

**PARTICIPATION IN PHYSICAL ACTIVITY AMONG  
INPATIENTS WITH SEVERE MENTAL ILLNESS: A PILOT STUDY**

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**Abstract**

**Aims:** Severe mental illness is associated with low levels of physical activity. The current study explored participation in a physical activity program among patients with severe mental illness and its relationships to other variables.

**Methodology:** Eighteen hospitalized patients participated in the study. Their level of participation in a physical activity program was explored and their age and anxiety and depression levels were used to predict participation.

**Results:** The patients had low levels of participation. Seventy-eight percent attended 50 percent or less of the activities, while the sample mean level was 28 percent participation. Participation in the program increased with age.

**Conclusion:** This pilot study has several limitations, most importantly the limited sample size. A greater variety in activities offered and better inclusion of personal activity preferences may increase motivation to participate among younger patients. Adequate social support may counteract barriers related to anxiety and depression symptoms, and thus increase participation. Recommendations for future research include undertaking larger scale studies exploring the relationships between physical activity and other variables, and to investigate processes of motivation for physical activity among patients in this group.

**Keywords:** Physical activity, participation, severe mental illness

**Participation in physical activity among inpatients with severe mental illness:****A pilot study**

People in the industrialized, Western world have become less physically active over the last decades (Biddle & Mutrie, 2008). Physical activity is unequally distributed in the population: Among adults, physical activity is related to socio-economic status and gender, where richer people and males are more active than poorer people and women. Similarly, younger people and those with a Western cultural background are more physically active than older people and those with Non-western ethnic backgrounds (Biddle & Mutrie, 2008; Trost, Owen, Bauman, Sallis, & Brown, 2002).

**Unhealthy lifestyle characteristics**

For people with severe mental illness, the trend of a passive lifestyle is far more outspoken than it is in the rest of the population (Brown, Birtwistle, Roe, & Thompson, 1999; Daumit et al., 2005; Ussher, Stanbury, Cheeseman, & Faulkner, 2007). Their level of physical activity is often lower than what is proposed by the health authorities (U.S. Department of Health and Human Services, 2000). In a study of 140 community-living participants with schizophrenia, none had done any form of physically strenuous activity in the last week. Approximately one third of both male and female participants had not performed any kind of physical activity during the last week (Brown et al., 1999).

In addition to the health-risk factor of little physical exercise, many with severe mental illness smoke excessively (Brown, Inskrip, & Barraclough, 2000; McCreadie, 2003), and they have a much higher mortality rate than the normal population (Brown, 1997). A large proportion of psychiatric patients are overweight, and obesity (BMI > 30) is far more common in this group of patients than in the rest of the population (Aronne, 2001).

**Benefits of physical activity**

It has been suggested that the physical health benefits in terms of reduced morbidity and increased possibility of occupational rehabilitation, is sufficient reason alone to have physical activity implemented in treatment and rehabilitation programs for this group (Faulkner & Biddle, 2002). Specifically, regular physical activity prevents the development of diabetes, heart disease, hypertension, and obesity, and may even benefit those who already have documented cardiovascular disease (Richardson et al., 2005).

Research has been less conclusive about the mental health effects from physical activity. Most of the evidence for mental health benefits of physical activity come from studies of clinical depression, where anti-depressant effects from physical activity have been similar to those from psychotherapeutic interventions (Richardson et al., 2005). However, there is some evidence that physical activity can have positive effects on depression, social interest, energy, and self-esteem in patients with severe mental illness (Cole, 2008; Faulkner & Biddle, 1999; Pelham, Campagna, Ritvo, & Birnie, 1993; Richardson et al., 2005). It can also be one way of coping with auditory hallucinations (Faulkner & Biddle, 1999), and it may improve general quality of life (Skrinar, Huxley, Hutchinson, Menninger, & Glew, 2005).

**Physical activity preferences and barriers**

Recent studies have investigated the preferences with respect to physical activity forms for this group (Daumit et al., 2005; Ussher et al., 2007). Based on these studies, walking generally seems to be the most popular choice of activity, while motivation for physically tiresome or socially complex activities seems rare. Interventions that aim at encouraging physical activity for these patients should therefore consider the patients' own activity preferences as well as the demands for skills and physical and social capacity inherent in different forms of activity (Cole, 2008).

Effective interventions for increasing physical activity should also consider the barriers experienced by the patients. Fatigue, illness perception, anxiety, low self-efficacy, and a problematic body image are important person-related barriers to physical activity. Situational factors like lack of social support and lack of facilities also represent barriers to physical activity (Cole, 2008; Daumit et al., 2005; Dishman & Buckworth, 1997; Ussher et al., 2007). Theoretically, these factors can be described as social norm variables and control variables, in accordance with Ajzen's Theory of Planned Behavior (Ajzen, 1988). The social norms as expressed by important others may influence on participation by increasing the patient's motivation. Control variables may influence participation through an impact on motivation, as well as through external barriers that may hinder participation regardless of the patient's motivation (Ajzen, 1988; Biddle & Mutrie, 2008).

### **Anxiety and depression in patients with severe mental illness**

There is reason to believe that our sample of patients with severe mental illness will experience many of the barriers mentioned above. Psychotic symptoms like hallucinations and thought disturbance may severely limit the person's ability to maintain focus and accomplish a series of actions involved in some activities, in particular activities of a social nature (Cole, 2008). Anxiety symptoms are very common in patients with schizophrenia (Dernovsek & Sprah, 2009; Huppert & Smith, 2005), and paranoid delusions may increase anxiety and general vigilance, adding to the barrier towards physical activity participation. Depression is also common in schizophrenia (Gorna, Jaracz, Wrzyszczyńska, & Rybakowski, 2007; Romm et al., 2010), and a psychotic episode in remission may lead to feelings of emptiness, sadness, and hopelessness, which in turn may add to the depressive dimension of the barrier (Addington, Williams, Young, & Addington, 2004; Wittmann & Keshavan, 2007).

The studies cited above give evidence for high occurrence of anxiety and depression in patients with severe mental illness. However, the impact on physical activity participation

from anxiety and depression symptoms in these patients remains to be formally investigated. The lack of knowledge justifies addressing this issue in the present study.

### **The Norwegian context**

Over the last years in Norway, resources for psychiatric health care purposes have been channeled away from the larger hospitals towards the local health care, in line with a more community based approach to treatment and care. As a consequence, the number of hospital beds has been reduced and patients are rarely admitted to hospital unless they are psychotic and clearly unable to take care of themselves. Thus, the sample investigated in this pilot study may have a lower level of functioning than the samples in earlier studies. They may also have a higher level of psychiatric symptoms, like anxiety and depression. Therefore, several of the known barriers may interplay and hinder physical activity participation among the patients in our study sample.

### **Adherence to physical activity**

Previous research has recommended that a variety of health-promoting interventions should be emphasized for people with severe and longstanding mental illness. Such interventions may include serving healthy food in psychiatric hospitals, educating patients in healthy nutrition and cooking skills, encouraging smoking cessation or -reduction, and including physical activity in the treatment programs. However, we know little about how such interventions are received among the patients and to what extent the patients adhere to the intervention programs. In our literature review, we were unable to find studies that systematically describe the level of participation in structured physical activity programs for this group of patients while admitted to hospital treatment. Adherence to exercise programs for patients with anxiety and depression have been found to resemble that of the normal population (Martinsen, 1993; Richardson et al., 2005). Our clinical experiences with the

severely mentally ill, though, point in the direction of a varying, but generally low level of adherence to physical activity programs.

### **Aims of the study**

The aim of the current pilot study is therefore to 1) investigate the level of participation in a structured physical activity program among hospitalized patients with severe mental illness. We also aim to 2) explore the impact on physical activity participation from age and anxiety and depression symptoms.

### **Method**

#### **Sample**

As we wanted the sample to mirror the diverse clinical reality of the department, all the admitted patients were considered eligible for participating in the study, regardless of diagnosis. Excluded were only those unable or unwilling to give informed consent to participate. Sociodemographic and clinical characteristics of the study sample is described in Table 1. In total, 18 patients participated, 12 men (66.7 %) and six women (33.3 %). The mean age for the total sample was 44 years (SD = 13 years).

All the patients were also regularly encouraged to participate in the physical activity program, excepting those whose clinical condition prevented from participating. The clinical condition of each patient was assessed by a physician and/or a psychologist before recruitment to the activity program. Patients were excluded from participating in the activity program in cases of serious somatic illness, suicide risk, escape risk, violence risk, mania, or severe confusion.

TABLE 1 ABOUT HERE

**Clinical context**

The department of general psychiatry at Oslo University Hospital - Ulleval, where this pilot study took place, is rurally located at Dikemark, about 30 km south of Oslo, Norway. The department consists of four wards, each of these having eight to 15 patients admitted. Two of the wards have the primary task of providing observation, assessment, and shorter term treatment (between three and six months stay), whereas the other two wards provide longer term treatment and care for patients with more chronic illness (between six months and two years stay).

**Measures**

The Hospital Anxiety and Depression Rating Schedule (HADS) (Zigmond & Snaith, 1983) was used as a measure of the participants anxiety and depression symptoms. HADS is a 14 items questionnaire with subscales for anxiety and depression. Each item is formed as a statement, to which the patient replies by stating his or her level of agreement on a four-level scale; ranging from 0 (*not at all*) to 3 (*very often*). The score range is 0-21 for each of the subscales. A subscale score of 11 or above represents a case of anxiety or depression, respectively, whereas a total score of 19 or above represents a mixed case of anxiety and depression (Zigmond & Snaith, 1983). The total score was used as a general measure of psychiatric symptoms in this study. The HADS has been shown to have good psychometric properties (Herrmann, 1997).

**Data collection**

Age and gender was collected from routine data, and attendance to the activity sessions was registered by staff during the course of treatment for all patients. The HADS was in most cases administered as a self-report questionnaire for the participants. When considered needed, the author (on-site project leader) collected these data by administering the HADS as an interview. These data were collected at the time of recruitment shortly after



admission to the department. Some of the patients were recruited for study participation later during the course of treatment due to inability or unwillingness to participate from the beginning.

The author is qualified as an occupational therapy clinical specialist in mental health. He has long time clinical experience (> 13 years) from the field of mental health and is familiar with using the HADS assessment.

### **Physical activity program**

A physical activity program was part of the general treatment program for patients admitted to the department between May 2009 and April 2010. In most cases, walking was the selected activity. As often as was permitted by the weather conditions, we walked on pathways in the nearby forest areas. Occasionally, and for the sake of variation, we selected gym studio training, ergometer cycling, ball games, and other kinds of physical play. The activity program consisted of two weekly sessions, each lasting one hour. In general, the activities were performed in a group format, with all the participants together in one or two groups. Groups were largely based on the patients wanting different intensity in the sessions – i.e., walking fast or slowly. For some patients, participation in a group based program was difficult for shorter or longer periods of time. Participation in the physical activity program was therefore based on one on one contact with staff or in smaller groups in cases where such an approach was called for.

The program was lead by two assistant nurses (during 2009) and one occupational therapist (during 2010). The leaders had appropriate education and/or long time experience in utilizing physical activity for patients with severe mental illness. The leaders' tasks consisted in welcoming the group of patients at the beginning of the sessions, provide instruction for the activities, and to establish and maintain overall structure in the activities in close collaboration with other clinical staff participating. Clinical staff participated in the activities in order to

provide additional structure, guidance and support for patients who needed highly individualized interventions. The aim of the clinical support was to help establish a safe environment in the sessions, establish and maintain motivation among the patients, provide individualized support during the course of the sessions, and help create a friendly and supportive atmosphere in the group.

### **Statistical analysis**

Missing data concerning a patient's presence or absence from the physical activity program were replaced with the last observation for this patient. This strategy of replacing missing data is considered a conservative strategy (Field, 2005). In total, 10 missing data points were replaced in the dataset.

The statistical analyses were performed with *SPSS* for Windows, version 15. The frequency of attendance was calculated, as was the total number of sessions that each patient could have participated in during his or her treatment period. Then, the percentage attendance was calculated and frequency analysis was performed on this variable in order to investigate the level of participation in the physical activity program.

The relationships between physical activity participation, age, gender, and psychiatric symptoms were first investigated with Pearson's correlation coefficient. Then, regression analysis was performed to measure the impact of age and psychiatric symptoms on the level of participation. The first model included age as predictor of participation, whereas the second model added the total symptom score of depression and anxiety. The level of statistical significance was set to 0.05.

### **Ethics**

The present pilot study is part of a larger study investigating physical activity in relation to health and quality of life among inpatients with severe mental illness. The study was granted ethical approval by the regional research ethics committee.

## Results

During their time in treatment, the patients had the opportunity to attend between two and 90 activity sessions, due to different lengths of admission. The mean number of possible sessions to attend was 35 (SD = 20). The level of participation ranged between 0 % and 100 % attendance, and the mean level was 28.4 % attendance. The larger proportion, 78 % of the sample, attended less than 50 % of the activity sessions during treatment whereas 50 % of the participants attended 20 % or less of the activity sessions during treatment. Figure 1 shows the participation levels for the study sample.

FIGURE 1 ABOUT HERE

Table 2 shows the relationships between physical activity participation and age, gender, and anxiety and depression symptoms. None of these relationships were statistically significant. However, there were trends indicating that higher age was related to higher levels of participation ( $r = 0.45$ ,  $p = 0.061$ ), and that being female was related to reporting more anxiety and depression symptoms ( $r = 0.42$ ,  $p = 0.085$ ).

TABLE 2 ABOUT HERE

Table 3 shows the impact of age and psychiatric symptoms on activity participation during treatment, and the proportion of the variance in participation explained by the two statistical models. In the second model, participation increased with increasing age among the participants ( $\beta = 0.49$ ,  $p = 0.036$ ), whereas anxiety and depression symptoms among the patients did not have an impact on participation reaching statistical significance ( $\beta = -0.34$ ,  $p = 0.130$ ). The second model explained 32 % of the variance in participation.

## TABLE 3 ABOUT HERE

An additional analysis included gender as predictor together with age and symptoms. This third model showed that participation increased with increasing age ( $\beta = 0.51, p = 0.020$ ). Being female showed a trend towards increased participation in physical activity ( $\beta = 0.44, p = 0.058$ ), whereas anxiety and depression symptoms had a negative impact on participation ( $\beta = -0.53, p = 0.027$ ). In total, 48 % of the variance in participation was accounted for by the three variables age, gender, and psychiatric symptoms.

### Discussion

The patients' low level of physical activity attendance during treatment was not surprising, given the results from earlier studies also suggesting low levels of physical activity for this group of patients (Brown et al., 1999; Daumit et al., 2005; Ussher et al., 2007). However, we had hoped that the easy access to a systematic physical activity program and good opportunity for individual support would result in a higher level of attendance among the patients. We considered the structured program and the support from clinical staff as means to facilitate participation among the patients; counteracting the barriers concerning lack of facilities and lack of social support, as presented in earlier studies (Cole, 2008; Daumit et al., 2005; Dishman & Buckworth, 1997; Ussher et al., 2007). However, the attendance levels remained low and several factors can contribute to explain these.

The low functional status, as evidenced by the sample receiving hospital treatment, is a particular reason for these patients to be having even more problems in regularly attending physical activity sessions than the participants in the cited studies, who were community-living patients. Our sample also had high levels of distress related to anxiety and depression (Table 1), which are barriers to physical activity participation that are both theoretically

reasonable as well as empirically supported (Cole, 2008; Daumit et al., 2005; Dishman & Buckworth, 1997; Ussher et al., 2007). Even though our main analysis could not confirm a significant negative impact on physical activity participation from anxiety and depression symptoms (Table 3), our additional analysis suggested that such an impact may be found in a larger sample with adequate statistical power.

It seems like a clinical paradox that physical activity participation may be hindered by some of the very same symptoms that research has shown can be alleviated by physical activity. In particular, this applies to symptoms of depression, where a substantial amount of research has evidenced symptom reduction from physical activity and physical exercise (Knubben, Reischies, Adli, Schlattmann, & Dimeo, 2007; Martinsen, 1995; Martinsen, Medhus, & Sandvik, 1985; Stathopoulou, Powers, Berry, Smits, & Otto, 2006; Tkachuk & Martin, 1999), but positive results with respect to reduced anxiety have also been reported (Broocks et al., 1998). Although these findings are concerned with other clinical populations than the sample in the present pilot study, it has been suggested that also the severely mentally ill can achieve positive effects on mental health from physical activity interventions in addition to the positive impact on their general health (Chamove, 1986; Faulkner & Biddle, 1999; Pelham et al., 1993; Plante, 1993; Richardson et al., 2005; Skrinar et al., 2005). Thus, the promotion of physical activity among those with severe mental illness is a two-sided case: We need to empathize with the patient who suffers and has reduced capacity for activity due to his symptoms. On the other hand, we should also encourage participation in activities that contribute to better health. When to choose either one of these strategies is a question of clinical judgment and skill.

In earlier studies, social contacts and social support have been found to represent an important dimension that can either facilitate or hinder physical activity participation among these patients (Cole, 2008; Daumit et al., 2005; Dishman & Buckworth, 1997; Ussher et al.,

2007). We did not measure social support for participation in this study. However, if the level of social support and encouragement was insufficient in relationship to the patients' needs, this may have impacted negatively on their participation. To the extent that the patients' low internal motivation works together with insufficient support from others, the sum of these factors may strongly hinder participation in a physical activity program.

Motivation is closely linked to behavior (Hagger, Chatzisarantis, & Biddle, 2002) – in this case, the intention to participate in a physical activity program is closely related to actual participation. However, motivation does not determine a person's actions alone. We have referred to the influence on participation from variables functioning as barriers and facilitators. These factors may influence participation through an impact on motivation, as it does when a person stops participating because his friend has stopped doing it. Moreover, barriers may affect participation directly regardless of the person's motivation, as when external, objective barriers get in the way. The barriers and facilitators toward physical activity may therefore be viewed as influencing the level of participation by increasing or decreasing motivation, but barriers may also hinder participation directly. This outline is very similar to the Theory of Planned Behavior (Ajzen, 1988), and may be viewed as a simplified version of some of the aspects outlined in this model. Figure 2 shows the suggested relationships between motivation, participation, and the facilitators and barriers. When the facilitating influence is stronger than the influence from barriers, motivation for activity increases and participation is more likely to occur.

FIGURE 2 ABOUT HERE

The level of participation was influenced by the participants' age. In our study, the older adults were the more stable participants in the activity program, whereas the younger

patients to a larger extent dropped in and out of the program during their time in treatment. This finding contrasts earlier findings concerning the general population, where the relationship between physical activity participation and age has been oppositely directed – younger people being more active than older (Biddle & Mutrie, 2008; Trost et al., 2002). We wonder if this can be due to differences in symptoms between younger and older patients. If younger patients to a larger extent than older patients become passive and withdrawn in the course of their illness, this may contribute to explain differences in physical activity participation. However, we have not come across any studies supporting such an explanation.

Another explanation for the impact from age on participation may be related to the content of the activity sessions. Our program with emphasis on relatively simple activities, like walking in nearby forest areas, can be perceived as old-fashioned and therefore unattractive for younger patients. To the extent of our knowledge, the patients who actually did perform some kind of physical activity in their leisure time were mostly the younger patients. Some of the younger patients also expressed their wishes to do activities like ball games more often. Therefore, it seems that the knowledge concerning activity preferences among patients in this group should be expanded and elaborated. The patients are at different age levels and may therefore have different preferences for activity participation.

### **Study limitations**

This study examined physical activity participation during treatment by registering attendance in a structured activity program. This registration may not accurately represent the patients' level of physical activity during their time in treatment. Some of the patients exercised in their leisure time – some regularly, some sporadically; some in addition to attending the physical activity program, some as an alternative to this. This limits the opportunity to generalize from our findings, as we do not know how well our data concerning program attendance inform of the general level of physical activity during treatment.

However, our data are objective with respect to measuring the patients' attendance in a designated physical activity program during treatment.

The most important limitation concerns our small sample size of 18 patients. We are not able to rule out that our study participants may come from a special subset of the population with severe mental illness. Therefore, the results from this study may have limited applicability to the larger population. The small sample size also strongly limited the number of variables to include in the analyses. Advice on statistical procedures differ between various authors, suggesting that study samples should consist of 10 - 15 persons per variable to be included in statistical models like multiple regression models (Field, 2005; Stevens, 1996). This implies that the results from this pilot study should be considered tentative, suggesting variables to include in future research in this area. The small number of variables included in this study also limited our ability to discriminate between the impacts from different clinical characteristics, like different kinds of psychiatric symptoms.

### **Conclusion and further recommendations**

The study has shown that the level of participation in a structured physical activity program was low during hospital treatment for patients with severe mental illness. The lower level of participation among younger patients may give cause to a reconsideration of the content of the activities. Implementing other forms and a greater diversity of activities in the activity program may lead to a higher level of participation among younger patients. Novel approaches designed to increase physical activity motivation and participation among these patients should be carefully described and researched.

A potential negative impact from anxiety and depression symptoms on participation in physical activity is suggested but not confirmed by this study, and it is suggested that relationships between diverse symptoms and physical activity participation are studied more carefully in future research. Clinicians promoting physical activity for these patients should



carefully balance between empathy and patience on one hand, and encouragement and support for activity on the other.

Future studies should preferably collect data from larger samples and should investigate a larger number of clinical variables with a theoretically proposed relationship to physical activity participation. The clinical variables to be studied should also be more distinct than the aggregated symptom score used in this study, so that the impact from different clinical characteristics can be measured. Clinical staff providing encouragement and support seems an important aspect for increasing physical activity participation for these patients, and future studies should attempt to measure the influence from such support. Age was an important factor in determining participation in this sample, and future studies should closer investigate the relationships between age and physical activity participation in this group. The processes leading to higher or lower levels of physical activity participation seem to be an area of little prior research, and given the clinical importance of increasing the activity level for this group, this should be studied further.

### **Key points**

- People with severe mental illness often have poor physical health
- Clinicians should encourage physical activity and increase its accessibility among these patients
- Clinicians should consider the patients' age, functional ability, and their personal activity preferences
- Social support is important for increasing motivation among these patients

**Conflict of interest:** None

## Reference List

- Addington, J., Williams, J., Young, J., & Addington, D. (2004). Suicidal behaviour in early psychosis. *Acta Psychiatrica Scandinavica*, *109*, 116-120.
- Ajzen, I. (1988). *Attitudes, personality and behavior*. Milton Keynes: Open University Press.
- Aronne, L. J. (2001). Epidemiology, mortality, and treatment of overweight and obesity. *Clinical Psychiatry*, *62* (suppl 23), 13-22.
- Biddle, S. & Mutrie, N. (2008). *Psychology of Physical Activity. Determinants, well-being and interventions*. (2 ed.) London/New York: Routledge/Taylor & Francis Group.
- Broocks, A., Bandelow, B., Pekrun, G., George, A., Meyer, T., Bartmann, U. et al. (1998). Comparison of aerobic exercise, cloripramine, and placebo in the treatment of panic disorder. *American Journal of Psychiatry*, 603-609.
- Brown, S. (1997). Excess mortality of schizophrenia: A meta-analysis. *British Journal of Psychiatry*, *171*, 502-508.
- Brown, S., Inskrip, H., & Barraclough, B. (2000). Causes of the excess mortality of schizophrenia. *British Journal of Psychiatry*, *177*, 212-217.
- Brown, S., Birtwistle, J., Roe, L., & Thompson, C. (1999). The Unhealthy Lifestyle of People with Schizophrenia. *Psychological Medicine*, 697-701.
- Chamove, A. S. (1986). Positive short-term effects of activity on behavior in chronic schizophrenic patients. *British Journal of Clinical Psychology*, *25*, 125-133.

Cole, F. (2008). Mental health and physical activity: Enabling participation. In J.Creek & L. Lougher (Eds.), *Occupational therapy and mental health*. (4th ed., pp. 277-301).

Edinburgh: Elsevier, Ltd.

Daumit, G. L., Goldberg, R. W., Anthony, C., Dickerson, F., Brown, C. H., Kreyenbuhl, J. et al. (2005). Physical Activity Patterns in Adults With Severe Mental Illness. *Journal of Nervous and Mental Disease*, 193, 641-646.

Dernovsek, M. Z. & Sprah, L. (2009). Comorbid anxiety in patients with psychosis. *Psychiatr.Danub.*, 21 Suppl 1, 43-50.

Dishman, R. K. & Buckworth, J. (1997). Adherence to physical activity. In W.P.Morgan (Ed.), *Physical activity and mental health* (pp. 63-80). Washington, DC: Taylor & Francis.

Faulkner, G. & Biddle, S. (1999). Exercise as an adjunct treatment for schizophrenia: A review of the literature. *Journal of Mental Health*, 5, 441-457.

Faulkner, G. & Biddle, S. (2002). Mental health nursing and the promotion of physical activity. *Journal of Psychiatric and Mental Health Nursing*, 9, 659-665.

Field, A. (2005). *Discovering statistics using SPSS*. (2 ed.) London: Sage Publications.

Gorna, K., Jaracz, K., Wrzyszczyńska, L., & Rybakowski, F. (2007). Quality of life and depression in schizophrenic patients. *Adv.Med.Sci.*, 52 Suppl 1, 108-111.

Hagger, M. S., Chatzisarantis, N. L. D., & Biddle, S. J. H. (2002). A meta-analytic review of the theories of reasoned action and planned behavior in physical activity: Predictive validity and the contribution of additional variables. *Journal of Sport and Exercise Psychology*, 24, 3-32.

Herrmann, C. (1997). International experiences with the hospital anxiety and depression scale - a review of validation data and clinical results. *Journal of Psychosomatic Research, 42*, 17-41.

Huppert, J. D. & Smith, T. E. (2005). Anxiety and schizophrenia: the interaction of subtypes of anxiety and psychotic symptoms. *CNS.Spectr., 10*, 721-731.

Knubben, K., Reischies, F. M., Adli, M., Schlattmann, P., & Dimeo, F. (2007). A randomised, controlled study on the effects of a short-term endurance training programme in patients with major depression. *British Journal of Sports Medicine, 41*, 29-33.

Martinsen, E. W. (1993). Therapeutic implications of exercise for clinically anxious and depressed patients. *International Journal of Sport Psychology, 24*, 185-199.

Martinsen, E. W. (1995). The effects of exercise on mental health in clinical populations. In S.J.H.Biddle (Ed.), *European Perspectives on Exercise and Sport Psychology* (pp. 71-84). Champaign, IL: Human Kinetics.

Martinsen, E. W., Medhus, A., & Sandvik, L. (1985). Effects of aerobic exercise on depression: A controlled study. *British Medical Journal, 291*, 109.

McCreadie, R. G. (2003). Diet, smoking, and cardiovascular risk in people with schizophrenia. *British Journal of Psychiatry, 183*, 534-539.

Pelham, T. W., Campagna, P. D., Ritvo, P. G., & Birnie, W. A. (1993). The effects of exercise therapy on clients in a psychiatric rehabilitation program. *Psychosocial Rehabilitation Journal, 16*, 75-84.

Plante, T. G. (1993). Aerobic exercise in prevention and treatment of psychopathology. In P. Seragianian (Ed.), *Exercise Psychology* (pp. 358-379). London: Wiley-Interscience.

Richardson, C. R., Faulkner, G., McDevitt, J., Skrinar, G. S., Hutchinson, D. S., & Piette, J. D. (2005). Integrating physical activity into mental health services for persons with serious mental illness. *Psychiatric Services, 56*, 324-331.

Romm, K. L., Rossberg, J. I., Berg, A. O., Barrett, E. A., Faerden, A., Agartz, I. et al. (2010). Depression and depressive symptoms in first episode psychosis. *Journal of Nervous and Mental Disease, 198*, 67-71.

Skrinar, G. S., Huxley, N. A., Hutchinson, D. S., Menninger, E., & Glew, P. (2005). The Role of a Fitness Intervention on People with Serious Psychiatric Disabilities. *Psychiatric Rehabilitation Journal, 2*, 122-127.

Stathopoulou, G., Powers, M. B., Berry, A. C., Smits, J. A. J., & Otto, M. W. (2006). Exercise Interventions for Mental Health: A Quantitative and Qualitative Review. *Clinical Psychology: Science and Practice, 13*, 179-193.

Stevens, J. (1996). *Applied multivariate statistics for the social sciences*. (3 ed.) Mahwah, NJ: Lawrence Erlbaum.

Tkachuk, G. A. & Martin, G. L. (1999). Exercise Therapy for Patients With Psychiatric Disorders: Research and Clinical Implications. *Professional Psychology: Research and Practice, 30*, 275-282.

Trost, S. G., Owen, N., Bauman, A. E., Sallis, J. F., & Brown, W. (2002). Correlates of adults' participation in physical activity: Review and update. *Medicine and Science in Sports and Exercise*, 34, 1996-2001.

U.S.Department of Health and Human Services (2000). Physical activity and fitness. In *Healthy people 2010: Objectives for improving health* (2 ed., pp. 22-39). Washington, D.C.: Government Printing Office.

Ussher, M., Stanbury, L., Cheeseman, V., & Faulkner, G. (2007). Physical activity preferences and perceived barriers to activity among persons with severe mental illness in the United Kingdom. *Psychiatric Services*, 58, 405-408.

Wittmann, D. & Keshavan, M. (2007). Grief and mourning in schizophrenia. *Psychiatry*, 70, 154-166.

Zigmond, A. S. & Snaith, R. P. (1983). The hospital anxiety and depression scale. *Acta Psychiatrica Scandinavica*, 67, 361-370.

Table 1

*Sociodemographic and clinical characteristics of the study sample (N = 18)*

Characteristic	
Mean age (SD)	43.7 (13.3)
Males / females (%)	12 / 6 (66.7 / 33.3)
Diagnosis	n ( %)
Schizophrenia	9 (50.0)
Paranoid psychosis	3 (16.7)
Bipolar disorder	2 (11.1)
Other <sup>1</sup>	4 (22.4)
Psychiatric symptoms	M (SD)
Anxiety	10.5 (4.9)
Depression	10.3 (4.6)
Sum anxiety and depression	20.7 (7.9)

*Note.* <sup>1</sup> Other diagnoses were major depression (n = 1), schizotypal disorder (n = 1), unspecified developmental disorder (n=1), and borderline personality disorder (n = 1).

Table 2

*Relationships between physical activity participation and age, gender, and anxiety and depression symptoms at admission (N = 18)*

	Age	Gender	Symptoms
Gender	.02		
Symptoms	.13	.42	
Participation	.45	.23	-.28

*Note.* Table content is Pearson's  $r$  correlations. Gender was coded male = 1, female = 2. No statistically significant relationships between the variables.



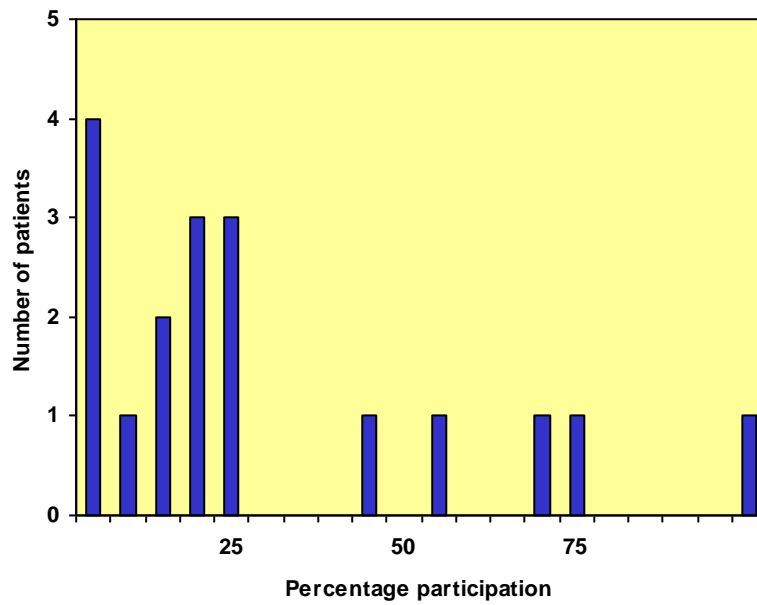
Table 3

*Physical activity participation during treatment predicted by age and anxiety and depression symptoms at admission (N = 18)*

Predictor	$r^2$	Coefficients ( $\beta$ )	
		Model 1	Model 2
Age	.20	.45	.49*
Symptoms	.32		-.34

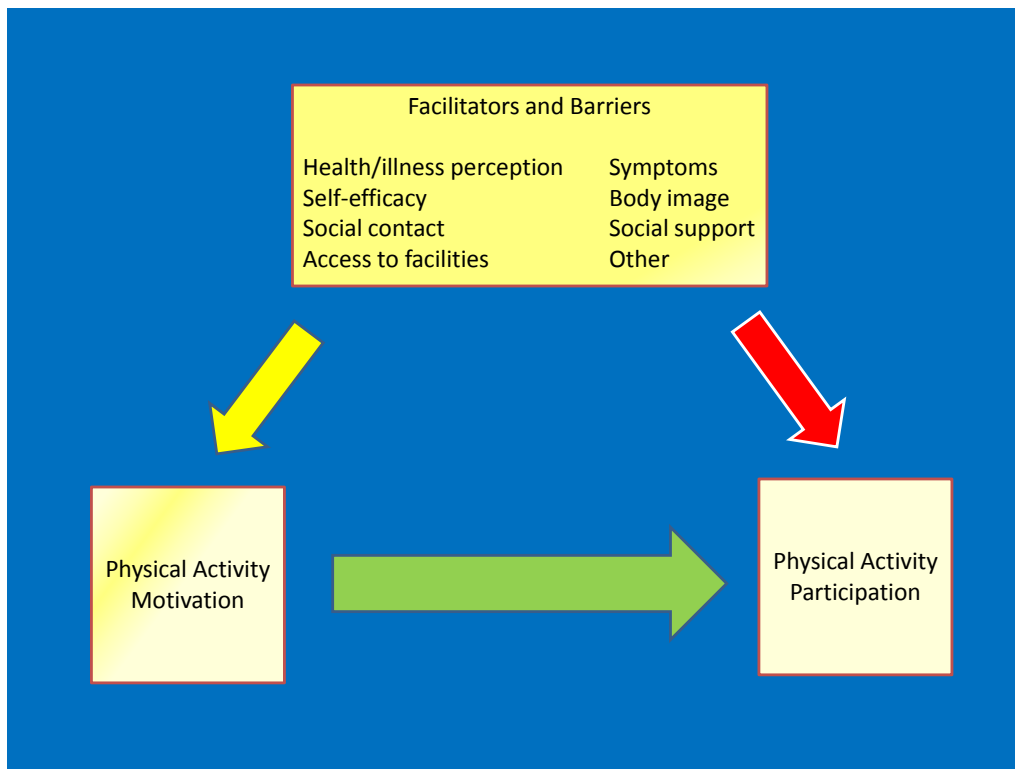
*Note.* Table content is standardized beta values ( $\beta$ ) and variance in physical activity participation explained by the models ( $r^2$ ). \*  $p < 0.05$ .

Figure 1. Physical activity participation in the study sample (N = 18)



*Note.* The horizontal axis shows the percentage levels of participation, whereas the vertical axis shows the number of patients at each level.

Figure 2. A model of motivation, participation, and influence from facilitators and barriers



*Note.* The level of motivation strongly influences participation (green arrow) (Hagger et al., 2002). Facilitators and barriers may influence participation indirectly, by influencing motivation (yellow arrow). Barriers may also influence participation directly (red arrow) (Ajzen, 1988).