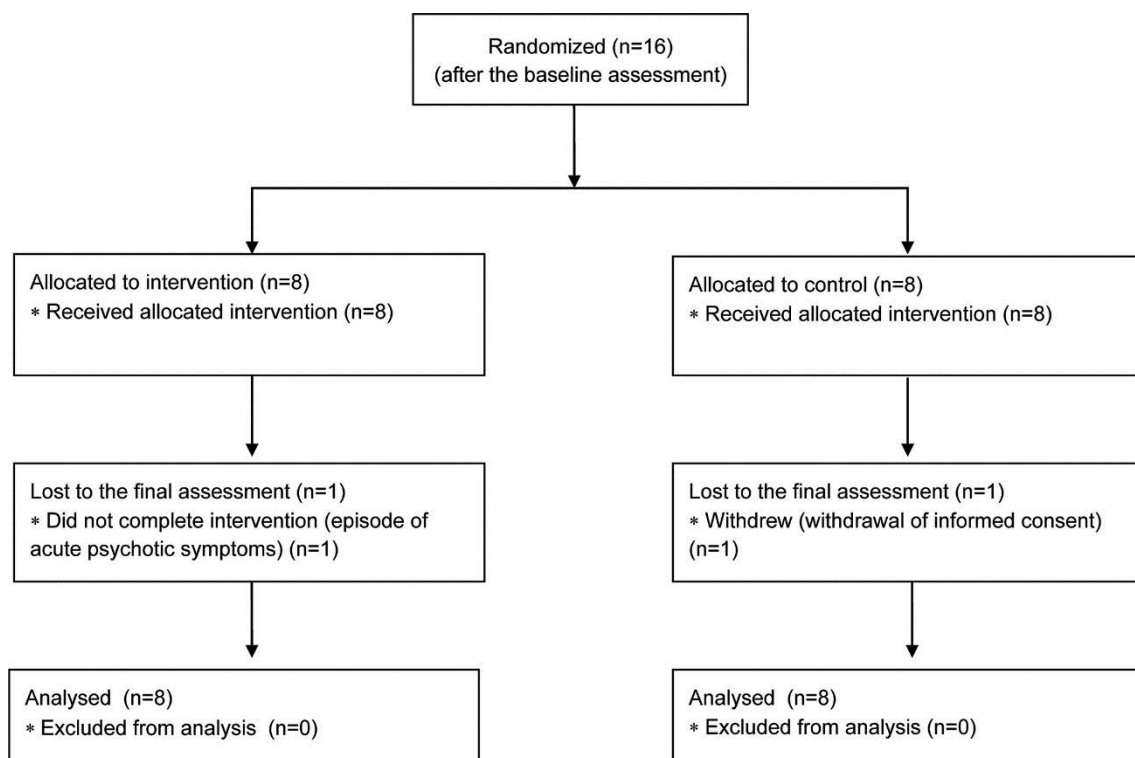


FIGURE 1. Open in figure viewer

Table 2 presents the baseline characteristics. Patients were on average 37.6 years old ($SD = 9.9$). Most participants were single men of primary educational level and lived with others in a highly urban area (Table 2). The majority of participants had a diagnosis of psychotic disorder: 81.3% schizophrenia, 12.5% bipolar disorder, and 6.2% schizoaffective disorder. There was no significant difference in baseline characteristics between the two groups (Table 2). In addition, the baseline evaluation scores for psychosocial problems (HoNOS) and performance of social activities (BELS) did not differ between the groups. Regarding the SF-36, the two groups differed significantly at baseline on two scales: social functioning ($p = .024$) and role-emotional ($p = .004$); participants in the experimental group had higher HRQOL on these two scales. There were no significant differences in the other six SF-36 scales.

3.2 Outcomes

No adverse events or side-effects were noted. The data analysis was based on the intention-to-treat principle. All participants had at least one assessment (baseline). We used the last observation carried forward method, and we assigned the pretest data into missing posttest data of two participants who did not complete the trial. Regarding the severity of psychosocial problems (primary outcome), comparisons of change scores between the experimental and control groups showed significant differences on the four subscales analyzed. The experimental group improved on these subscales, while the control group evidenced no change (Table 3): Symptoms [ES(*r*) = 0.69]; Impairment [ES(*r*) = 0.67]; Social Problems [ES(*r*) = 0.59]; and Behavior [ES(*r*) = 0.50]. With respect to the secondary outcomes, comparisons between the two groups on change scores showed significant differences in several outcomes. Compared to the control group, the intervention group significantly improved on two HRQOL scales and in the performance of social activities (Table 3): Mental Health [ES(*r*) = 0.78], Physical Functioning [ES(*r*) = 0.62], and Activity and Social Relations scale [ES(*r*) = 0.59].

TABLE 3. Outcomes in the aquatic-based occupational therapy versus treatment as usual groups (*n* = 16)

Primary outcome: HoNOS	Group	T0 Median (Q1–Q3)	T1 Median (Q1–Q3)	<i>p</i> -value (within group)	<i>p</i> -value (between groups)
Behaviour problems	Control	0.5 (0–1)	0.5 (0–1.7)	0.317	0.045*
	Experimental	1 (0–2)	0 (0–1)	0.102	
Impairment	Control	1.5 (1–2.7)	1.5 (1–3.7)	0.157	0.007*
	Experimental	2 (0.2–3)	0.5 (0–1)	0.034*	
Symptoms	Control	6 (4.2–6)	6 (5–7.5)	0.414	0.006*
	Experimental	3 (2–4.7)	1.5 (0–2.7)	0.024*	
Social problems	Control	3 (2–3.5)	3 (2.5–4)	0.564	0.018*
	Experimental	2 (0–3)	0 (0–0.5)	0.042*	
Secondary outcomes	Group	T0 Median (Q1–Q3)	T1 Median (Q1–Q3)	<i>p</i> -value (within group)	<i>p</i> -value (between groups)
SF-36: physical functioning	Control	87.5 (51.2–100)	82.5 (52.5–100)	0.317	0.013*
SF-36: role-physical	Experimental	85 (68.7–98.7)	97.5 (91.2–100)	0.042*	0.324
	Control	62.5 (12.5–100)	75 (0–100)	0.854	
SF-36: bodily pain	Experimental	75 (31.2–100)	100 (81.2–100)	0.102	0.092
	Control	62 (43.7–100)	67 (42–100)	0.854	
SF-36: general health	Experimental	81 (41–100)	100 (100–100)	0.066	0.150
	Control	58.5 (37.7–64.2)	58.5 (36.2–64.2)	0.500	
SF-36: vitality	Experimental	58.5 (38–64.2)	76 (56.7–81.5)	0.028*	0.185
	Control	37.5 (30–77.5)	52.5 (25–65)	0.833	
SF-36: social functioning	Experimental	67.5 (47.5–93.7)	85 (70–98.7)	0.046*	0.181
	Control	43.7 (25–62.5)	56.2 (21.9–62.5)	0.457	
SF-36: role-emotional	Experimental	68.7 (53.1–84.4)	100 (78.1–100)	0.042*	0.505
	Control	0 (0–58.3)	33 (0–58.3)	0.593	
SF-36: mental health	Experimental	83.3 (66.7–100)	100 (100–100)	0.102	0.002*
	Control	48 (41–65)	46 (27–60)	0.080	
BELS: activity and social relations	Experimental	56 (46–70)	90 (70–96)	0.018*	0.018*
	Control	11.5 (10–12)	15.5 (10.5–22.2)	0.066	
	Experimental	12 (11.2–12)	23.5 (22–24)	0.017*	

Abbreviations: BELS, Basic Everyday Living Skills; HoNOS, Health of the Nation Outcome Scales; SF-36, 36-Item Short Form Health Survey.

Bold values denote statistical significance. **p* < .05.

To further highlight the changes, Table 3 presents within-group changes for the intervention and control group separately. No significant differences were found for the control group across all outcome measures. Participants in the intervention group showed significant improvements in several outcomes: three HoNOS subscales (Impairment, Symptoms, and Social Problems), five SF-36 scales (Physical Functioning, General Health, Vitality, Social Functioning, and Mental Health), and the Activity and Social Relations scale.

The OT program was positively evaluated by participants. After completing the OT intervention, on a 10-point scale, between 0 and 10, the degree of satisfaction with the program (median) was the maximum (10 points) in the experimental subjects (range 7–10, Q1–Q3 = 8–10).

4 DISCUSSION

The main contribution of our investigation was to examine the outcomes of an OT program consisting of 12 weeks of aquatic-based activities. Overall, the study has the following strengths: (a) this is the first pilot RCT specifically designed to explore the impact of this type of intervention in adults living with SMI; (b) this strategy was unique in terms of its content (group aquatic-based activities and community approach) and the combined use of aquatic therapy methods (Halliwick and Ai-Chi); (c) the inclusion of difficult-to-engage patients in a RCT, with various types of complex mental health needs; (d) the comprehensive collection of information, which included the participant's subjective perspective and the view of a professional assessor; and (e) the fact that the study was conducted in various psychiatric medical facilities. The program was well received. Participants randomized to the intervention group had high rates of participation in the program. Furthermore, participants indicated high satisfaction with this intervention. Since participation was voluntary, these findings show that its application appears to be feasible in the study population. In addition, they represent a promising line of work, given that the experimental group improved considerably in most of the outcome measures. The effect sizes were large. However, all analyses are purely exploratory given that this is a pilot trial.

The largest differences between groups were identified in the domain of mental health. The results show that those who participated in the aquatic-based activities program perceived a significant reduction in the self-assessed frequency of emotions of nervousness, sadness or discouragement. In addition they experienced significant benefits in physical functions such as mobility, the ability for moderate/intense effort and autonomy in activities of daily living. The impact of this intervention was also positive in social relations. The program improved the performance of social activities in aspects such as seeking company, the frequency of social contact, showing consideration and caring for others or the need for support in social relations. The results were relatively consistent with the scarce evidence on the aquatic-based interventions in the population with SMI. In a study on the subjective experiences of adults living with SMI, semi-structured interviews were conducted with five individuals diagnosed with schizophrenia (Evans, 2017). This research found that an aquatic activities program facilitated the development of supportive relationships between clients, as well as positive sensations, such as relaxation and confidence. Similarly, in a sample of people with SMI, a pre-post study assessed the impact of group programs in the community that included swimming and aqua aerobics (Smith et al., 2007). This study found significant improvements in the emotional area. In adults living with SMI, no literature has been found on the impact of aquatic-based interventions in the domain of physical functions.

Several possible mechanisms may explain the positive findings of our study in the emotional, physical, autonomy, and social domains. First, a key principle of interventions in the aquatic environment is the therapeutic use of the properties of water. The warm temperature of the water (Frye et al., 2017) and the slow performance of deep-breathing relaxation exercises following the Ai Chi method, an aquatic therapy technique derived from Asian Tai Chi, promoted a feeling of calmness (Sova, 2009). This is similar to how the participants in the work of Evans (2017) described aquatic-based activities in terms of positive emotions such as relaxation and peacefulness. Simply being immersed in the water and perceiving the body as floating was experienced as calming sensorial stimulation that favored achieving a feeling of peace (Evans, 2017). In the general population, the literature has corroborated the relaxing effect of aquatic-based programs (Stan, 2013). Consistent with our study, the systematic review conducted by Alexandratos et al. (2012) observed that mixed-style exercises such as swimming bring more benefits than just walking. The findings of this review suggest improvements in symptoms of mental illness,

including mood and a distraction from psychotic symptoms such as hallucinations. In addition, making use of the physical properties of water, such as buoyancy and flow, is a possible explanation for the improvement in the participants' physical functioning, which is restricted by the long progression of the illness, the predominance of sedentary lifestyles, and side effects of prescription drugs (Richardson et al., 2005). Water allows freedom of movement and the aquatic environment facilitates body movements that are limited by the force of gravity on land (Becker, 2009; Frye et al., 2017). By diminishing the influence of gravity and resistance to body motion, the literature has suggested that carrying out activities in the water allows training physical skills such as coordination, flexibility, or tolerance to exercise, promoting increased aerobic and cardiopulmonary output, and improving general physical condition (Becker, 2009; Da Silva et al., 2017; Frye et al., 2017; Waller et al., 2009). Furthermore, our program encouraged motor activity and exercise in the aquatic environment, in line with the available evidence on the physical health benefits of physical activity in people with mental illness (Richardson et al., 2005). In people with SMI, a meta-analysis showed that interventions based on physical activity (e.g., exercise programs, tai chi, or yoga) raise aerobic capacity (Rosenbaum et al., 2014).

Second, the inclusion of strategies aimed at daily activities and community mobility is a potential explanation for the positive impacts of this intervention in the domain of autonomy. In support of our hypothesis, the literature has shown that OT has great potential to improve daily functioning in people living with SMI. A systematic review evaluated the effectiveness of OT interventions for this population (Gibson et al., 2011). The findings provided evidence for the effectiveness of life skills and instrumental activities of daily living training. Similarly, a recent review located studies on the effects of OT on the population with SMI, concluding that these interventions improved daily activities (D'Amico et al., 2018). Occupational therapists use various methods to train autonomy in daily life and mobility through the community environment, highlighting counseling, individualized adaptation, and simplification of tasks (Noyes & Lannigan, 2019). These professionals directly address daily life skills, performance patterns such as habits and routines, activity demands, and context characteristics (Gibson et al., 2011). In the current study, the specific and individualized training in various daily activities through these methods and its location in a community setting favored greater independence among the participants, demonstrating the possibilities for improvement in this area. Consistent with this argument, in the study of Evans (2017), participation in swimming groups improved skills for autonomy in daily life in a small sample of people with schizophrenia.

Finally, the group and recreational nature of the activities were fundamental advantages of the program. According to the Halliwick philosophy, the aquatic-based interventions should ensure a fun experience, so games should prevail, especially in groups (Lambeck & Gamper, 2009). In our study, participating in recreational activities helped patients focus their attention on positive and gratifying stimuli. Furthermore, we postulate that planning simple recreational activities maximized the chances of successful patient engagement, fostering the development of greater self-confidence and self-esteem, which may have translated to emotional improvements. In line with this hypothesis, in the study of Smith et al. (2007), people with SMI who participated in an intervention based on group aquatic activities showed significant improvement in self-reported measures of self-esteem. Regarding the area of social interaction, in line with the literature in this field (Evans, 2017), our work has promoted a cohesive group structure, beneficial for interpersonal functioning and the acquisition of social skills. Its implementation in a recreational context characterized by experiences of amusement, teamwork, and the absence of competition offered more opportunities for social contact and interaction. The enthusiasm and enjoyment produced by playing in the water favors getting closer to other people and establishing partnership and friendship bonds (Broach & McKenney, 2012). Evans's (2017) research provided evidence in this regard. In this work, people with SMI highlighted that participation in aquatic-based group activities fostered the development of positive relations of inclusion, friendship and partnership.

Some limitations warrant further consideration. The sample size included in this pilot trial was small. The limited size of the sample may have contributed to decreased statistical power to detect changes in some variables. However, our trial showed positive effects in most variables measured and changes due to the treatment effect were easily detected. Participants were characterized by their gender (predominantly male participants), age, long duration of symptoms, and high number of psychiatric hospital admissions. In addition, the sample did not consist of a random selection of people and the participants were recruited from mental health units belonging to the public health system in a relatively urban setting.

Generalization of the findings to other Spanish people with SMI, such as those living outside an urban context, should be made with caution. Since the participants were recruited through the local mental health services, it is possible the sample may have been skewed towards a particular representation of people with SMI as a result and perhaps other recruitment procedures would lead to different outcomes. Therefore, we must be very cautious about applying our conclusions to other populations with different backgrounds. Another limitation of our study design is that, given the nature of the experimental and control interventions, it was not possible to blind the therapist or the participants to whether they were in the experimental or control group. Informed consent required that participants knew that two different approaches were being compared. However, failure to blind the therapist and patients in intervention studies is common (Schneider et al., 2007). Lastly, outcome data were collected at the end of the intervention. Thus it is impossible to conclude from this research whether the observed changes in the outcomes were sustained after the intervention was terminated.

5 CONCLUSIONS

The results show the feasibility and potential benefits of a novel OT program consisting of group activities in warm water. The program resulted in a high retention of participants. This pilot RCT showed that this type of intervention can improve the severity of psychosocial problems, patient-reported health status, and social relations. Based on the preliminary findings of this research, this community-based psychosocial program may be beneficial as a non-pharmacologic method in the illness management and recovery for people with complex mental health problems. However, structured application of this treatment approach in SMI care will require a large, fully-powered RCT.

CONFLICT OF INTEREST

No conflicts of interest have been declared.

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available from the corresponding author upon reasonable request. This will not include data from participants who requested to have data deleted within 2 years of analysis.

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