



Changes during hospital treatment in patients with SMI

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ABSTRACT

Severe mental illness (SMI) is associated with low levels of functioning, severe symptomatology, and low levels of physical activity and quality of life. This study explores changes in these variables during hospital treatment in a sample with SMI. Participants were 11 patients with SMI who completed assessments at admission and discharge from hospital. Changes with regard to physical activity levels, global functioning, psychiatric symptoms, and quality of life during treatment were investigated with non-parametric tests for related samples. Participants achieved higher functional status and experienced reduced depression during treatment. There was a trend of increased quality of life during treatment, but no changes were detected on other measures. Physical activity levels were unchanged from admission to discharge. Efforts to increase physical activity levels among patients with SMI should have a long-term perspective, as significant changes may not occur during hospital treatment.

Patients with severe mental illness (SMI) generally have low levels of physical activity (Brown et al, 1999; Daumit et al, 2005; Ussher et al, 2007). They also smoke more and have higher intake of fat and sugar compared to the general population (Brown et al, 1999). Associated with this unhealthy pattern of nutrition, obesity is much more common in SMI patients than in the general population (Aronne, 2001). Antipsychotic medication is a core treatment for many patients with SMI, but has also been shown to cause weight gain (Fontaine et al, 2001; Gupta et al, 1998). Physical inactivity, a poor diet, and antipsychotic medication all increase the risk of overweight and obesity and—

along with excessive smoking—the risk of poor physical fitness. They also increase the risk of a variety of somatic illnesses, including type-2 diabetes and cardiovascular disease (Brown, 1997; Sokal et al, 2004). Due to these relationships, a growing area of research concerns physical activity and how it can be increased in patients with SMI (Faulkner and Biddle 1999; Richardson et al, 2005; Tkachuk and Martin, 1999).

There is much evidence for high levels of depression and anxiety symptoms in patients with SMI. In patients with schizophrenia—which seems to be the most frequently researched diagnostic category included under the SMI umbrella concept—several studies have evidenced that anxiety (Huppert and Smith, 2005; Lysaker and Salyers, 2007) and depression symptoms (Conley et al, 2006; Wassink et al, 1999; Zisook et al, 1999) are frequent. Furthermore, these symptoms detract from their wellbeing and quality of life (Conley et al, 2006; Huppert and Smith, 2005; Huppert et al, 2001; Kim et al, 2010; Kugo et al, 2005; Norholm and Bech, 2006; Xiang et al, 2007).

It has long been proposed that physical activity can be one way of alleviating psychiatric symptoms. A large number of studies on depression have found physical activity interventions to be effective in reducing mild-to-moderate depression symptoms (Knubben et al, 2007; Martinsen, 1995; Martinsen et al, 1985; Stathopoulou et al, 2006; Tkachuk and Martin, 1999). A recent review concluded that physical activity is beneficial in reducing anxiety symptoms, as well as in combating mild-to-moderate depression (Martinsen, 2008). However, findings are not unanimous. A recent randomised controlled trial for adults with depression found no improvement in depression scores among patients receiving the physical activity intervention beyond that of control group patients (Chalder et al, 2012).

Given the frequent occurrence of anxiety and depression symptoms among patients with SMI, physical activity has great appeal as an adjunct treatment intervention for this group. In addition to this medical viewpoint, a psychosocial perspective suggests that the participation in culturally valued activities; the experience of being physically active;

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and the performing of personally meaningful activity with peers, may contribute to the wellbeing and quality of people's lives. Thus, the psychosocial aspects of physical activity may be as important to the experience of quality of life as the increased fitness levels achieved by the regular performing of physical activity (Bonsaksen and Lerdal, 2012; Cole, 2008).

Intervention research using physical activity for patients with schizophrenia is at a beginning stage, and most available research to date have used small sample sizes and uncontrolled research designs (Gorczyński and Faulkner, 2011). Nevertheless, the studies to date suggest a possible impact of physical activity on reduced anxiety (Gimino and Levin, 2008), reduced depression (Chamove, 1986; Pelham et al, 1993), increased self-esteem (Plante, 1993), as well as on improved general health, empowerment, and quality of life (Skrinar et al, 2005) among patients with schizophrenia.

The studies cited above provide evidence that patients with schizophrenia may achieve reduced symptom levels and increased quality of life during relatively short-term physical activity intervention programmes in conjunction with other treatment. Moreover, as SMI does involve similar presentations to those found in depression and anxiety (e.g. withdrawal, anhedonia), a focus on presentations rather than diagnosis makes it likely that physical activity can have positive effects brought about by the same process and mechanisms.

Designated treatment programmes aimed at increasing physical activity are not necessarily well-attended, as shown in a recent study focusing on programme attendance among hospitalized patients with SMI (Bonsaksen, 2011). Internal factors (e.g. symptomatic burden, low self-efficacy, or low body image) as well as factors external to the person (e.g. poor social support) may account for this clinical paradox. Participation in physical activity may be hindered by some of the very same problems that may be alleviated by participating (Bonsaksen, 2011).

Patients with SMI may have low levels of functioning in several areas, including occupational, social, and self-care functioning (Mueser and McGurk, 2004). However, the clinical reality of psychiatric hospital wards is often diverse. Although no authoritative definition of 'severe mental illness' exists, it is generally agreed that the clinical problems in hospitalised patients vary considerably and span across several diagnostic categories. These diagnoses include schizophrenia, paranoid psychosis, and bipolar disorder, and may include other psychiatric disorders with psychotic features (National Institute of Mental Health, 2011). Because of this diversity of conditions and problems subsumed under the SMI concept,

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equal symptomatology, functional levels, and lifestyle characteristics (such as physical activity levels) should not be automatically assumed among hospitalised patients. Furthermore, whether and how these factors change during the course of hospital treatment appears to be relatively unexplored.

The aim of this study was to explore changes during hospital treatment with regard to physical activity, functional status, psychiatric symptoms, and quality of life in patients with SMI. Specifically, increases in physical activity, functional status, and quality of life, and decreases in psychiatric symptoms, were hypothesised to occur for the patients between admission and discharge. In addition, the association between participants' self-reported physical activity levels and their level of attendance in a physical activity intervention programme was explored.

Method

The study had a one group pre/post design, using data from two times of measurement: admission and discharge. All participants signed a written consent to take part in the study, and the appropriate research ethics committee (REK Sør-Øst) approved of the study being conducted (S-09105b 2009/1494).

Clinical context and treatment

The study was conducted at the Department of General Psychiatry at Oslo University Hospital, rurally located about 30 km outside of Oslo. The department consisted of four wards, each having between eight-to-ten patients admitted. Two of the wards were aimed at providing diagnostic observation and intermediate term treatment (three-to-six months stay), while two other wards were aimed at providing long-term treatment and care (six-to-24 months stay) for patients with more chronic conditions.



The treatment was individually tailored to each patient's needs. The general treatment on the wards consisted of milieu therapy, occupational therapy, individual therapy, and medication. The milieu therapy was largely performed with an ego-supportive and structuring stance, in combination with motivation for activity and individually selected psychodynamic and cognitive behavioral methods (Oestrich et al, 2006; Thorgaard, 2006; Henriksen, 2007; Jacobsen and Gjertsen, 2010).

Patient education was highlighted, and issues pertinent to disease and symptom management, such as social support, medication, daily life management, substance abuse, and relapse prevention, were discussed in regular group meetings on each of the wards (Jordahl and Repål, 2009). Occupational therapy was provided employing modified group-based approaches (i.e., skill enhancing groups, workshop groups, physical activity groups) (Cole, 2005) and individually tailored skill-building and activity-promoting interventions (Creek and Lougher, 2008). Individual therapy was to a large extent based on an ego-supportive and structuring stance and, when appropriate, a set of cognitive-behavioral techniques (Kingdon and Turkington, 2007).

Recruitment

The department provided treatment for patients with severe psychiatric conditions and low levels of functioning. All consecutive patients were considered eligible for participation in the study, while clinical considerations concerning the physical and psychological state of each individual determined whether and how physical activity would be implemented for the patients during their time in treatment. For example, highly disorganised or paranoid patients were frequently offered individual physical activity with support from staff instead of the usual group-based physical activity. All participants were initially assessed by a physician to ensure that the patient was able to give informed consent to participate, and that the patient was not considered to be inflicted any harm from participating in the study. Once this assessment had been performed, the on-site project leader (the author) was notified. Each patient was then informed about the study and asked to participate.

Physical activity programme

A twice-weekly physical activity programme was given particular attention to support the patients to increase their levels of physical activity during treatment (Bonsaksen, 2011; Lund et al, 2009). In most cases, walking was the selected activity. As often as was permitted by the weather conditions,

participants walked on pathways in the nearby forest areas. Occasionally, and for the sake of variation, gym studio training, ergometer cycling, ball games, and other kinds of physical play were the selected activities. Each activity session had a one-hour duration. In general, 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 faster or slower. For some patients, participation in a group-based programme was difficult for shorter or longer periods of time. Participation in the physical activity programme was therefore based on one on one contact with staff, or in smaller groups in cases where such an approach was called for.

The leaders of the physical activity programme had their professional backgrounds in nursing and occupational therapy, and had appropriate education and/or long time experience in using 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 to provide additional structure, guidance and support for patients who needed highly individualised 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 individualised support during the course of the sessions, and help create a friendly and supportive atmosphere in the group.

Data collection

Data were collected at the hospital shortly after the patients' admission and shortly before discharge. In some cases, admission data were collected later during the course of treatment, due to the patients' inability or unwillingness to participate from the beginning. The measures were completed as self-report questionnaires, excepting the functional assessments which were performed by each patient's individual therapist (physician or psychologist). In cases where filling out questionnaires was difficult for the patient, data were collected in the form of structured interviews performed by the author. Sociodemographic data and data concerning diagnosis and illness duration were collected from routine hospital data. The participants were recruited in 2009 and 2010.

Measures

The participants generally had long histories of psychiatric illness and had been diagnosed for years before this hospital admission. Nevertheless, all



patients were diagnosed during their stay. The patient's individual physician or psychologist performed the diagnostic evaluation. In the diagnostic evaluation, criteria from the ICD-10 manual (World Health Organization, 1997) and the MINI and MINI Plus were used (Sheehan et al, 1998).

Functional status

The Global Assessment of Functioning is divided into a symptom severity scale (GAF-S) and a functional status scale (GAF-F) (American Psychiatric Association, 1994). Both scales range from zero (least functional ability/most symptomatic distress) to 100 (best functional ability/no symptomatic distress). In general, GAF scores below 60 indicate problems in maintaining ordinary work, whereas scores below 40 indicate psychotic functioning. The GAF was scored by each patient's individual therapist.

Physical activity

The International Physical Activity Questionnaire (IPAQ) measures days with strenuous physical activity, moderate physical activity, and walking during the last week, and for how long this activity lasted on a usual day (IPAQ committee, 2005). Examples of activities that are considered strenuous and moderate in intensity are provided in the questions. Energy use (metabolic equivalent of task [MET] minutes per week) for each type of activity was calculated according to standard procedure (IPAQ committee, 2005). The procedure calculates strenuous activity, on average, as demanding eight times the energy spent while inactive (sitting). Therefore, the MET strenuous score was

calculated as: number of days with strenuous activity last week \times how many minutes (on average) each day \times 8. Moderate activity and walking is considered 4 times and 3.3 times as energy demanding as sitting, respectively. The MET total score, which is the measure of physical activity in this study, was calculated by summing up the scores for each of the three physical activity subtypes. The physical activity change score was calculated as the difference between the MET total scores at admission and discharge.

Psychiatric symptoms

The Hospital Anxiety and Depression Scale (HADS) consists of 14 items with subscales for anxiety and depression (Zigmond and Snaith, 1983). The patient responds by indicating his or her level of agreement with the item statements on a four level scale; for instance 'occasionally' (0) or 'very often' (3). The score range is 0–21 on each of the subscales. A score of 11 or above indicate a case of clinically significant anxiety or depression, respectively. A total score of 19 or above represent a case of mixed anxiety and depression. Reliability and validity of the HADS is considered good, as demonstrated by Cronbach's alphas ranging between 0.80 and 0.93 for anxiety and between 0.81 and 0.90 for depression in various studies (Herrmann, 1997). In the total sample at baseline, Cronbach's alphas were 0.75 and 0.74 for anxiety and depression, respectively (Bonsaksen and Lerdal, 2012).

Quality of life

The World Health Organization Quality of Life BREF (WHOQOL-BREF) consists of 26 items, covering two general statements of quality of life and health, in addition to 24 statements about specific areas of importance for life satisfaction (WHOQOL Group, 1998). These areas are divided into four domains: The physical, psychological, social relations, and environment domains. The scores on each domain are transformed on a 0–100 scale to enable comparisons between domains composed of unequal number of items (Skevington et al, 2004). For this study, the Norwegian instrument version was employed. This translated instrument has demonstrated fairly good psychometric properties, supporting the existing factor structure with Cronbach's alphas ranging from 0.60 (social domain) to 0.84 (physical domain) (Hanestad et al, 2004). In the total sample at baseline, Cronbach's alphas were 0.74, 0.88, 0.87, and 0.64 for the physical, psychological, social relations, and environmental domains, respectively. We also used a sum score of all 26 items, transformed as described above, as an index of total quality of life. In the total sample at baseline, Cronbach's alpha for the quality of life index was 0.90 (Bonsaksen and Lerdal, 2012).

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Table 1. Characteristics of the total sample at admission (n=11)

| Sociodemographic characteristics | n | % |
|--|-----|-----------|
| Male/female | 6/5 | 54.5/45.5 |
| Source of income | | |
| Disability pension | 7 | 63.6 |
| Illness/rehabilitation/social benefits | 4 | 36.4 |
| Education | | |
| < 12 years | 10 | 90.9 |
| Relationships | | |
| Custody of children | 0 | 0 |
| In paired relationship | 0 | 0 |
| Clinical characteristics | | |
| ICD-10 Diagnosis | | |
| Schizophrenia | 6 | 54.5 |
| Bipolar disorder | 2 | 18.2 |
| Paranoid psychosis | 1 | 9.1 |
| Schizotypal disorder | 1 | 9.1 |
| Borderline personality disorder | 1 | 9.1 |
| Illness duration | | |
| 5 years or less | 3 | 27.3 |
| 6–10 years | 2 | 18.2 |
| > 10 years | 6 | 54.5 |

Table 2: Clinical characteristics at admission and discharge (n = 11)

| Measures | Scale | Admission | Discharge | |
|----------------------|-------|-------------|-------------|--------|
| Global functioning | | Md (range) | Md (range) | p |
| GAF symptoms | 0–100 | 37.0 (17.0) | 42.0 (23.0) | < 0.01 |
| GAF function | 0–100 | 35.0 (21.0) | 45.0 (33.0) | 0.01 |
| Psychiatric symptoms | | | | |
| Anxiety | 0–21 | 10.0 (17.7) | 10.0 (15.0) | 0.88 |
| Depression | 0–21 | 10.0 (13.0) | 5.0 (16.0) | < 0.01 |
| Physical activity | | | | |
| Total MET score | | 720 (4386) | 284 (7539) | 0.58 |
| Quality of life | | | | |
| Physical | 0–100 | 48.2 (71.4) | 64.3 (78.6) | 0.31 |
| Psychological | 0–100 | 37.5 (75.0) | 41.7 (62.5) | 0.63 |
| Social | 0–100 | 33.3 (66.7) | 50.0 (50.0) | 0.27 |
| Environment | 0–100 | 51.6 (44.2) | 59.4 (37.5) | 0.15 |
| Total | 0–100 | 46.9 (58.7) | 50.0 (44.9) | 0.06 |

Note. Median values (Md), range, and probability (p) of differences between time points by Wilcoxon signed-rank tests.

Statistical analysis

Data were analysed using SPSS for Windows Version 19.0 software (SPSS Inc, 2010). Missing data concerning a patient's presence or absence from the physical activity programme were replaced with the last observation for this patient, as this is considered to be a conservative strategy (Field, 2005). Attendance in the physical activity programme was calculated as the number of sessions attended divided with the total number of sessions that each patient could have participated in during his or her treatment period.

Descriptive analyses were performed for all variables. Due to the non-normal distribution of participants on several variables, changes from admission to discharge were investigated with the non-parametric Wilcoxon signed-rank test for related samples. The relationship between participants' self-reported physical activity levels and their level of attendance in the physical activity intervention programme was similarly investigated with the non-parametric Spearman correlation coefficient. The level of statistical significance was set at $p < 0.05$, and all tests were two-tailed. However, in light of the small study sample, trends ($p < 0.10$) were noticed and reported.

Results

Attrition

Initially, a total of 18 patients agreed to participate, whereas seven patients did not complete assessments at the second measurement. Thus, the sample used in this study consisted of the remaining 11 participants who completed the measures at both admission and discharge. Non-respondents at the time of discharge (six men, one woman) had significantly lower baseline score on the symptoms scale of the Global Assessment of Functioning (non-respondents GAF-S Md = 28.0, respondents GAF-S Md = 37.0, $p = 0.033$) and showed a trend towards lower scores on the function scale (non-respondents GAF-F Md = 31.0, respondents GAF-F Md = 35.0, $p = 0.061$) than respondents. Otherwise, no statistically significant differences between respondents and non-respondents at discharge were detected on baseline measures.

Sample

Table 1 shows the sociodemographic characteristics of the sample at admission. Participants consisted of six men and five women, and the mean age was 43.3 years (SD = 15.8 years). On average, treatment duration was 7.5 months (SD = 6.0 months).

Changes from admission to discharge

Table 2 shows the clinical changes in the sample from



admission to discharge. Patients had significantly more global symptomatology at admission ($Md = 37.0$) than at discharge ($Md = 42.0$, $p = 0.008$). Global functional ability was significantly lower at admission ($Md = 35.0$) than at discharge ($Md = 45.0$, $p = 0.012$). Initially, patients also had significantly more depression symptoms ($Md = 10.0$) as compared to their levels after treatment ($Md = 5.0$, $p = 0.007$). The total score on quality of life showed an increasing trend from initial levels ($Md = 46.9$) to post-treatment levels ($Md = 50.0$, $p = 0.062$). Otherwise, no significant changes were detected on the clinical measures.

Association between self-reported physical activity and programme attendance

Participants who reported higher levels of activity at admission showed a trend of also reporting higher levels at discharge ($r_s = 0.59$, $p = 0.08$). However, there was no association between participants' level of attendance in the physical activity intervention programme and their self-reported physical activity levels at admission ($r_s = 0.12$, $p = 0.72$), nor at discharge ($r_s = 0.13$, $p = 0.71$). Similarly, there was no significant association between programme attendance and participants' change in self-reported physical activity during treatment ($r_s = -0.29$, $p = 0.43$).

Discussion

The broad picture provided by this study is that the patients did not change significantly on most of the variables. Scores on both domains of the GAF increased and depression showed a statistically significant decrease after treatment, whereas a borderline trend was shown for an increase in the total quality of life score.

Clinical changes during treatment

It was hoped that the physical activity programme, being part of the overall treatment plan at the wards, would lead to an increase in physical activity levels in the patients while receiving hospital treatment (Lund et al, 2009; Bonsaksen, 2011). In this sample, however, physical activity levels were initially low (Bonsaksen and Lerdal, 2012) and did not change during treatment. This result indicates that the treatment—including the specifically designed physical activity programme—had not increased patients' interest in physical activity. This aligns with the previous literature, confirming the low levels of physical activity in this group (Brown et al, 1999; Daumit et al, 2005; Ussher et al, 2007), but also extends the knowledge about how hard it can be to change their pattern of physical inactivity.

In the future, more effort should be put into designing and evaluating alternative ways of increasing

physical activity in these patients. Such alternatives may include working to instill the belief that the patient can perform specified forms of activity; to design activities based on any interest, role, or skill the patient may have; and to establish opportunities for performing physical activity within a supporting social context. Working to promote positive attitudes toward physical activity in the ward environment—and this may well include modifying attitudes among the staff—may be important to have a supporting ward culture established.

Living independently in the community demands a certain functional level. Not all the participants in this study would return to a home of their own in their local communities, but would have different kinds of support after discharge from the hospital. Some would be transferred to long-term rehabilitation units, others to group or individual homes supported by clinical staff. Even with a prospect of having continued support in community living, the patients were generally not considered eligible for transfer from the hospital before their functional levels had increased. Obviously, there was no defined minimum GAF score of all discharged patients, as the functional level needed for discharge or transferring would also largely depend on the kind and amount of support that could be offered in the local community in each particular case.

The participants had increased global functional status and less global psychiatric symptoms by the end of treatment. A relation between the two scores seems highly probable, as reducing serious symptoms in patients with SMI is likely to increase their functional status. However, as this study demonstrates that the patients improved their functional status significantly during treatment, this reflects at least two aspects. One is that the treatment—including medication, but there is no way of differentiating between the effects of the various treatment elements in this study—was helpful for combating severe symptoms of psychosis and for improving the functional level among the patients. Another is that functional improvement was a premise for the patients' transferring or discharge. Therefore, discharge data from patients who had not sufficiently improved were not available, as they would still be in treatment. The attrition analysis provides some support for this interpretation, as non-responders at the second measurement had lower initial GAF scores than the completers.

Depression was reduced in the sample during treatment. Several factors may contribute to explain why the time in treatment resulted in reduced depression in the patients. Having a time off from the daily hassles; such as shopping, cleaning, and paying the bills, may be important means of reducing stress for the patient for a brief period of time. Being exposed



to a relatively calm, stable, warm, and undemanding social environment may also be important for building self-esteem, social competence, and a sense of social belonging among other patients, especially for patients with a history of loneliness and social and occupational deprivation. Also, the gradual development and expression of hope, friendliness and trust in the relationship to the therapist(s) may be crucial (Henriksen, 2007; Jacobsen and Gjertsen, 2010; Jordahl and Repål, 2009; Oestrich et al, 2006; Thorgaard, 2006). All of these aspects should be taken into account when explaining the improvement of depressive symptoms in this sample. The low levels of physical activity in the sample, before treatment (Bonsaksen and Lerdal, 2012) and during treatment (Bonsaksen, 2011), suggest no particular impact from physical activity on the reduction of depressive symptoms.

Increased quality of life is one important aim for the treatment of patients with SMI. In this study, participants' scores on quality of life subdomains were apparently unchanged during treatment. The quality of life domains relate to the perceived quality of specific aspects of a person's living condition in a way that may not be readily accessible during hospital treatment. However, the total quality of life score trended towards an increase during the course of treatment, indicating that the patients' general outlook on their life had changed into a more positive one. The possibility of increasing quality of life in poorly functioning SMI patients during hospital stays is uplifting. The methods by which to improve it may specifically include combating depression (Huppert et al, 2001; Conley et al, 2006; Norholm and Bech, 2006; Kim et al, 2010). This view was also indicated by a recent cross-sectional study of gender differences in the same sample, where lower quality of life scores in women compared to men were partly mediated by their higher levels of depression (Bonsaksen, 2012).

Relationships between self-reported physical activity and programme attendance

Participants who were more physically active at admission appears to have continued to be so at discharge, but no relationship was found in this sample between changes in self-reported physical activity levels and physical activity programme attendance during treatment. This means that participants' changes in physical activity during treatment apparently had nothing to do with their adherence to the physical activity programme that was part of the general treatment regime at the hospital. This is good news for those with initial moderate or high levels of physical activity, who maintained their activity levels during their time in hospital treatment.

For the patients with initial low levels of physical

activity, on the other hand, it appears that this kind of lifestyle change is difficult to achieve during hospital treatment—even in this case, where particular emphasis was placed on physical activity during treatment (Lund et al, 2009; Bonsaksen, 2011). Therefore, efforts to increase physical activity levels in patients with SMI should be considered a long-term project, with a need to be maintained beyond the termination of hospital treatment. It also seems viable to suggest that treatment interventions aimed at increasing physical activity in patients with SMI should consider alternative ways of organising the efforts. Group-based activities may not fit well with the needs of hospitalised patients. Similarly, low levels of general functioning and sometimes unpredictable, rapid changes in participants' clinical condition may call for a more individualised approach in addition to activities that are scheduled in a planned programme.

Study limitations

This study is largely based on self-report measures from hospitalised patients with SMI. It should be kept in mind that it is limited in the reporting of subjective assessments from inpatients with high levels of psychiatric symptoms and low levels of functioning. The GAF scores, however, were determined by an assessor with a medical- or psychology background. Therefore, this measure represents one important functional assessment that was unrelated to the patients' self-perception. In addition, attendance registration was made by clinical staff at the hospital. The use of both self-report measures in combination with registration and judgments from clinical staff strengthen the study in this respect.

One could have hoped that new studies, like the present one, could have addressed and improved the weaknesses of previous research. Many of these have been conducted with small samples and uncontrolled research designs (Faulkner and Biddle, 1999; Gorczynski and Faulkner, 2011), but unfortunately, we were not able to recruit a larger sample during the time available for the study. Severe symptomatology and motivational problems related to the illness experience can probably account for much of the resistance towards participating in research, as well as the high attrition rates. In the author's opinion, however, the need for larger and better designed studies does not imply that small scale studies are worthless, but that such contributions should be considered as providing low-quality evidence in the absence of stronger evidence, from which conclusions hopefully can be drawn in the future.

Thus, the small study sample indicates a risk of Type II errors; i.e., not detecting effects that exist in the data. The sample size also allowed each participant



to strongly influence the group scores—there is reason to suspect that the sample does not represent the study population well, and that the results actually obtaining statistical significance may be caused by Type I error. Similarly, the high attrition rates may indicate a non-representative sample due to self-selection.

Large variations within the sample at both time points (in particular for self-reported physical activity) may point to substantial individual differences. Different length of illness may also have influenced physical activity levels in the patients, as well as other characteristics. The potential effects of medication are difficult to adequately assess in relation to the patients' physical activity levels. Medication may improve the health status of the SMI patient, and as a result increase the patient's willingness (compliance) or own wish (internal motivation) to perform physical activity. On the other hand, antipsychotic medication may cause weight gain (Gupta et al, 1998; Fontaine et al, 2001), and may thus make it harder for patients to engage in such activities. For these reasons, the results from the study should be considered only tentative, suggesting questions to be addressed in future well-designed studies with larger samples of hospitalised patients with SMI.

Conclusion

This study explored changes in patients with SMI admitted to hospital. The combined treatment,

KEY POINTS

- There may be several important differences between sub-groups of patients with SMI
- The knowledge concerning low physical activity levels among patients with SMI should be further explored within subgroups of patients, as it appears not to apply to all groups
- In patients with schizophrenia, increased functional ability and decreased symptomatic distress are probable treatment outcomes, whereas physical activity levels appear hard to increase
- Patients with diagnoses other than schizophrenia appeared to maintain their moderate physical activity levels during treatment

incorporating a structured physical activity programme, was not sufficient to bring about increased physical activity in the sample. In addition, the patients' level of attendance in the physical activity programme was apparently unrelated to their self-reported change in physical activity during treatment. Global psychiatric symptomatology was reduced and functional status increased during treatment. In addition, depression in the participants was reduced, and overall quality of life tended to increase over the course of treatment. However, caution is warranted when interpreting these results. **BJMHN**

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