Exercise: a neglected intervention in mental health care?

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CALLAGHAN P. (2004) *Journal of Psychiatric and Mental Health Nursing* **11**, 476–483

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This paper reports the results of a literature review examining the effects of exercise on mental health and well-being. Throughout history many societies, ancient and modern, have used exercise as a means of preventing disease, and promoting health and well-being. There is evidence that exercise is beneficial for mental health; it reduces anxiety, depression, and negative mood, and improves self-esteem and cognitive functioning. Exercise is also associated with improvements in the quality of life of those living with Schizophrenia. However, exercise is seldom recognized by mainstream mental health services as an effective intervention in the care and treatment of mental health problems. There is evidence to suggest that exercise may be a neglected intervention in mental health care.

Keywords: mental health, physical activity, well-being

Accepted for publication: 11 December 2003

Introduction

There is a growing body of literature, empirical and otherwise, that has investigated the effects of exercise on mental health and well-being. The purpose of the present paper is to review a selection of this literature and examine the evidence for including exercise interventions in the repertoire of treatment options for people with mental health problems.

Search strategy

A preliminary search of the literature was conducted to identify appropriate keywords for a more extensive search (Reed & Baxter 1994) and the following terms were settled on; exercise and history, exercise and history and health, exercise and health, exercise and mental and health, exercise and health and psychology and outcomes, exercise and cognitive and functioning.

The following databases were searched: PSYCHLIT, PSYCHINFO, MEDLINE, EMBASE, CINAHL, ERIC, SPORTS DISCUSS, Social Science Citation Index, Dissertation Abstracts International and SOCIOFILE. Also, in order to uncover unpublished, or grey literature the following sources were also searched: the System for Information on Grey Literature (SIGLE), the Index of Scientific and Technical Proceedings, the National Technical Information Service (NTIS), the International Network of Agencies for Health Technology Assessment (INAHTA) and the British Reports, Translations and Theses of the British Library Document Supply Centre, the Cochrane Library Database using Cochrane CD Roms, the website of the NHS Centre for Reviews and Dissemination at the University of York, UK (http://www.nhscrd.york.ac.uk), the website of the Agency for Health Care Research and Quality, Washington, DC (http://www.ahcpr.gov), the Department of Health (http://www.doh.gsi.gov.uk), the British Psychological Society (http://bps.org.uk), the European Health Psychology Society (http://www.ehps.net), the Health Development Agency in the UK (http://www.hea.org.uk), the World Health Organization (http://www.who.org) and the National Centre for Social Research in the UK (http://www.nat cen.ac.uk). References were also generated by incremental searching of the reference lists of published articles, from contacts made at various conferences that the author attended whilst researching the paper and from

subject experts at the British Library in London on the history of exercise, play and games across cultures.

Exercise

Exercise is the 'training of the body to improve its function and enhance its fitness' (Encyclopeadia Britannica Online 2000, p. 1). It has many benefits. Physically fit individuals are thought to be able to engage in everyday activities without feeling tired or exhausted and better able to withstand disease, infection and deterioration. However, to enjoy its benefits people need to exercise with sufficient intensity for 30 min five times per week. (British Heart Foundation 2003). Although there is no conclusive evidence that exercise prolongs life, many epidemiological studies show that regular exercise is associated with reduced risk of many life-threatening illnesses (Thompson 1994).

The history of exercise

Exercise has a long history in many cultures. Not surprisingly in a culture that gave the world the Olympic Games, among many groups in ancient Greece there is evidence of extraordinary athleticism in the course of events like fist-fighting, wrestling, foot-races and 'diskos' throwing (Ionananides 1975). Examination of historical records and archives in the Cairo museum show that Tutankhamun, Pharaoh of Egypt who is thought to have reigned around the time of 1347 BC, was a gifted sportsman, despite his delicate health (Habashi 1975). There is evidence showing that the Turkomans and Bakhtiari of ancient Iran exercised regularly by climbing mountains and through vigorous dances to ensure that they were physically able to meet the demands imposed on them by their nomadic lifestyle (Pirnia 1975). Native Americans in North America have for centuries engaged in vigorous exercise through their playing of various sports such as handball, racket ball and kick ball race (Cheska 1975). During the 18th century, the Manching Government in China launched a series of reforms that it called 'The Self-Improvement Movement'. The purpose of these reforms was to introduce physical education and sports into educational curricula and make people healthier and fitter (Shuy 1975). In boarding schools in England in the early 19th century, exercise in the form of sports became a fundamental part of the education process so as to improve scholastic, as well as physical well-being (Smith 1975). Although the exercise performed by many groups throughout the ages appears to have been prompted by the need for pleasure and enjoyment, there is evidence that these groups also believed that exercise conferred health benefits and improved general well-being.

The claim that exercise improves health and well-being has a long history. Claudius Galen is reported to have been born in Pergamus, a city in Asia Minor around 131 AD, studied medicine from the age of 17 and travelled extensively throughout Europe, the Middle East and Africa to learn from the teachings and writings of the great physicians of his time. He settled in Rome in 162 AD and in 169 AD became physician to the Roman Emperor Marcus Aurelius. Accounts vary as to how long Galen lived – 70 years is thought most likely – and he is quoted as attributing his good health to 'eating easily digested meats and taking moderate exercise' (Green 1951, p. XX). Of the many books that Galen is thought to have written *De Sanitate Tuenda* (Hygiene) is regarded as a classic. Green has translated this text from an earlier German translation and he has called his text *Galen's Hygiene*. Galen's Hygiene consists of six books concerned with the nature of health and illness and the role of personal hygiene (habit) in each state. In books 1 and 2, Galen writes on the benefits of exercise to health: 'the habit of the mind is impaired by faulty customs in food, drink and exercise . . . and these constitute the beginnings of severe diseases' (p. 26). In book 2, Galen alludes to intensity as an important factor in the health effects of exercise:

> To me it does not seem that all movement is exercise, but only when it is vigorous. But since vigor is relative, the same movement might be exercise for one and not another. The criterion of vigorousness is change of respiration; those movements which do not alter respiration are not called exercise (p. 53).

Galen's musings on exercise and health were prescient as shown by the findings from empirical studies in many countries in more recent times.

The effect of exercise on mental health and psychological functioning

Exercise and depression

Mental illness is a significant impediment to health and well-being (Department of Health 1999). Reducing mental illness and improving mental health services is a milestone of the UK Government's health service reforms reflected in the *National Service Frameworks for Mental Health* issued in 1999. In 1987 the US National Institute Mental Health (NIMH) assembled a panel of experts to produce a consensus statement on the mental health effects of exercise and thus reconcile research and clinical practice. The resultant consensus statement concluded that exercise is (i) positively linked with mental health and well-being, (ii) reduces stress and state anxiety, and (iii) has emotional benefits for all ages and in both genders (Morgan &

O'Connor 1988). A recent World Health Report (WHO 2000) shows that depression is a significant mental health problem afflicting people living in all member states. Among males it is ranked eighth accounting for 2.8% of Disability Adjusted Life Years (DALY's). Among females it is ranked third accounting for 5.8% of DALY's. Running is advocated as a more effective antidote to depression than psychoanalysis (Greist *et al*. 1979). Empirical and anecdotal evidence show that exercise may have an antidepressant effect in healthy individuals (North *et al*. 1990, DiLorenzo *et al*. 1999), and among those with profound multiple disabilities (Green & Reid 1999). Schizophrenia is one of the most disabling of all mental illnesses. Exercise is shown to reduce auditory hallucinations, raise self-esteem, and improve sleep patterns and general behaviour in people living with schizophrenia (Faulkner & Sparkes 1999).

North *et al*. (1990) reviewed the results of narrative and meta-analytic reviews investigating the effect of exercise on depression. In this review exercise is suggested to improve depression by changing people's daily routine, increasing their interactions with others, helping them lose weight, participate in outdoor recreation and master difficult physical and psychological challenges. Evidence that biological factors may explain the beneficial effects of exercise on depression derives from research showing that exercise promotes the secretion of neurotransmitters like serotonin (Ransford 1982, Morgan 1985). Also, evidence from animal studies suggests exercise stimulates the secretion of endogenous morphines ('Endorphins') and produces a state of euphoria (Pert & Bowie 1979). The narrative reviews reviewed by North *et al*. (1990) provide evidence for the benefits of exercise on depression but these derived mainly from anecdotal observations. The meta-analytic review, however, supported the anecdotal observations. The effect of acute exercise (single exercise session) was different than for an exercise programme, but both were effective antidepressants. Exercise had a better effect on outcomes for respondents who were most physically and psychologically unhealthy at the outset of the studies. A particular strength of this meta-analysis is that the authors analysed the results of published and unpublished studies. This was important because respondents in published studies had lower levels of depression when compared with respondents in unpublished studies. Another strength of this meta-analysis is that the authors' accounted for factors that may have produced the positive effects on depression attributed to exercise, e.g. source of participants, purpose of exercise, exercise location, group assignment of participants, age, gender and mode and duration of exercise. Effect sizes (the size of the difference in outcomes between two interventions) for exercise were higher when respondents performed exercise for medical rehabilitation, at home, when they were randomly assigned to exercise conditions and when the exercise was of medium intensity. Middle-aged males undergoing haemodialysis benefited most from exercise. Weight training of between 21 and 24 weeks produced lower depression levels.

On the basis of a systematic review of the effect of exercise on depression as measured by Beck Depression Inventory (BDI) scores, Lawlor & Hopker (2001) reported that exercise produced a large decrease in depression symptoms (effect size = 1.1) when compared with no treatment. However, most of the studies in this review were of poor quality (inadequate randomization and lack of blinding in outcome assessment), had brief follow-up and sampled non-clinical volunteers. Schulz *et al*. (1995) have shown that such methodological weaknesses exaggerate results in favour of the intervention by 20–40%. Lawlor & Hopker (2001) thus conclude that the effectiveness of exercise on depression is undetermined, a conclusion challenged by others. Mutrie (2002) argued that the large effect size reported by Lawlor and Hopker offers compelling evidence for the benefit of exercise and points out that unlike drug therapy, exercise has few negative side-effects. In a letter to the *British Medical Journal* (*BMJ*, 2nd April 2001) commenting upon the Lawlor and Hopker review, Biddle (2001) suggested that the exclusion of other types of studies in the original review, such as large population surveys led the authors to underestimate the benefits of exercise. It is hard to disagree with Biddle especially in light of arguments Lawlor raises in a reply to Biddle's letter (*BMJ*, 10th April 2001). Lawlor argues that the statistics reported by Schulz *et al*. (1995) showing methodological weaknesses in trials exaggerate the effects of interventions by between 20 and 40% (see above) and thus invalidate the evidence for exercise on depression. On closer scrutiny it would be more accurate to conclude, in my view, that the evidence is weakened but not invalidated. In their review Lawlor and Hopker report an average effect size for exercise on BDI scores of 1.1. Taking the upper end of Schulz *et al*.'s figure, we can reduce this effect size by 40% to account for methodological weaknesses. This leaves an effect size of 0.66, medium by widely cited estimates (Cohen 1992). Statistically, those who exercised were 0.66 standard deviations less depressed and scored 7.3 points lower on the BDI than those who did not exercise. It is difficult to interpret what this means exactly for clinicians treating depression, or people experiencing depression. But if we consider how the BDI is used in clinical practice as an indicator of the experience of depression the statistics may have significant clinical relevance.

For example, Mary Blue (pseudonym) is enrolled on an exercise on prescription programme to treat her depression. Prior to starting the exercise regime, Mary has a BDI

score of 24 indicating moderate to severe depression (Stinton & Devilly 2002). Following the exercise programme, Mary's BDI score drops to 16.7 indicating mild to moderate depression. Mary is significantly less depressed and more likely to re-engage with her activities of living, a good result by anyone's reckoning. Psychotropic drugs with harmful side-effects have been prescribed liberally with smaller effect sizes than exercise. Given the difficulty in translating outcomes from studies using continuous variables such as BDI scores in clinical practice, Lawlor & Hopker (2001) exhort researchers to use more dichotomous (i.e. depressed/not depressed) outcome measures. This is a clinically naïve position; depression is a question of degree and is seldom, if ever, dichotomized so easily. The BDI is after all a widely used measure of depressive features with consistent validity (Richter *et al*. 1998).

It is important to note that no evidence of effect as found by Lawlor and Hopker does not mean that no effective evidence exists. In the most recent issue of *Clinical Evidence* – the so-called international source of the best available evidence for effective health care – Geddes *et al*. (2003) state that exercise has *limited effectiveness* in the treatment of depression. This view conflicts with the *National Quality Assurance Framework for Exercise* (*NQAFE*) (Department of Health 2001) that states exercise has causal impact on mental health problems including depression. Also, the National Consensus Statements on exercise and mental health published by the Health Education Authority (Grant 2000) state that exercise is consistently associated with positive affect, mood and psychological well-being.

Exercise and anxiety

Petruzzello *et al*. (1991) conducted three meta-analyses to examine the effect of acute and chronic exercise on state (current) anxiety, trait (dispositional) anxiety and psychophysiological correlates of anxiety derived from published and unpublished studies (n = 104) reported between 1960 and 1989. The results for state anxiety showed that exercise produced a small effect on state anxiety (effect size = 0.24); the effect size was largest when the researchers used the Multiple Affect Adjective Checklist (MAACL) as the outcome measure of anxiety. Chronic exercise had a slightly better effect on anxiety than acute exercise. The effect of exercise was largest in pre–post test within-groups designs, aerobic exercise was better than anaerobic exercise, and high intensity exercise of 21–30 min duration had a better effect than low intensity exercise shorter than 20 min or longer than 30 min. The effect size was largest when anxiety was measured 20 min post-exercise. Effect sizes were largest in studies using matched controls and lowest in studies using random assignment. Effect sizes were largest in participants aged between 31 and 45.

When trait anxiety was the outcome measure the effect size for exercise was moderate (0.34) overall. High intensity aerobic exercise of more than 40 min duration, performed for more than 15 weeks produced the highest effect sizes. Effect sizes were largest in participants aged below 18. For trait anxiety, exercise had the largest effect in people with a psychiatric illness.

When psychophysiological correlates of anxiety were the outcome measures, exercise had a fairly large effect on anxiety (effect size = 0.56) overall. The effect size was largest when skin measures were used to measure anxiety. Acute exercise had a better effect on psychophysiological outcomes than chronic anxiety. Pre–post within-groups designs produced larger effect sizes than other designs. Lower intensity exercise, of up to 20 min duration, lasting 4–6 weeks produced the largest effect sizes. Effect sizes were largest in studies using matched controls, among 18 to 30-year-olds and those with a psychiatric illness.

The results from these detailed meta-analyses show that aerobic exercise is associated with reductions in anxiety although the effects were not uniform across the three outcome measures. Exercise fared similarly to other interventions (e.g. relaxation) on trait anxiety. Random assignment was needed for effects on trait anxiety as were programmes exceeding 10 weeks. The variable that was significant across all outcome measures was duration of exercise; exercise of more than 20 min duration appears necessary for reduction in anxiety levels, irrespective of how anxiety is measured. However, the effect of exercise on anxiety was more apparent in studies eschewing randomization and not controlling for the effect of other variables on anxiety. When the studies were better designed, the effect for exercise was smaller.

In a narrative review of the effect of exercise on psychological health, Weyerer & Kupfer (1994) examined data from observational studies as well as controlled trials. The authors concluded that exercise improved psychological health, in some cases better than counselling alone, even when controlling for unspecified sociodemographic and health-related confounding variables.

There are several views that seek to explain the beneficial effects of exercise on anxiety. One view suggests that exercise raises body temperature and reduces muscle tension similar to the effect of having a warm bath – the so-called thermogenic hypothesis (Raglin & Morgan 1985). Another view suggests that exercise stimulates activity in the sympathetic nervous system (SNS); adrenaline levels are increased and this has an arousing effect. When the SNS is activated, it provides a catalyst for parasympathetic ner-

vous system (PNS) activity; acetylcholine is released and this has a calming effect. This is known as the Opponents Process Model (Solomon 1980). Exercise is also thought to distract people from stressful events thereby reducing the anxiety provoking impact of these events (Bakre & Morgan 1978). It is unclear from the studies reviewed by North *et al*. (1990) how long term are the effects of exercise on anxiety. A recently published study addressed this issue.

DiLorenzo *et al*. (1999) investigated the effects of exercise on self-reports of depression, anxiety and self-concept and aerobic fitness, heart rate and maximum oxygen uptake. Eighty-two participants aged between 18 and 39 were randomly allocated to a 12-week programme of bicycle ergometry or a control condition and followed up 12 months later. At the end of the programme and at follow-up participants allocated to the exercise programme had more positive changes in all outcomes than the control participants.

It is rare to find studies investigating the role of exercise on health that use qualitative research methods. One exception is the study reported by Faulkner & Sparkes (1999). Using an ethnographic design – participant observation and interviews with participants and their key-workers – Faulkner and Sparkes explored the therapeutic value of a 10-week exercise programme of twice weekly sessions, for people living with schizophrenia. The authors found that exercise reduced participants' perception of auditory hallucinations, raised their self-esteem and improved their sleep patterns and 'general behaviour'. Exercise provided distraction and social interaction and these accounted for the exercise benefits, the authors concluded. It may be that the three individuals studied in this investigation are unrepresentative of the experiences of people living with schizophrenia. Also, it is unclear from this study how exercise interacted with other interventions, like medication, that may have produced the positive outcomes. Nevertheless, the ethnographic design allowed the researchers to study intensively the participants and their key-workers' experiences. The results of this study support the therapeutic value of exercise. The results therefore converge with the findings of many quantitative studies and this convergence lends further support to researchers' claims that exercise improves mental health.

Exercise and cognitive functioning

Cognitive functioning is an important part of mental health and well-being and researchers have used cognitive functioning as an outcome measure in many studies testing the effects of exercise on mental health.

Van Sickle *et al*. (1996) conducted a meta-analysis of 18 previously published studies that examined the effects of exercise on cognitive functioning in elderly people. Exercise interventions used in the studies reviewed in this meta-analysis included bicycle ergometry, walking and callisthenics, flex and stretch exercises, aerobic workouts of varying levels of intensity and duration and non-aerobic stretch and coordination exercises. Outcome measures used in the studies in this meta-analysis included performance on memory tests, mathematical tests, IQ tests and perceptual organisation. The studies included in this meta-analysis included pre–post test within-group designs and pre–post test between-group designs using either two conditions, or three or more conditions. Many studies used multiple outcome measures. The researchers analysed the findings from the original studies in three ways: (1) a comparison of the number of statistical tests reporting significant findings with the total number of statistical tests used, (2) a summary of the findings for specific outcome measures, and (3) an examination of the effect sizes from each study. The results show 34% of the statistical tests used yielded significant findings; exercise promoted improved cognitive functioning. Of the 66% of studies yielding non-significant findings 30% had such small sample sizes, that there was a high risk of type 2 errors (power = 0.05–0.43). Only mathematical abilities were significant across studies. By Cohen's (1992) estimate, 11 effect sizes were small (0.01–0.18), 20 were small to medium (0.21–0.48), 9 were medium to large (0.50–0.77) and 6 were large (0.80–1.59). Exercise produced a moderate improvement in cognitive functioning. Yoga produced the largest effect sizes for most outcome measures. Many of the studies using aerobic exercise produced non-significant findings but the statistical power of these studies was very low. Thus, aerobic exercise may have had significant effects but many of the studies using this intervention had insufficient sample sizes to detect these effects. When the researchers excluded these studies from the meta-analysis, the percentage of studies showing significant effects rose from 34% to 47%. Elderly adults often show poorer cognitive function when compared with younger adults, especially when their performance is measured on IQ tests (Van Sickle *et al*. 1996). Therefore, perhaps the cognitive benefits attributed to exercise shown in this meta-analysis only emerge in people whose cognitive function is below optimal levels. The meta-analysis conducted by Etnier *et al*. (1997) addresses this issue as it included studies sampling participants of most age groups.

Etnier *et al*. meta-analysed the results of 134 studies that investigated the effects of exercise on cognitive functioning. Participants' ages in this analysis ranged from 6 to 90. Exercise interventions used in the original studies included short and long-term applications of aerobic and anaerobic

exercise, muscular resistance, callisthenics and step tests, of various intensity. The location of the interventions included home, laboratory, hospital, fitness centre and classroom. Outcome measures included line matching tests, motor skills test, verbal comprehension tests, the Stroop test, Ravens Progressive Matrices IQ test, the Weschler Memory Scale and the Sternberg number task. The results showed that the overall effect size for exercise on cognitive functioning was 0.25, small by Cohen's (1992) estimates. More detailed analyses revealed that a mixed (acute and chronic) exercise intervention produced the largest effect size (0.54). When the researchers analysed the effect of the acute exercise interventions separately studies using random sampling produced the largest effect size (0.65), but so did studies that had more threats to internal validity (1.76). Exercise had the largest effect on motor-skills performance (1.47), in studies using samples of both genders (0.70) and studies using exercise groups of 20 or more people (0.61). When the researchers analysed the effect of the chronic exercise interventions separately, studies using a single group design had the largest effect size (0.88), as did studies that had more threats to internal validity (0.57), those using older adults (45–60 years, effect size = 1.02), in studies where exercise was conducted in a classroom (effect size = 0.67), as did studies using exercise groups with 10 people or fewer (1.22). When the researchers analysed the data from cross-sectional/correlation studies separately low intensity exercise had the largest effect size (1.12), as did studies using exercise groups of fewer than 10 people (0.85), and when the researchers did not report the exact outcome measure (1.69). Overall, chronic exercise produced a larger effect size (0.33) than acute exercise (0.16).

In this meta-analysis as effect size increased threats to internal validity increased; thus, the poorer the study, the larger the effect size. This suggests that the link between exercise and cognitive functioning may be more correlation and less causation. However, a closer examination of the effect sizes when well-designed studies with few threats to internal validity are considered separately shows a small (0.18), but significant effect on cognitive functioning. The results of this meta-analysis also suggest that the benefits of exercise on cognitive functioning are more marked in older adults. This meta-analysis, like all other studies and meta-analyses, show the effect sizes for exercise on various outcome measures. However, none of the studies or meta-analyses explain what, exactly, the effects sizes mean in terms of longevity and general quality of life. Curfman (1993) estimates that regular intensive exercise may add up to 2 years on life expectancy.

In summary, there is consistent evidence from many studies using various research methods demonstrating that aerobic exercise of 20–30 min duration performed between three and five times per week is beneficial to mental health and well-being. There are, however, consistent methodological limitations in many of the exercise studies. These limitations weaken the case for exercise, but they *do not* invalidate it. The final part of this paper examines whether mental health practitioners use exercise as a therapeutic intervention and provides guidance on how exercise can be incorporated into the routine care of people with mental health problems.

Exercise in mental health care

On the whole exercise appears to be a neglected intervention in mental health care. There is little or no mention of exercise as a treatment option in most standard mental health/illness texts or reports published by authoritative groups in mental health. There are, however, notable exceptions, and increasingly, some mental health professionals are advocating exercise as a therapeutic tool in the treatment of various mental health problems.

A keen advocate of using exercise in mental health care is psychologist Kate Hays who has used exercise in her work with clients in a career spanning more than 25 years. In *Working it Out: Using Exercise in Psychotherapy*, Hays (1999) recommends that practitioners prescribe exercise to aid the recovery of people with mental health problems. She also provides detailed evidence-based information on the effects of exercise on mental health and well-being, the use of different exercise regimens tailored to client needs and abilities, as well as addressing ethical issues relevant to exercise. In a review article that examined the effects of exercise on mental health, Chung & Baird (1999) also recommend the use of exercise as a therapeutic tool. One of the 'Beacons' of mental health services in the UK is the Community Gym project in Barrow-in-Furness that uses exercise as a therapeutic intervention with people living with mental illness. On the recommendations of Cynthia Levin, a Chicago based psychologist, a client suffering from low self-esteem originating from childhood abuse took up running and improved her competence and sense of control (D'Silva 2002).

D'Silva (2002) offers a concise summary of the ways in which various forms of exercise can improve mental health and well-being and recommends martial arts for depression, weights or running to improve confidence, boxing or tennis for dealing with anger or frustration. Team sports are indicated for loneliness or poor social skills, trekking for lack of spirituality, swimming or yoga for existential angst and dancing for flatness or creative blockages.

The *NQAFE* (Department of Health 2001) acknowledges the strong causal evidence for the impact of exercise on mental health.

Using exercise in mental heath care

To illustrate how mental health practitioners can use exercise in their work with clients, I will refer to the experience of a young man whom I shall call David diagnosed with Schizophrenia and with whose care I am familiar.

David is in late twenties and was diagnosed about 8 years ago following an acute psychotic episode triggered possibly by sudden redundancy from his gardening apprenticeship. David, typically of many young men living with Schizophrenia experiences bouts of remission and relapse the latter of which sometimes lead to admission for acute care and is often associated with lack of productive occupation, social engagement, and concordance with medication.

David's acute care centres invariably upon helping him re-establish his medication concordance, little attention is paid to the other aspects of his lifestyle that are almost certainly weakening his mental and physical health. Aside from his lack of occupation and social engagement, he smokes heavily, seldom takes regular exercise, drinks alcohol in excess of healthy levels, and has a body mass index (BMI) close to mild obesity. In other words, David is in danger of becoming socially excluded from mainstream society and were it not for the support of his parents his relapses would be more frequent. If David is to live as a relatively independent member of society free of incapacitating mental health problems the keys to his engagement, to coin a phrase, lie in addressing the wider psychosocial and physical issues that are impeding his health and well-being. David's engagement could include advice on the health effects of smoking and drinking alcohol to excess, or enrolment on a smoking cessation programme if he chooses. Also indicated are counselling around issues in the healthy use of alcohol, a medication concordance programme, social skills training, active help in finding work and other productive occupation, and in light of the focus of this paper, enrolment on an exercise referral programme.

Exercise on referral involves referral by a general practitioner or practice nurse to exercise facilities such as gyms or leisure centres for supervised exercise. In line with the *NQAFE*, exercise referral schemes do not simply offer advice. They provide a systematic individualized process of screening for suitability, assessment of exercise needs, the provision of a range of specific activities for a defined time delivered by exercise professionals, and evaluation of the impact of the programme. David, like many young people living with mental illness, would benefit from referral to an exercise programme. The *NQAFE* offers detailed guidance to mental health workers interested in referring patients to exercise referral programmes.

In addition to referring patients to exercise referral programmes, nurses can use exercise interventions with relative ease in their day-to-day work with patients. A good start would be incorporating lifestyle assessments (including exercise) into routine mental health assessments. Exercise could be part of structured interventions and patients could be accompanied or partnered by nurses whilst doing exercise, e.g. a brisk daily walk, swimming, football or racquet sports. Many patients are unwaged and local authority run leisure centres offer discounts for this group. Nurses could exploit this facility. Many forms of exercise are fun and incorporating them into the daily lives of patients could alleviate the boredom and monotony that patients often experience on acute psychiatric wards.

Conclusion

Exercise improves mental health and well-being, reduces depression and anxiety and enhances cognitive functioning. Although exercise seems to improve the quality of life of those living with mental health problems, its value is seldom recognized by mainstream mental health services. The evidence suggests that exercise may be a neglected intervention in mental health care.

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