

Comparison of Changes in Physical Self-Concept, Global Self-Esteem, Depression and Anxiety following Two Different Psychomotor Therapy Programs in Nonpsychotic Psychiatric Inpatients

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Key Words

Exercise therapy · Depression · Anxiety · Self-esteem · Physical self-concept · Physical fitness

Abstract

Background: The first objective of this study was to compare the changes in physical self-concept, global self-esteem, depression and anxiety after participation in one of two 16-week psychomotor therapy programs for non-psychotic psychiatric inpatients. The second objective was to study the relationship between changes in these variables. **Methods:** One hundred and ninety-nine inpatients were randomly assigned to either a personalized psychomotor fitness program, consisting of aerobic exercise and weight training, or a general program of psychomotor therapy, consisting of different forms of physical exercises and relaxation training. Physical self-concept was evaluated using the Dutch version of the Physical Self-Perception Profile at baseline, after 8 weeks, and after completion of the 16-week interventions. At the same time points, additional variables of global self-esteem, depression and anxiety were assessed by means of the Rosenberg Self-Esteem Inventory, the Beck De-

pression Inventory and the Trait Anxiety Inventory, respectively. **Results:** After 16 weeks, both groups showed significant improvements in all outcome measures (p values ranged from 0.01 to <0.0001), with no between-group differences. In both groups, the improvement in physical self-concept was correlated with increased global self-esteem and decreased depression and anxiety levels (p < 0.01). **Conclusions:** The results suggest that both psychomotor therapy programs are equally effective in enhancing physical self-concept. The relationship between improvements in physical self-concept and enhancements in global self-esteem, depression and anxiety supports the potential role of the physical self-concept in the recovery process of depressed and anxious psychiatric inpatients.

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Low self-esteem is closely related to mental illness and diminished psychological well-being. It frequently accompanies psychiatric disorders such as clinical depression, anxiety disorders and personality disorders [1–3]. Most recently, Beck et al. [4], and Van de Vliet et al. [5] have indicated an inverse relationship between level of

self-esteem and severity of depression and anxiety in sample groups of psychiatric outpatients and inpatients, respectively. The latter also detected that Flemish depressed psychiatric inpatients had significantly lower self-esteem and physical self-concept scores when compared with nonpatients. A prospective study suggested that low self-esteem may play a causal role in major depressive disorder [6]. Improvement of self-esteem has therefore regularly been described as one of the main treatment aims for psychiatric patients. Self-esteem is defined as the 'way in which an individual is able to express a positive idea about him/herself'. This includes a personal evaluation, based on cognitive comparison, and is considered to be the evaluative component of the self-concept [7]. 'Self-concept' is described as a multidimensional system of constructs, which contains more specific perceptions in different areas. These constructs are therefore regarded as components or domains of the global self-concept. Roles in several life domains may contribute to the global self-concept and include perceptions of the self at work or in school (academic self-concept), in social relationships (social self-concept), in emotional relationships (emotional self-concept), and also perceptions about the body and physical abilities (physical self-concept). Physical self-concept is dictated by qualities related to physical acceptance and physical competence [8]. During the last 20 years, much value has been attached to body attractiveness, health-related physical fitness, motor skills and sporting performances as these features of the physical domain are consistently tied to the global self-concept. As a result, the physical self-concept may be important for the development and the enhancement of global self-concept especially for individuals with low self-concept such as psychiatric patients. Leith [9] indicated that clinical populations in particular (e.g. depressed adults, persons with mental retardation, rehabilitation patients) have problems with self-concept. He also reported that exercise programs lead to a significant improvement in self-concept in 10 out of 13 conducted investigations with these groups. The Exercise and Self-Esteem Model developed by Sonstroem and Morgan [10] and further by Fox [11] represents the theoretical framework of the hierarchical model of self-concept. This model proposes that physical self-perceptions can be improved through physical activity participation. Improvements in specific physical self-perceptions (e.g. stamina, muscular strength, attractiveness of body) may generalize to physical self-worth in general. In turn, physical self-worth is related to global self-esteem. Finally, increased global self-esteem can lead to a reduction of depression and anxiety.

There have been over 25 years of systematic investigation examining the relationship between exercise, especially aerobic forms and weight training, and negative affect. Recently, two meta-analyses were conducted in the area of exercise and depression. Craft and Landers [12] reported that regular exercise is as beneficial as individual or group psychotherapy and other behavioral interventions. Lawlor and Hopker [13] inferred from their meta-analysis of 14 randomized controlled trials that physical activity is more effective than no treatment and as effective as traditional forms of treatment including cognitive therapy and antidepressant medication. Landers and Petruzzello [14] examined in a meta-analysis the results of 27 narrative reviews on the relationship among exercise and anxiety. These authors found that in 81% of the conducted studies, the researchers had concluded that physical activity has a moderate anxiety-reducing effect.

Notwithstanding the strong inverse relationship between level of global self-esteem and severity of depression and anxiety, and the potential mediating roles of exercise participation, the physical self and the global self-esteem in the recovery process of clinically depressed and anxious individuals, there are only four studies containing randomized controlled clinical trials in the field of the Exercise and Self-Esteem Model and negative affect [15–18]. It is difficult to compare these randomized trials, because there are big differences between types of dependent variables, subject groups, age ranges, control groups, sample sizes, and duration of exercise programs. All the researchers concluded that exercise programs are associated with significant enhancements of physical self-concept and/or global self-esteem and/or reductions of depression. However, none of them investigated whether improvements in physical self-concept are accompanied with an increase in global self-esteem and a decrease in negative affect.

Over the last 35 years, many psychiatric hospitals in Europe have implemented physical exercise and body awareness techniques as an additional therapy in the comprehensive treatment programs for psychiatric patients. This specific therapy is often referred to as movement therapy, exercise therapy, 'Sporttherapie, Bewegungstherapie' and since 1980 as psychomotor therapy (PMT). The general objectives of PMT are the improvement of both psychological and physical well-being and the maintenance or enhancement of physical fitness in patients suffering from various mental illnesses such as psychotic, eating, personality, mood and anxiety disorders. In psychiatric hospitals in the Netherlands and Belgium, the most commonly used PMT program consists

of a great variety of sports and games, physical activities and relaxation training [16]. In this article, the usual therapy program is called general program of psychomotor therapy (GPMT). Since 1992, psychomotor fitness training (PF) has been developed as a specialized form of PMT at the University Centre Sint-Jozef in Kortenberg, Belgium [19, 20]. The development of this type of PMT was based on (a) the scientific findings regarding therapeutic effects of aerobic exercise and weight training on the symptoms of depression and anxiety in sample groups of mainly nonclinical subjects [21], (b) on the evidence that well-balanced exercise programs improve physical health and fitness [22], and (c) on patient's reports about psychological and physical benefits from personalized and gradual exercise programs [23].

The first objective of the present randomized controlled trial was to compare the changes in physical self-concept, global self-esteem, depression and anxiety after participation in two PMT programs in a sample group of nonpsychotic psychiatric inpatients. This aim arose from one of the suggestions for future research formulated by experts in this area [9, 21, 24], that is to examine the effectiveness of different types of exercise programs. Morgan [24] states: 'There is no need for further research or reviews dealing with the question of whether or not physical activity results in improved mood. There is compelling evidence supporting the efficacy of physical activity in the prevention and treatment of both physical and mental disorders. There are, however, many questions that remain unanswered, and these questions will hopefully be addressed in the decade ahead... Future research in this area will also need to address the related issues exercise mode, intensity, duration, frequency, preferred versus prescribed exertion levels, and personalized prescription.' (pp 230–231). According to recent reviews of Fox [3, 8], regarding the effects of exercise on physical self-perceptions, several types of exercise are effective, but there is some evidence that aerobic exercise (e.g. running, walking, cycling, stepping) and weight training programs are most effective. Aerobic and weight training produce quick, visible and measurable improvements in stamina and muscular strength, which may provide a series of graded mastery experiences that enhance perceptions of cardiorespiratory fitness and strength and improve physical self-worth [8, 9, 18]. The second objective was to investigate the relationship between changes in physical self-concept and changes in global self-esteem and negative affect. To our knowledge, this is the first clinical trial that investigates this association in a population of psychiatric inpatients.

Table 1. Principal diagnoses (n = 199)

Mood disorders	63
Anxiety disorders	32
Adjustment disorders	13
Personality disorders	70
A paranoid/schizoid/schizotypal	6
B antisocial/histrionic/narcissistic/borderline	39
C avoidant/dependent/obsessive-compulsive/ personality disorder not otherwise specified	25
Substance-related disorders	10
Other diagnoses	11

Method

Participants

Subjects were inpatients hospitalized in three cognitive-behavioral treatment units in a university psychiatric hospital in Belgium. Patients already had a long psychiatric history (mean = 7.78 years, SD = 9.21). Most of them formerly had not responded successfully to the usual pharmacological and psychological interventions in primary and/or secondary care. Eight to 10 weeks before the beginning of the specialized treatment in one of the three wards, patients were admitted to an observation unit and treated with psychotropic medications and short-term supportive psychotherapeutic interventions. During this period of time, 98% patients received one or more psychotropic medications at adequate dosage (81% antidepressants, 37% hypnotics, sedatives or anxiolytics, 24% antipsychotics). Patients continued pharmacological treatment without changes throughout the trial. All patients who were admitted with severe depressive and/or anxious symptoms, and/or personality disorders over a period of 20 months were asked to take part in the study. Patients were excluded if they suffered from psychosis. The somatic exclusion criteria were severe orthopedic, neurological or cardiopulmonary diseases that would prohibit regular exercise. The final sample size of patients was 199 subjects (71 males and 128 females). The patients were diagnosed by psychiatrists according to the Diagnostic and Statistical Manual for Mental Disorders, ed 4 (DSM-IV) [1] for syndrome diagnosis (axis I) and diagnosis of personality disorders (axis II). Multiple diagnoses were possible on both axes and most patients received three or more diagnoses. The principal diagnoses, subdivided in clusters according to the guidelines in the DSM-IV, are represented in table 1.

Measures

The Physical Self-Perception Profile

The Physical Self-Perception Profile (PSPP) [5] is a 30-item self-rating scale with a hierarchical structure. It consists of three subdomain scales – namely perception of sports competence and physical condition (12 items; perceptions of sport and athletic performances, level of stamina, capacity to learn sport skills and maintain physical fitness), perceived attractive body (6 items; perceived attractiveness of body, maintaining an attractive figure and self-confidence in appearance), and perceived physical strength (6 items; perceived muscular strength, muscle tone, and self-confidence in physical activities requiring strength) – and the superordinate scale

of physical self-worth (6 items; general feelings of happiness and satisfaction in the physical self). Each item is scored on a scale from 1 to 4, with higher scores indicating more positive self-perceptions. The range of possible total scores is 0–24, for the scale sports competence and physical condition it is 0–48. Van de Vliet et al. [5] demonstrated an adequate reliability and validity of the Dutch version of the PSPP in a sample group of Flemish psychiatric inpatients. The internal consistency assessed by Cronbach's alpha coefficients in the present study varied from 0.81 to 0.89.

The Rosenberg Self-Esteem Scale

The Rosenberg Self-Esteem Scale (RSES) [25] was used to evaluate global self-esteem and self-acceptance. This self-rating scale is composed of 10 items. Higher total scores indicate higher self-esteem (range: 10–40). The Dutch version of the RSES is regarded as one of the better measures of global self-esteem [25]. The internal consistency in the present study was 0.87.

The Beck Depression Inventory

The Beck Depression Inventory (BDI) [26] is a 21-item self-reporting questionnaire consisting of symptoms and attitudes relating to depression. The range of possible total scores is 0–63, with higher scores indicating greater depression. The Dutch version of the BDI has been shown to be a valid and reliable measure of depression severity [26]. The internal consistency in the present study was 0.88.

The Trait Anxiety Inventory

The Trait Anxiety Inventory (TAI) [27] was used to assess trait anxiety. This self-rating scale consists of 20 items, with response scores on a scale from 1 to 4. The range of possible total scores is 20–80, and a higher score indicates higher levels of anxiety. The TAI represents one of the most reliable and valid instruments for assessing trait anxiety in psychiatric settings, and has been validated for use in Dutch by Hermans [27]. The internal consistency in the present study was 0.92.

Procedure

The study was carried out using a randomized controlled parallel-group design. Patients were randomly assigned to PF or GPMT using computer-generated lists of random numbers [28], provided by an independent statistician. The random allocation was done during the first week of admission in three specialized treatment units by the head nurses, who were not involved in the clinical trial. With the exception of the participation in either the PF or the GPMT, the patients followed identical cognitive behavioral therapy programs. Randomization was stratified according to treatment unit, gender and motivation towards exercises and physical activities. Each treatment unit had 6 randomization lists, 3 for males and 3 for females, that corresponded with three categories of initial motivation. Initial motivation was assessed by the patients themselves by means of a visual analogue scale, ranging from 0 (not at all motivated) to 10 (extremely motivated). Evaluations in both groups were performed at baseline (time 1), after 8 weeks (time 2), and immediately after completion of the 16-week interventions (time 3). The study was approved by the Ethical Committee of the Faculty of Medicine of the Katholieke Universiteit Leuven. Written informed consent was obtained from all patients before entering the study.

Interventions

Since 1992, the PF has been developed as a specialized form of PMT at the University Centre Sint-Jozef in Kortenberg, Belgium [19, 20]. The GPMT is similar to the usual movement therapy program in many psychiatric hospitals in Belgium and the Netherlands [16].

The PF was a combination of aerobic exercise and weight training. The length of the program, the exercise frequency, the intensity and the exercise duration were based on the recommendations for enhancing physical self-concept, formulated by Leith [9]. Patients participated in endurance, strength and flexibility training, three times a week during a period of 16 weeks. The exercise intensity was moderate, ranging from 40 to 60% of the estimated maximal heart rate reserve. The exercise units were the treadmill, the multistation resistance machine, the rowing machine, the bicycle ergometer and the step machine. Depending on the outcome of the initial physical fitness assessments, the psychomotor therapists developed a gradual exercise program by applying the general guidelines of the American College of Sports Medicine [22]. Each session lasted 45 min and consisted of a warming-up with stretching exercises, the actual exercise and a cooling-down phase including repeated stretching. During the sessions, the psychomotor therapists carefully verified whether the exercise intensity was comfortable in order to avoid pain, discomfort and excessive fatigue. They followed the program with exercise cards and provided regular progress feedback to the patients. The therapists avoided between-patient comparisons.

The GPMT consisted of different forms of physical exercises, twice a week, and progressive relaxation training according to Jacobson, once a week. The length of the program (16 weeks), the therapy frequency (three times a week) and the duration of each session (45 min) were the same as in the PF. In this treatment condition, the therapists offered a great variety of physical activities, such as moving to music, badminton, gymnastics on mats, body awareness techniques and specially adapted versions of sports and games (e.g. volleyball, basketball, indoor hockey, soft-tennis). Following the recommendations for improving physical self-concept [9, 29, 30], the psychomotor therapists adapted sports and games in such a way that the competitive aspects were minimized and that the cooperative elements of these activities were emphasized. Most often, the activity was chosen in agreement with the participants. The exercise intensity varied from low to moderate depending on the type of activity. For the relaxation training, Jacobson's progressive relaxation was selected, because this technique is regarded as a gold standard in relaxation methods [31]. The objectives of the relaxation training were improving body awareness and teaching an effective method for coping with tension.

In both programs, participants and therapist discussed their experiences with the exercises and the relaxation training during the last 5 min of each session. All discussions were focused on personal experiences with the activities (e.g. social interactions, fair-play, emotions, tension reduction, sense of mastery, enjoyment and satisfaction) and on body awareness (e.g. breathing, muscle tone and relaxation, degree of effort, body acceptance). The two therapeutic interventions were based on personal responsibility, social reinforcement, self-evaluation, constructive feedback by therapist, hedonic properties of exercise and process internalization [30]. The differences between the therapy conditions were as follows. In the structured PF, the moderate exercise intensity was adapted exactly to the individual physical abilities and exercise tolerance. This intervention focused on perceived fitness gains, achievement of per-

sonal goals, mastery experiences and sense of control over the body and its functioning. In the less structured GPMT, on the other hand, the greater variety of activities was based on the personal preference of each participant (self-determination). This condition concentrated on the sense of belonging and significance through social interaction with peers. The exercise intensity varied from low to moderate, depending on the type of activity.

Both programs were presented as equally acceptable and attractive. The subjects were not informed about the investigator's hypotheses. Therefore, the interventions were offered as 'physical health-related programs' and not as 'programs for improving psychological well-being'. In both programs, patients exercised in groups with an equal number of participants (8–10), under supervision of 4 qualified psychomotor therapists, assisted by 8 students of the postgraduate specialization course in psychomotor therapy. During each session, 1 psychomotor therapist and, for the most part, 1 student were present. The psychomotor therapists and the students met the two groups of each treatment unit on the same days and at the same time, in order to control for the influence of daily mood fluctuations. The therapists and students were rotated across the groups to minimize the possible effects of personal supportive contact with a particular therapist or student.

Statistical Analysis

Statistical analyses were conducted using the intention-to-treat principle. The patients who dropped out of the study due to discharge were included in the data analysis as well. Baseline data of study dropouts and patients who remained in the study until time 2 or time 3 were compared using 1-way ANOVAs.

Outcomes variables were assessed in both groups using repeated-measures ANOVAs corrected for multiple testing with Bonferroni-Holm *p* value adjustments [32].

The effect sizes were calculated as the difference between the mean score after and before the exercise programs, divided by the standard deviation of the intra-individual difference scores. An effect size of 0.20–0.50 is considered to be a small effect, 0.50–0.80 medium, and a value of more than 0.80 a large effect [33].

In order to investigate the responsiveness of each subject who completed the 16-week study, the reliable change index of all these patients was calculated by means of the formula of Christensen and Mendoza [34].

The relationship between changes in physical self-worth and changes in additional variables was examined using the Pearson product-moment correlation coefficients.

The significance level in all of the tests was set at 0.05 (two-tailed).

Results

Recruitment and Dropout

In the course of the research project, 237 patients (84 males and 153 females) were admitted into the three treatment units (fig. 1).

Twenty-nine patients did not meet the inclusion criteria or were excluded according to the exclusion criteria. Three individuals refused to take part in the study; 6 dropped out after the randomization but before PMT was

initiated due to dissatisfaction with their program assignments. One hundred-eight participants (33 males and 75 females) completed the 16-week repeated-measures study. Thirty-nine patients (17 males and 22 females) were discharged after the second evaluation at week 8. Fifty-two (21 males and 31 females) were discharged prior to time 2. The reasons for discharge of the dropouts were unrelated to the study.

Sample Characteristics

The mean age of the PF subjects (mean = 35.54 years, SD = 10.76) was significantly higher than that of the GPMT subjects (mean = 32.44 years, SD = 10.75) ($p = 0.04$). Males showed a significantly higher initial motivation (mean = 6.88, SD = 2.44) in comparison with females (mean = 6.16, SD = 2.44) ($p = 0.045$). However, because gender stratification was performed, there was no difference between the groups of both conditions. Study dropouts did not significantly differ from patients who remained in the study until time 2 or time 3 on baseline measures of motivation, physical self-perceptions, depression, global self-esteem and age; dropouts only demonstrated lower TAI scores at baseline ($p = 0.02$).

Adherence to Treatment

All 199 patients remained in the study until their discharge. The attendance of both groups was similar, with patients in the PF attending 85.42% of the scheduled sessions and patients in the GPMT attending 84.33%. The most common reasons for missed sessions were increase in suicidal ideation or psychosomatic complaints, illness (e.g. acute infectious diseases) and appointments outside the hospital. In those cases where a participant's program had been interrupted, the patient remained a few weeks longer in the study until all 48 sessions had been completed.

Changes in Physical Self-Perceptions

After 8 weeks, both groups showed significantly higher scores on the PSPP scales (F and *p* values ranged from $F_{1, 195} = 11.32$, $p = 0.0037$ to $F_{1, 195} = 34.73$, $p < 0.0001$), except the PF group on the scale attractive body and the GPMT group on the scales strength and physical self-worth. After 16 weeks, the within-group comparison revealed that both groups displayed significant increases on all PSPP scales (F and *p* values ranged from $F_{1, 195} = 9.13$, $p = 0.0114$ to $F_{1, 195} = 32.67$, $p < 0.0001$). The between-group comparison of differences between means after 8 and after 16 weeks was not significant. The changes after 16 weeks in the PF condition demonstrated effect sizes varying from 0.50 to 0.73, representing moderate en-

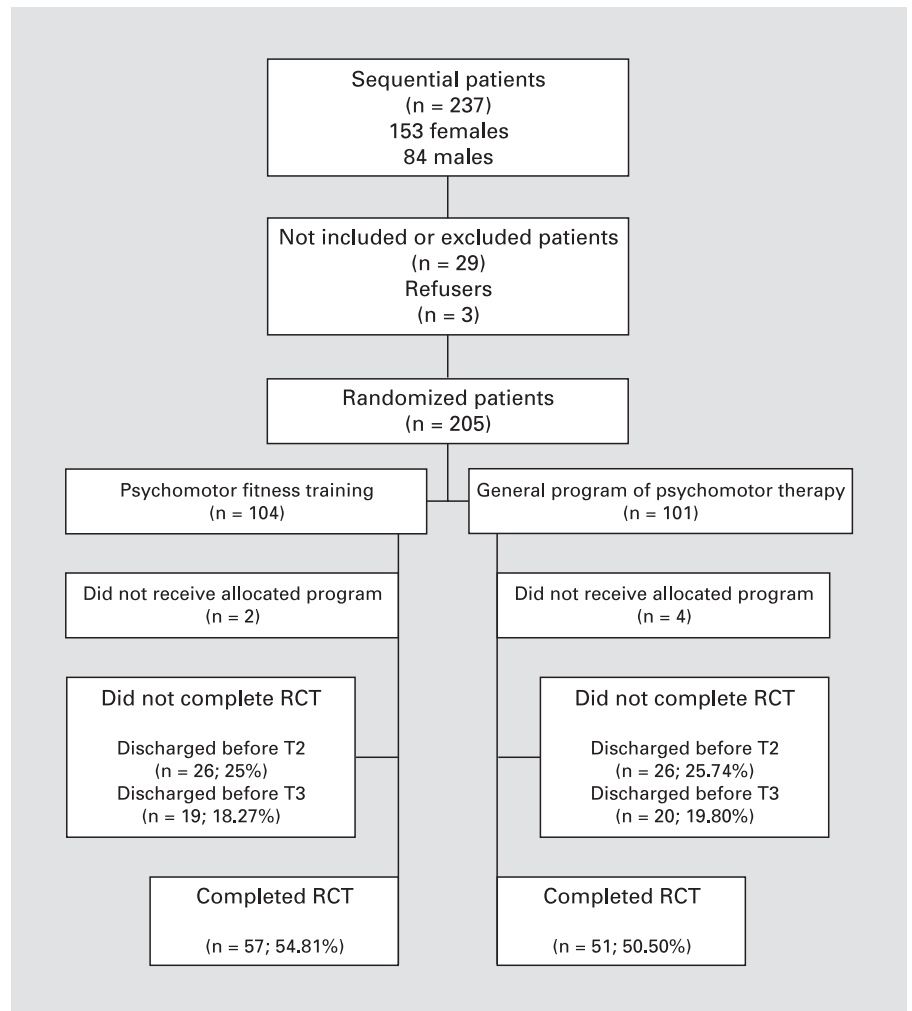


Fig. 1. Flowchart of the trial.

hancements; in the GPMT condition, effect sizes varied from 0.34 to 0.64, considered as small to moderate improvements. The percentages of patients in both groups who showed a positive reliable change index after 16 weeks were comparable: in the PF condition, the percentages varied from 60 to 74%, while in the GPMT the range was 61–69%. There were no significant differences in response over the period of the first 8 weeks between the patients who were discharged after the second evaluation and those who completed the 16-week programs. We found no significant therapy-by-time interaction effects.

Changes in Additional Variables: Global Self-Esteem, Depression and Anxiety

The within-group differences revealed that both groups demonstrated significant improvement on RSES, BDI and TAI scores during the period of the first 8 weeks

(F and p values ranged from $F_{1, 192} = 6.91, p = 0.0278$ to $F_{1, 195} = 31.39, p < 0.0001$). During the second 8 weeks, both groups made further progress on these instruments (F and p values ranged from $F_{1, 145} = 13.82, p = 0.0009$ to $F_{1, 195} = 31.66, p < 0.0001$). The between-group comparison of differences between means was not significant either at 8 weeks or 16 weeks follow-up. The effect sizes of progress after 16 weeks in the PF condition were considered to be moderate (0.60–0.72), and in the GPMT condition as small to moderate effects (0.46–0.61). Substantial and comparable percentages of patients of both groups showed a positive reliable change on RSES (PF 54%, GPMT 63%), BDI (PF 65%, GPMT 71%) and TAI (PF 63%, GPMT 60%). There were no significant differences in response over the period of the first 8 weeks between the patients who dropped out after the second evaluation due to discharge and those who completed the

16-week study. We found no significant therapy-by-time interaction effects.

Relationship between Changes in Physical Self-Worth, Global Self-Esteem, Depression and Anxiety

For these analyses, the patients who completed the 16-week programs were used ($n = 108$). For the relationship between the changes in physical self-worth and the changes in depression, the patients with at least a mild to moderate depression level (BDI score >15) were included ($n = 94$). In both groups, all correlation coefficients were significant in the expected direction (r ranged from 0.45 to 0.81, $p < 0.01$).

Discussion

Main Findings

The changes in physical self-concept, global self-esteem, depression and anxiety after two PMT programs were compared in nonpsychotic psychiatric inpatients. A representative sample group of 199 subjects was recruited in three treatment units over a period of 20 months. Both programs were associated with significant improvements in the different domains of physical self-concept (effect sizes varying from 0.34 to 0.73). This finding suggests that PMT programs help patients to develop a more positive attitude towards their physical self. However, without a no-exercise control group, we cannot be certain that either of these programs caused these changes (see limitations of the study described below). The enhancements in the two groups were of similar magnitude, and the differences between the groups were not significant.

Both groups significantly increased in global self-esteem and decreased in severity of depression and anxiety (effect sizes varying from 0.46 to 0.72). Substantial percentages (varying from 54 to 71%) of patients showed positive reliable changes on these variables. The improvements in physical self-worth went along with an increase in global self-esteem and a decline in depression and anxiety levels. This finding corroborates the Exercise and Self-Esteem Model [10, 11], which is based on the self-efficacy theory of Bandura [35]. This hierarchical model proposes that improvements in physical self-concept lead to enhancements in global self-esteem. In turn, increased global self-esteem can lead to a reduction of depression and anxiety. This means that the relationship between changes in primary and secondary outcomes provide some interesting information regarding the potential role of the physical self in the recovery process of depressed

and/or anxious psychiatric inpatients. However, it also remains possible that changes in secondary outcomes improve subject's physical self-concept.

Limitations of the Study

The subjects in this study were inpatients who were treated within multidisciplinary treatment programs. Other therapy forms and their interactive effects with the PMT programs could have influenced the response in all outcome variables. All patients were on a stable medication regimen at an adequate dosage for at least 8–10 weeks prior to inclusion, and the medication scheme was not altered during the study. Eighty-one percent of patients were treated with antidepressants. These drugs have been shown to have an onset of action of 4–6 weeks [36, 37]. Onset of action of hypnotics, sedatives, anxiolytics and antipsychotics that were prescribed is even shorter [36]. This makes it unlikely that medication accounts for important effects on outcome variables. A second limitation was the absence of a no-exercise control group to control for placebo effects and potential spontaneous recovery. After much consideration of this issue during the initial planning of the study, by the ethical committee, we decided to assign patients only to two active exercise groups. It was deemed unethical to create a no-exercise control group, as PMT has been a valuable therapy form in the multidisciplinary treatment programs for over 35 years. Moreover, several studies have already addressed this topic, showing exercise programs to be associated with reductions of depression and anxiety and enhancements of physical self-concept [3, 8, 12–14]. Another limitation is that program agents, such as those described below, as well as score agents (e.g. social desirability, self-presentation strategies, expectancy effects, demand characteristics) might be responsible for 'increased scores' on self-reporting questionnaires [38]. With the intention of minimizing expectancies for psychological improvement, both exercise programs were offered as 'physical health-related programs' and not as 'programs for improving psychological well-being'. The motivation to take part in the study is a variable probably highly related to expectancies with respect to PMT. In order to control for the influence of motivation before program onset, the level of motivation was included as a covariate in analyzing the response profile of physical self-worth. The analysis of covariance did not demonstrate that initial motivation had played a significant role in the response profile of physical self-worth (therapy \times motivation $F_{1, 190} = 2.14$, $p = 0.15$). A last limitation is that although self-rating scales as well as rating scales may be reliable and valid from a classic psy-

chometric viewpoint, they may lack sensitivity due to their quest for homogeneous components [39].

Mechanisms in Enhancing Physical Self-Concept

In contrast with many other investigations in the field of exercise and mental health, the participants were not volunteers for exercise. Patients initially seek treatment to discuss psychological ailments and relational problems, usually expecting a (psycho)pharmacological and psychotherapeutic treatment for their psychiatric illness and psychosomatic complaints. It is therefore reasonable to assume that the compliance with exercise in psychiatric patients would be worse than in the general population. Many psychiatric patients demonstrate multiple risk factors for noncompliance in exercise programs, such as learned helplessness, hypochondria, a loss of energy and interest, smoking, general fatigue, a negative physical self-concept, a low intrinsic motivation and a poor physical health and fitness [13, 21, 29, 40]. Despite these psychological and physical barriers to participate in exercise, there was a good adherence to both interventions. This may be attributable to the motivational strategies and the supportive and task-oriented climate put into place by the psychomotor therapists [41]. Except for the 6 individuals who dropped out after randomization due to dissatisfaction with their program assignment, no dropout of patients with a low initial motivation occurred. It is plausible that, in PMT for psychiatric patients, certain elements are critical to ensuring optimal exercise adherence, allowing physical self-concept enhancement to take place. These elements are (1) an enhanced body acceptance and perceived physical competence, (2) goal achievement, (3) self-evaluation, social reinforcement and constructive feedback by therapist, (4) an enhanced sense of personal control over the body and its functioning, (5) an improved sense of belonging and social significance through relationships with peers, (6) self-determination, and (7) focus on personal responsibility and hedonic properties of exercise [3, 8, 30]. Every effort was made to implement all these mechanisms in both therapeutic programs. The PF was mainly focused on 1, 2, and 4; the GPMT on 5 and 6. The finding that both PMT programs are equally effective in improving physical self-concept is in accordance with the hypothesis of Fox [3, 8], who posits that several psychosocial mechanisms, some tied to perceived improvements in the body and others linked to social significance and the nature of the exercise setting, mediate enhancement of physical self-concept. He suggests that several mechanisms most likely operate in concert with highly individual-specific characteristics (such as

state of mental health, coping strategies, internal locus of control, perceived exertion, preferences and personal exercise history). That is, different processes operate for different people in different circumstances.

Benefits of Physical Fitness

The fact that exercise is associated with physical health benefits and fitness gains, and that many psychiatric patients have poor physical health and low physical fitness are additional arguments for the incorporation of PMT into treatment programs for psychiatric patients [40, 42]. In our sample group, participation in exercise programs also resulted in an increase or maintenance of physical fitness [43]. Patients in the PF condition improved in cardiorespiratory fitness (13.59% increase in physical work capacity) as well as in strength and participants in the GPMT condition increased strength and maintained cardiorespiratory fitness. However, we found no significant correlations between changes in physical fitness and changes in subdomains of physical self-concept. This indicates that the changes in the patient's perception of fitness rather than the objective gains in fitness themselves are responsible for enhancing the individual's physical self-concept.

Conclusions

Despite the existence of some methodological limitations, the results of this study suggest that both types of PMT programs are effective in enhancing physical self-concept in nonpsychotic psychiatric inpatients. The relationship between the improvement in physical self-worth and the increase in global self-esteem and the decline in negative affect suggests that changes in the physical self-concept might lead to enhancement in mental health. Psychiatric illnesses, especially mood disorders, have a high risk of relapse. The value of exercise training in relapse prevention is highly dependent on the degree to which the patients maintain physical activity after termination of supervised PMT programs. We plan a follow-up study to determine and to compare the exercise adherence and the long-term protective effects in both groups after discharge.

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