



## The effects of physical activity on psychological well-being for those with schizophrenia: A systematic review

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This paper systematically reviews the existing evidence of the effects of physical activity on psychological well-being for those with schizophrenia. A search of 15 databases including for example, *PsycINFO*, *SportDiscus*, and *Science Direct* was conducted to identify studies investigating the effects of physical activity on psychological well-being for those with schizophrenia. The included studies were then assessed, extracted, and synthesized. Fifteen studies met the inclusion criteria: 12 quantitative and 3 qualitative. The physical activity interventions lasted between 3 and 20 weeks and included a wide range of physical activities. The instruments used to measure psychological well-being varied across all studies, this along with the variety of study designs made statistical analysis impossible. The findings of this systematic review however, suggest that physical activity has a beneficial effect on some attributes associated with psychological well-being in individuals with schizophrenia.

The benefits of physical activity for physical health have been well documented and acknowledged, and are a major deterrent of morbidity and mortality rates (Richardson *et al.*, 2005). Furthermore, people who are physically active have a decreased risk of developing diabetes, heart disease, and high blood pressure amongst other common and disabling chronic conditions (Hillsdon & Thorogood, 1996). In terms of a focus on mental health, there was an emergence in Britain's health care in the 1990s which placed greater emphasis on the importance of mental health as an area of concern for public health. The white paper, *Choosing Health* (Department of Health [DoH], 2004) stated that improving mental health as an overarching health priority and highlighted the relationship between mental health and physical health, and of enabling people to make healthier life-style choices.

Despite these overarching policies concerning the improvement of people's mental health, there is still an estimated one in four people in the UK who develop a mental health problem at some point in their lives (NHS Choices, 2007). This population not only

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have poorer mental health but are at a significantly greater risk of developing physical health problems compared to the general population (Crone *et al.*, 2004). The benefits of physical activity may help to address some of the physical and mental health problems associated with this population.

Mental ill-health is a short-lived occurrence of negative emotions such as stress, depression, and anxiety (Biddle & Mutrie, 2001). In terms of the relationship between physical activity and mental health, evidence suggests that physical activity can be used as an adjunct treatment in the prevention, maintenance, and treatment of mental health problems (Scully, Kremer, Meade, Graham, & Dudgeon, 1998). Furthermore, physical activity is also known to be an effective coping strategy to help minimize these negative emotions and therefore promotes good mental health within non-clinical populations (McAuley, 1994). Negative emotions such as depression and anxiety can however be longer in duration and can disrupt everyday functioning; these are then defined as mental health disorders (McAuley, 1994). Further evidence suggests that physical activity can be used in clinical populations, such as those with mental health disorders. For instance, results from a meta-analysis investigated the effects of physical activity as a treatment for depression and concluded that physical activity led to a greater reduction in depressive symptoms compared to no treatment (Lawlor & Hopker, 2001). There is also evidence which suggests that physical activity may also be helpful on more severe mental health disorders such as schizophrenia and psychosis (Ellis, Crone, Davey, & Grogan, 2007; Faulkner & Biddle, 1999). As a consequence of this evidence, there has been an increased use of physical activity in mental health care as an adjunct to treatment, and in some cases, as an integral part of the care plan approach to health care (Crone, Heaney, & Owens, 2009).

Schizophrenia is a brain disease which affects a person's thoughts, feelings, and behaviour (The Royal College of Psychiatrists, 2004). The most common form of treating schizophrenia is by the use of antipsychotic drugs. Although these drugs are well recognized for their treatment advantages (Allison *et al.*, 1999; Moller, 2003) they do however, demonstrate numerous negative side effects such as weight gain (Allison *et al.*, 1999) and problems with compliance have also been found (Bebbington & Kuipers, 1994). The use of psychological interventions is also well documented in the treatment of schizophrenia (Haddock & Lewis, 2005; Pilling, Bebbington, Kuipers, Garety, Geddes, & Martindale, 2002; Pilling, Bebbington, Kuipers, Garety, Geddes, & Orbach, 2002). Examples of these include cognitive behavioural therapy and social skills training. These psychological interventions do however require qualified professionals to carry them out and training staff can be both time consuming and expensive (Ellis *et al.*, 2007; Haddock & Lewis, 2005).

It is well documented that the physical health of people with schizophrenia is poorer than that of the normal population (Daley, 2002; DoH, 2006; Faulkner & Sparkes, 1999). It would therefore be important to investigate alternative therapies that may be easier to access in terms of larger populations which are also cost effective and that could cater for the patient's individual needs in terms of their diagnosis and overall physical and mental health (Ellis *et al.*, 2007). There has been substantial evidence through consensus statements and guidelines that physical activity improves the physical and mental health of people with mental health problems (Biddle, Fox, & Boutcher, 2000; Grant, 2000). As a consequence, the use of physical activity provision has been commonly and actively promoted in mental health services for more than a decade (Crone & Guy, 2008; Crone *et al.*, 2009). Previous explanations on the effects of physical activity on the mental health of those with mental health disorders has catered more towards a

medical narrative (Carless & Sparkes, 2008) by focusing on the symptoms, deficits, and dysfunctions. Conversely, it is also important to look more broadly towards the beneficial effects of physical activity on the psychological well-being of those with mental health disorders.

Psychological well-being or good mental health can be difficult to define as it can be determined by a multiplicity of factors (European Commission, 2005). It has been said that it is related to 'self-esteem, cognitive functioning, personality and mood, including positive effects such as happiness, vigour, and morale and negative effects such as depression and anxiety' (Brown, 1992, pp. 186–187). The negative effects of mental health such as depression and anxiety can have a debilitating effect on our psychological well-being. Psychological well-being can be associated with our health-related quality of life (HRQL; Rejeski, Brawley, & Shumaker, 1996). This is typically defined in terms of a person's perceptions of their own functions which are outlined by a number of HRQL measures including physical symptoms such as energy and fatigue, emotional symptoms such as depression and anxiety, social functioning such as forming relationships with family and friends, and cognitive functioning such as attention span and problem solving (Rejeski *et al.*, 1996).

Previous reviews regarding the role of physical activity for people with mental health disorders have been reviewed by focusing on the effects of exercise on anxiety and depressive disorders (Barbour, Edenfield, & Blumenthal, 2007; Burbach, 1997; Daley, 2008) or have focused on psychosis which encompasses schizophrenia as well as other associative disorders (Ellis *et al.*, 2007). Conversely, Faulkner and Biddle (1999) specifically examined the literature that investigated the effects of physical activity as an adjunct treatment for schizophrenia. They found that physical activity was useful in alleviating negative symptoms of schizophrenia and that physical activity can also act as a possible coping strategy for positive symptoms such as auditory hallucinations. There has however been no systematic investigation identifying the psychological benefits of physical activity as a sole treatment for schizophrenia (Faulkner & Taylor, 2005). The last review, by Faulkner and Biddle (1999), was however published over a decade ago and although there have been several research papers published since that date there has been no review article. As a consequence, this systematic review provides an update of the literature including articles published since the previous review, to present a comprehensive assessment of the benefits of physical activity on the psychological well-being for those with schizophrenia.

### ***Aims of review***

This systematic review aims to examine the effects of physical activity on the psychological well-being for people with schizophrenia.

## **Methods**

### ***Inclusion criteria***

For inclusion, studies had to meet the following criteria:

- Published in peer-reviewed journals.
- English and non-English language papers

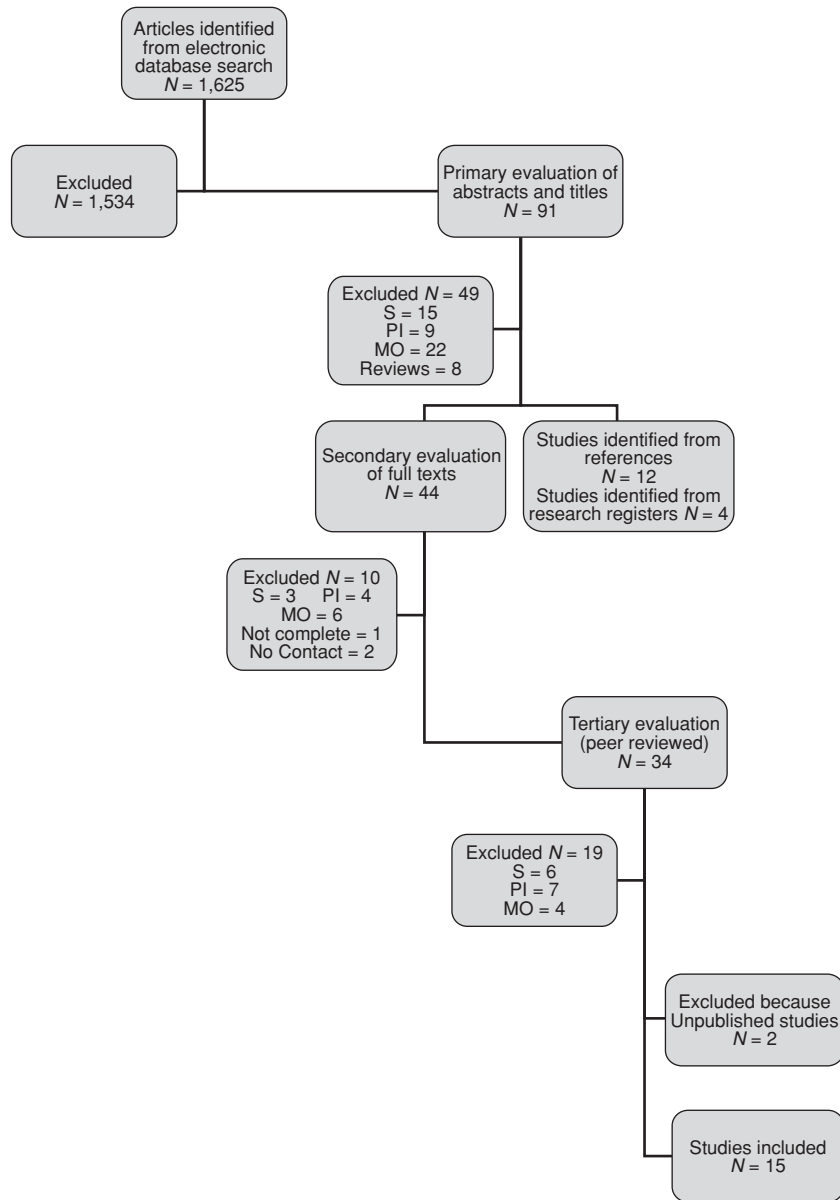
- Adult populations of 15 years and over (as diagnosis of schizophrenia is rare before the age of 15; Walker, Kestler, Bollini, & Hochman, 2004)
- Diagnosis of schizophrenia using criterion-based classification systems known as the Diagnostic Statistical Manual IV (DSM, 1994) or the expert judgments of mental health professionals. The diagnosis also included residual, schizoaffective, and schizophreniform disorders.
- Papers with differing nationalities and gender of participants were to be included.
- The use of an exercise or physical activity interventions (no inclusion criteria was set for setting or length of physical activity).
- All study designs would be included (e.g., randomized control trials, quasi-experiments, and both quantitative and qualitative studies).
- Studies must include at least one psychological outcome (cognition, symptom presence, and psychological well-being).
- Studies published between the 1 January 1978 to the 31 December 2008.

### **Search strategy**

The search used a variety of sources for research evidence. These included electronic bibliographic databases, reference and citation lists from primary and review articles, conference proceedings, research registers, and the Internet ([www.Clinicaltrials.gov](http://www.Clinicaltrials.gov)). First and second authors of relevant articles were contacted after studies were retrieved. The list of relevant electronic bibliographic databases included: *CINAHL*, *EJS EBSCO*, *PsychArticles*, *Psychology and Behavioural Sciences*, *PsycINFO*, *SportDiscus*, *Science Direct*, *ASSIA*, *PubMed*, *ISI Web of Knowledge*, *Cochrane Library*, *SocINDEX*, *Proquest (South West Region)*, *Embase*, and *Medline*. The literature search was carried out in January and February 2009 by the first author. The databases covered a range of relevant subject areas including psychology, psychiatry, mental health, and applied social sciences. The search terms included *schizophrenia*, *physical activity*, AND/OR *exercise*, *psychological well-being*, *self-esteem*, and *mental health*. Ninety-one abstracts were retrieved out of 1,625 initially identified papers for possible inclusion. The 91 abstracts were screened by the first and second authors, by cross-checking inclusion criteria and a further 76 studies were excluded for the following reasons: included other disorders other than schizophrenia ( $N = 24$ ), no physical activity/exercise intervention ( $N = 13$ ), no psychological outcome measure ( $N = 32$ ), or awaiting publication of full article ( $N = 2$ ). A final sample of 15 studies met the inclusion criteria of the review which was negotiated between the first, second, and third author (Figure 1).

### **Types of studies included**

A total of 12 studies included in the review were quantitative design, 5 were quasi-experimental (Acil, Dogan, & Dogan, 2008; Chamove, 1986; Gimino & Levin, 1984; Zd'arkova & Hatlova, 1995), 6 were pre-experimental (Adams, 1995; Belcher, 1988; Mrazek & Hatlova, 1995; Pelham & Campagna, 1991; Pelham, Campagna, Ritvo, & Birnie, 1993; Rosenthal & Beutall, 1981), and 1 was a randomized control trial (Duraiswamy, Thirthalli, Nagendra, & Gangadhar, 2007). The remaining three studies were qualitative design (Carless, 2008; Faulkner & Sparkes, 1999; Racinet & Chevrollier, 1997), one was an ethnographic study (Faulkner & Sparkes, 1999), one was a narrative life history (Carless, 2008), and one was an experimental design (Racinet & Chevrollier, 1997).



**Figure 1.** Details of included and excluded studies.

**Quality assessment and data synthesis**

Quality assessment of included studies focused on recording the strengths and weaknesses and provided insight into whether the results of the study had been unjustifiably influenced by the study’s design or conduct (National Health Service Centre for Reviews and Dissemination [NHSCRD], 2009). This systematic review used a checklist as they tend to be most appropriate for different study designs and it also enabled the design of two separate forms for both quantitative and qualitative studies. The assessment criteria for the quantitative studies were developed with the guidance of Bradshaw

*et al.* (2005) and NHSCRD (2001). The five different criteria were participants (e.g., details on eligibility criteria), interventions (e.g., whether there were co-interventions used alongside physical activity), measurement of outcome (e.g., clear description of outcome measures), study design (e.g., the presence of a control group), and results and analysis (e.g., were probability values reported and were they significant?). These assessment criteria for the qualitative studies were based on the critical appraisals skills programme tool (Critical Appraisal Skills Programme, 2006). The first three sections (research design, sampling, and data collection) focused on the rigour of the study in terms of the appropriateness and justification of the aims/objectives, research design, and methods used. The remaining three sections were reflexivity (e.g., researcher bias), data analysis (e.g., in-depth description of analysis process), and findings (e.g., critical evaluation of the findings).

The two quality assessment forms used the same method to score the quality of the included studies. One mark was given if the criteria were clearly defined, whilst no mark was given if the criteria were not mentioned. The marks for all criteria were then added up and given a total score. These scores were then calculated as percentages.

The data synthesis process drew results together from the main findings of the study whilst also collating, combining, and summarizing these results with the general characteristics and quality assessment of the studies. Data synthesis was carried out in the form of a narrative approach as the formal statistical techniques also known as meta-analyses were not appropriate for the broad range of study designs used within the reviews included studies. The defining characteristic of the narrative synthesis is that it adopts a textual approach to explain the relationship with and between studies (Popay *et al.*, 2006).

A more detailed account of the search strategy, data extraction, quality assessment, and data synthesis process can be given by the first author on request.

## Results

### Participants

From the 15 studies included in the review, there were an overall total of 356 participants who participated in the included studies: 63.8% male and 36.2% female. Two of the studies were not included as part of this percentage as these they did not specify whether their subjects were male or female (Gimino & Levin, 1984; Pelham *et al.*, 1993). The mean age was 39.3 years old, again, this was only accounted for 9 of the studies as the other 6 studies did not state the ages of their participants (Adams, 1995; Faulkner & Sparkes, 1999; Gimino & Levin, 1984; Mrazek & Hatlova, 1995; Racinet & Chevrollier, 1997; Zd'arkova & Hatlova, 1995). Nine studies recruited patients from in-patient hospitals, three from out-patient services, and three studies recruited from rehabilitation and day centre programmes. All participants had a diagnosis of schizophrenia, 8 studies included chronic (Adams, 1995; Belcher, 1988; Chamove, 1986; Gimino & Levin, 1984; Mrazek & Hatlova, 1995; Pelham & Campagna, 1991; Racinet & Chevrollier, 1997; Rosenthal & Beutall, 1981), 2 studies included schizoaffective (Bergman *et al.*, 1993; Pelham *et al.*, 1993), and 1 study included paranoid, undifferentiated, and catatonic (Bergman *et al.*, 1993). The other 6 studies did not define the type of schizophrenia that the participants were diagnosed with (Acil *et al.*, 2008; Carless, 2008; Duraiswamy *et al.*, 2007; Faulkner & Sparkes, 1999; Pelham *et al.*, 1993; Zd'arkova & Hatlova, 1995).

### **Physical activity interventions**

All studies included exercise or physical activity as an intervention. Ten of these studies used a form of aerobic exercise including: walking (Belcher, 1988; Duraiswamy *et al.*, 2007; Faulkner & Sparkes, 1999), jogging (Duraiswamy *et al.*, 2007; Gimino & Levin, 1984), cycling (Pelham & Campagna, 1991; Pelham *et al.*, 1993), swimming (Chamove, 1986; Faulkner & Sparkes, 1999), football (Racinet & Chevrollier, 1997), the gymnasium (Adams, 1995), skipping (Bergman *et al.*, 1993), frisbee (Bergman *et al.*, 1993), keep fit (Chamove, 1986), and gardening (Chamove, 1986). Four of the studies used a form of anaerobic exercise including: kinesiotherapeutic gymnastics (Mrazek & Hatlova, 1995; Zd'arkova & Hatlova, 1995), movement and relaxation exercises (Rosenthal & Beutall, 1981), and yoga therapy (Duraiswamy *et al.*, 2007). One of the studies had no specific details of an exercise intervention and described the interventions according to the participant's ongoing participation in sport and exercise (Carless, 2008). The duration of interventions ranged from 3 to 20 weeks long. The mean duration of an intervention was 2.3 weeks. Two studies were not included in this mean score as details of duration were not stated (Carless, 2008; Chamove, 1986). In these excluded studies, the interventions ranged in length from 30 to 90 min. The mean length of an intervention was 42.7 min. Four studies were not included in this mean score as the length of the interventions was not stated (Belcher, 1988; Carless, 2008; Chamove, 1986; Zd'arkova & Hatlova, 1995). The frequency in which the interventions occurred ranged from 1 per week to 7 per week. The mean frequency score was 3.3 per week. Two studies were not included in this mean score as details of interventions frequency was not stated (Belcher, 1988; Carless, 2008). Four of the 15 studies used physical activity as part of a co-intervention (Adams, 1995; Bergman *et al.*, 1993; Carless, 2008; Pelham & Campagna, 1991). A majority of the studies mentioned the use of antipsychotic drugs which was also being used alongside the physical activity interventions and only five did not mention the use of antipsychotic medication (Gimino & Levin, 1984; Mrazek & Hatlova, 1995; Pelham & Campagna, 1991; Pelham *et al.*, 1993; Rosenthal & Beutall, 1981).

### **Psychological outcomes**

Psychological well-being was measured under a number of areas including mental health (Acil *et al.*, 2008; Carless, 2008; Faulkner & Sparkes, 1999; Zd'arkova & Hatlova, 1995), social competence and interest (Adams, 1995; Chamove, 1986; Duraiswamy *et al.*, 2007; Pelham & Campagna, 1991; Racinet & Chevrollier, 1997), general well-being (Carless, 2008; Pelham & Campagna, 1991), anxiety/tension levels (Adams, 1995; Carless, 2008; Chamove, 1986; Gimino & Levin, 1984; Pelham *et al.*, 1993), perceived self-image/self-concept (Gimino & Levin, 1984; Racinet & Chevrollier, 1997), self-competence/efficacy (Bergman *et al.*, 1993; Chamove, 1986; Racinet & Chevrollier, 1997), self-esteem (Faulkner & Sparkes, 1999), and stress/irritability/hostility (Adams, 1995; Chamove, 1986; Faulkner & Sparkes, 1999). The psychological instruments used to measure these areas of psychological well-being included quality of life (Acil *et al.*, 2008; Duraiswamy *et al.*, 2007), Nurses' Observation Scale for In-patient Evaluation (Adams, 1995; Chamove, 1986), Mental Health Inventory (MHI; Pelham & Campagna, 1991), profile of mood states (Gimino & Levin, 1984), State-Trait Anxiety Inventory (Gimino & Levin, 1984), Physical Self-Efficacy Scale (Bergman *et al.*, 1993), Perceived Competence Scale (Bergman *et al.*, 1993), LOFOPT (Level of Functioning and Optimal Performance Test; Bergman *et al.*, 1993), structured interviews (Pelham *et al.*, 1993), and 'Draw-a-person' (Rosenthal & Beutall, 1981). The qualitative studies measured psychological well-being with in-depth

interviews (Carless, 2008; Faulkner & Sparkes, 1999), participant observation (Carless, 2008), and focus groups (Carless, 2008).

### **Quality of studies**

The quality score of included quantitative studies ranged from 28 to 88%. Two studies achieved a score over 50% (Acil *et al.*, 2008; Chamove, 1986), while three studies achieved a score over 70% (Acil *et al.*, 2008; Chamove, 1986; Duraiswamy *et al.*, 2007). The quality score of the three included qualitative studies were 81% (Carless, 2008), 85.7% (Faulkner & Sparkes, 1999), and 28.6% (Racinet & Chevrollier, 1997). The studies were arranged in order of highest to lowest quality score (see Table 1).

### **Main findings**

There was a significant improvement ( $p < .05$ ) in mental health/general psychological well-being found in two high-quality score studies (Acil *et al.*, 2008; Duraiswamy *et al.*, 2007) and one low-quality score study (Pelham & Campagna, 1991). These were overall scores from the results of either the MHI (Pelham & Campagna, 1991) or the World Health Organization Quality of Life (WHOQOL-BREF) mental domain (Acil *et al.*, 2008; Duraiswamy *et al.*, 2007). There were also studies that looked at more specific attributes encompassed within psychological well-being which can be either positive or negative attributes.

#### *Positive attributes of psychological well-being*

Two high-quality studies reported an overall significant ( $p < .05$ ) increase in social competence (Chamove, 1986; Duraiswamy *et al.*, 2007). Three low-quality studies also reported an increase in social competence, these scores were however non-significant (Adams, 1995; Belcher, 1988; Mrazek & Hatlova, 1995). Two of these studies reported an increase in patient's cooperation, communication, and interaction skills with other patients and health professionals (Belcher, 1988; Mrazek & Hatlova, 1995). There was alternatively one study that reported no significant difference in general competence levels (Bergman *et al.*, 1993). All of the qualitative studies supported the findings from the above quantitative studies; participants found that exercise and physical activity helped them to meet and talk to others and also believed that physical activity increased competence levels which improved interpersonal relations and networking with others (Faulkner & Sparkes, 1999). One study reported a significant ( $p < .05$ ) increase in physical self-efficacy amongst participants (Bergman *et al.*, 1993). Participants in one high-quality study found that physical activity was important for motivation and that it provided them with the motivation they needed to carry out other elements of the rehabilitation programme (Faulkner & Sparkes, 1999). One study found that post exercise results showed a significant ( $p < .05$ ) improvement in patient's body images (Rosenthal & Beutall, 1981). The only low-quality qualitative study reported that patients had more positive physical body perceptions after taking part in physical activity (Racinet & Chevrollier, 1997). Alternatively, one study found no significant improvements in patient's perceived self-image after participating in physical activity; this study was however also of low quality (Gimino & Levin, 1984). One participant in a qualitative study reported physical activity as being important for providing them with the motivation to get up in the morning (Faulkner & Sparkes, 1999). Two of the qualitative studies

**Table 1.** Characteristics summary of included studies

Author/date	Study design	Sample/diagnosis	Medication	Physical activity intervention/groups	Psychological measures	Outcomes	Q %
Acil et al. (2008)	Quasi-experimental	N = 30 (60% male) Age = 21–45 yrs old	AP drugs	Aerobic exercise programme (15 experiment, 15 control), 3 x/wk, first 2 weeks 25 min then increased to 40 min, 10 weeks	Quality of life; mental domain (WHOQOL-BREF-TR)	Physical exercise is a useful application to improve those with Schizophrenia's mental states. All psychological measures decreased ( $p < .05$ ) except for alogia ( $p > .05$ )	88
Duraiswamy et al. (2007)	Experimental versus control group RCT	Schizophrenia (DSM) N = 61 (N = 42 male, N = 19 female)	Chlorpromazine	Yoga therapy (19 male, 12 female) v physical training such as walking or jogging (23 male, 7 female) 5 x 60 min/wk 3 weeks	Quality of life; psychological (QOL) Social and occupational functioning (SOFs)	QOL improved signif in YT	80
	Comparative exercise groups	Age = 18–55 yrs old Schizophrenia (DSM: 4 + on clinical global impression severity scale)				SOFs improved for both groups Overall YT signif better on scores except positive symptoms and PANSS total scores. YT better on SOFS and QOL scores	

Table 1. (Continued)

Author/date	Study design	Sample/diagnosis	Medication	Physical activity intervention/groups	Psychological measures	Outcomes	Q %
Chamove (1986)	Quasi-experimental	N = 40 (N = 21 male, N = 19 female) Age = 20–77 yrs old Long-term schizophrenia	Chlorpromazine	Types of high and low physical activity (high-swimming, work therapy, gardening), low physical activity (occupational therapy, keep fit), 2 × /wk	Irritability, self-competence, social interest, tension (NOSIE)	There was a significant improvement in tension ( $p = .0004$ ). Patients also showed more social interest and social competence, and were less irritable	72
Pelham and Campagna (1991)	Pre-experimental single case study	N = 3 (N = 2 male, N = 1 female) Age = 18–45 yrs old Chronic schizophrenia (DSM)	na	Bicycle ergometer, warm up and cool down exercises in psychiatric rehabilitation clinic, 4 × 30 min/wk 12 weeks	General well-being, social benefits (MHI)	Overall mental health scores beneficial increase for 2 out of 3 p's	56
Adams (1995)	Pre-experimental single case study	N = 1 (male) Age = na Chronic schizophrenia	Neuroleptic medication	Exercise programme in community gym, 4 × 20–50 min/wk, 12 weeks	Social competence and interest (NOSIE)	Significant increase in social competence and interest ( $p < .05$ )	36
Gimino and Levin (1984)	Quasi-experimental	N = 80	na	Aerobic exercise conditioning programme (jogging), 3 × 40 min/wk 10 weeks	Anxiety, depression, perceived self-image	Decrease in POMS for subject group ( $p \leq .05$ ). No significant difference in perceived self-image between groups ( $p = .745$ )	36
Experimental versus control group		Age = na Chronic schizophrenia			(POMS, STAI)		

Table 1. (Continued)

Author/date	Study design	Sample/diagnosis	Medication	Physical activity intervention/groups	Psychological measures	Outcomes	Q %
Bergman, Hutzler, Stein, Avidan, and Wozner (1993)	Quasi-experimental (cross-over design)	N = 15 (N = 9 male, N = 6 female) Age = 16–21 yrs old	500 mg largektil, some cases lithium	Physical activity programme (warm up, frisbee, skipping, hoops in groups and individually. This was apart of an educational programme. 5.45 min/wk (for 3 weeks of study then a week of wash out then swapped intervention) 7 weeks	Physical self-efficacy, self-competence (PSE, PCS) – general observations	A significant difference in perceived competence ( $p = .028$ ). There was also an improvement in psychomotor characteristics from observed motor tasks	52
Belcher (1988)	Pre-experimental	Schizophrenia (N = 5 undifferentiated, N = 3 hebephrenic, N = 5 paranoid) Schizoaffective disturbance (N = 2) N = 1 (male) Age = 60 yrs old Chronic schizophrenia	Psychotropic medication	Hallway Walking (125 feet). Was asked to do this whenever had a hallucinatory episode 20 weeks	Social interaction (general observations)	Increased social interaction with members of staff	48
Rosenthal and Beurall (1981)	Pre-experimental	N = 9 (N = 5 male, N = 4 female) Age = 22–55 yrs old Chronic schizophrenia	na	Movement exercises followed with relaxation exercises, 1 x 30 min/wk 10 weeks	Body image (draw a person)	Body image scores post exercise intervention was significantly greater than before exercise ( $p < .05$ )	44

Table 1. (Continued)

Author/date	Study design	Sample/diagnosis	Medication	Physical activity intervention/groups	Psychological measures	Outcomes	Q %
Pelham <i>et al.</i> (1993)	Pre-experimental	N = 11	na	Aerobic: Bike ergometer at 65–75% heart rate reserve or Non-aerobic: muscle toning/strengthening exercises	Underlying psychiatric response such as mood and anxiety levels (structured interviews)	Anxiolytic and cognitive signs of anxiety effect, antidepressant and energizing effects. Increased motivation towards other components of rehabilitation programme	44
	Structured interview	Age = 18–45 yrs old Schizophrenia and major affective disorder		4 × 30 min/wk 8 weeks		Ratio of key words from patient responses: 2:1- positive: negative words after intervention Higher ratio of positive key words was found with those who carried out aerobic exercises compared to anaerobic	
Mrazek and Hatlova (1995)	Pre-experimental	N = 17 (male) Long-term schizophrenia	Age = na na	Kinesiotherapy programme (no specific details), 2 × 30–50 min/wk 3 months	Social interaction (general observations)	Increased cooperation, communication and interaction skills with staff and other patients	28

**Table 1.** (Continued)

Author/date	Study design	Sample/diagnosis	Medication	Physical activity intervention/groups	Psychological measures	Outcomes	Q %
Zd'arkova and Hatlova (1995)	Quasi-experimental	N = 25 (female) Age = na	Medication (no specific detail)	Kinesiotherapeutic gymnastic programme. Four different groups: exercise with ball and ribbon, relaxation exercises, passive exercises, or no exercise (control group) 2 x /wk 3 months	Overall psychiatric status and mental health (BPRS)	Overall, BPRS scores improved (9, 0% improvement). Highest improvement in the group with props followed by group with yoga and relaxation	28
Faulkner and Sparkes (1999)	Ethnography	N = 3 (N = 2 male, N = 1 female) Age = middle-aged Schizophrenia	Antipsychotic medication	Walking and swimming in local park and leisure centre, 2 x 30 min/wk 10 weeks	Mental health, mood, self-esteem, concentration (open-ended interviews with p's and key workers)	Increases motivation, self-esteem, social interactions. Alleviates depressive and anxious thoughts, social withdrawal, elevates mood. Gives structure to peoples lives	85.7

Table 1. (Continued)

Author/date	Study design	Sample/diagnosis	Medication	Physical activity intervention/groups	Psychological measures	Outcomes	Q %
Carless (2008)	Pre-experimental, narrative life history	N = 1 (male) Age = 36 yrs old	Antipsychotic medication	Apart of a larger physical activity and mental health project, ongoing participation	Mental health and well-being (participant observation, analysis of case history/notes, focus groups and interviews with health care professionals)	Exercise helped reconstruct subject's identity and sense of self. Also enabled him to gain control over his life through structure in his daily routine	81
Racinet and Chevrollier (1997)	Qualitative Experimental	Schizophrenia N = 13 (N = 9 male, N = 4 female) Age = na	Antipsychotic medication	Football programme (with physical warm-up) Participation attended 8–45 sessions 9 months	Mental health/abilities, competence, perceived self-image (participant observations)	Improved competence, perceived body differently, increased interest in sport, improved sociability; rebuild sense of self within the sport	28.6

Note. Cont, continued; na, not applicable/not mentioned; N, number; Q, Quality score; yrs, years old; X/wk, how many times per week the activity was taken part in; AP, antipsychotic; RCT, Royal College of Psychiatrists; PWB, psychological well-being; BSI, Brief Symptom Inventory; WHOQOL-BREF-TR, World Health Organization Quality of Life Scale Turkish version; BPRS, Brief Psychiatric Rating Scale; NOSIE, Nurses' Observation Scale for In-patient Evaluation; MHI, Mental Health Inventory; POMS, profile of mood states; STAI, State-Trait Anxiety Inventory; PAS, Psychiatric Assessment Scale; TSC, Tennessee self-concept test; NGI, Nurses Global Impression Scale; PCS, Perceived Competence Scale; PSE, Physical Self-Efficacy Scale; SOFS, Social and Occupational Functioning Scale. Q, R, S, and T, Qualitative studies included in the review which are quality assessed under a different criteria.

reported that participants experienced an overall increase in confidence levels (Carless, 2008; Faulkner & Sparkes, 1999). Other positive effects of physical activity on the psychological well-being reported by patients in qualitative studies included increased self-esteem (Faulkner & Sparkes, 1999). Physical activity was also reported to help reconstruct patient's identities and provided them with a sense of self and purpose (Carless, 2008; Racinet & Chevrollier, 1997).

#### *Negative attributes of psychological well-being*

Anxiety levels significantly ( $p < .05$ ) reduced for patients in one study (Gimino & Levin, 1984). Alternatively, Carless (2008), a qualitative study, found physical activity to actually increase the anxiety attacks of one patient. One low-quality study found that tension significantly ( $p < .05$ ) decreased (Adams, 1995). There was however a higher quality study that found no significant reductions in tension levels after patients participated in physical activity (Chamove, 1986). There was a significant reduction ( $p < .05$ ) in patient's irritability levels in two studies (Adams, 1995; Chamove, 1986) and one qualitative study felt that patient's were less socially withdrawn as a result of participating in physical activity (Faulkner & Sparkes, 1999).

#### *Summary of main findings*

All 12 quantitative studies that measured psychological well-being found an improvement in an area of psychological well-being. Alternatively, one of the participants from a high-quality qualitative study also reported a negative effect on their psychological well-being (Carless, 2008). There was also no significant difference found in some areas of psychological well-being after physical activity participation in 3 out of the 12 quantitative studies (Bergman *et al.*, 1993; Chamove, 1986; Gimino & Levin, 1984). The mean quality score of these studies was 59.2%. These results suggest the physical activity may have a positive effect on areas of psychological well-being for those with schizophrenia. Most commonly in positive attributes of autonomy/competence (self, social, and physical), social interest, psychological health/well-being/mental health, and perceived self-image/concept. Physical activity was also found to most commonly reduce levels of anxiety and tension for those with schizophrenia.

## **Discussion**

The findings of this systematic review suggest that physical activity has a beneficial effect on some attributes associated with psychological well-being. A wide range of study designs, participant samples, and physical activity interventions have been included within this review and it is therefore important to consider the differences and similarities in these studies and how they may have affected the credibility of the findings reported within the review.

The participant samples used within the included studies ranged in sample size, gender, and age, for example, Acil *et al.* (2008) recruited 30 participants whereas Pelham and Campagna (1991) recruited only 3 participants. The difference between the included studies methodological designs was therefore taken into consideration when concluding the findings of the review. For example, four of the included studies recruited only male participants whereas the ratio of the remaining 11 studies was

higher for males compared to females. This may demonstrate bias and is therefore difficult to generalize these findings for females with schizophrenia. The age difference of male's first making contact with the mental health services before the age of 35 is however higher compared to females (Kirkbride *et al.*, 2006). This may explain the reasons for why there were a higher percentage of male participants compared to female participants as the average age of participants recruited within the studies was 39.3 years old.

The differences in the physical activity interventions used within the included studies may have also affected the findings of the review. There was a wide range of physical activity interventions used in the included studies. Some physical activities involved participating football teams (Racinet & Chevrollier, 1997) or walking groups (e.g., Duraiswamy *et al.*, 2007) and were therefore more likely to promote social interaction as the participants were engaging in a social environment, which is seen as a positive contributor to psychological well-being (Crone *et al.*, 2004). Whereas the studies which used physical activities such as going to the gymnasium may have focused more on individual participation and therefore may have not benefited the participant in social contact or networking opportunities with others. The physical activity interventions also differed in terms of the frequency of how often the physical activity was carried out. This may, for example, have affected the findings of the results as an increased frequency of the interventions appeared to be related to an improvement in psychological well-being. These findings appear cognizant with Richardson *et al.* (2005) findings that a dose response similar to national physical activity recommendations are most effective in eliciting change in people with mental health disorders.

In the review, there were only three studies which adopted a qualitative approach (Carless, 2008; Faulkner & Sparkes, 1999; Racinet & Chevrollier, 1997). It is important to mention that qualitative findings can compliment and support quantitative studies however these findings cannot be compared between each other. This is because qualitative research is involved in the participant's subjective experiences and psychological outcomes are not generally measured objectively, therefore what participants perceive as an improvement in perceived self-image may differ to what the quantitative findings indicate. Settings too, differ, making comparisons and conclusions difficult.

The types of methodological instruments used to measure the psychological outcomes may also be a coinciding factor that effects the interpretation of the reviews results. For example, Acil *et al.* (2008) used the quality of life questionnaire (WHOQOL-BREF-TR; Fidaner *et al.*, 1999) to measure overall mental health whereas Duraiswamy *et al.* (2007) used Social and Occupational Functioning Scale (SOFS; Saraswat, Rao, Subbakrishna, & Gangadhar, 2005). These psychological instruments use different criteria to assess an individual's mental health and therefore the results could not be compared directly to one another. This also explains the reasons why statistical analysis was not possible.

Finally, there were differences between the quality scores of the included studies and it is important to assess the strength of how the findings of a study with a higher quality may outweigh the findings from a study with a lower quality. For example, this could occur when the size or the homogeneity of the sample recruited for the studies is larger; a larger sample size of patients with paranoid schizophrenia is more reliable than a smaller sample size with a wider range of diagnoses. However, as mentioned previously, these differences in quality scores must be understood within the context

of the wide variety of study designs adopted by the included studies, which made it difficult to directly compare the studies to one another.

### **Implications for health care practice**

The use of physical activity has been recognized and acknowledged as a successful holistic adjunct for the treatment of those with mental health disorders (for example, Crone & Guy, 2008; Crone *et al.*, 2009; Daley, 2002) and national policies and guidelines have been recommending physical activity as an adjunct treatment for patients in primary and secondary health care (e.g., DoH, 1999, 2004, 2006; Grant, 2000). This review however has focused specifically on investigating whether physical activity can improve the psychological well-being for those with schizophrenia.

According to Ellis *et al.* (2007), it is important to focus on psychotic-specific symptoms to be able to identify the types of physical activity that would be most successful for each mental health disorder. However, due to the wide range of physical activities used within the included studies, it is hard to conclude what type of physical activity is most beneficial for those with schizophrenia.

As a consequence perhaps, it is important therefore to consider that the type of physical activity which is most beneficial will depend upon the preferences of individual's regardless of the mental health disorder that they have been diagnosed with. 'The process of recovery from serious mental illness can be appreciated as far-reaching, complex, and closely related to each individual's life experiences', (Carless, 2008, p. 234). This suggests that recovery is not just about the removal or reduction of symptoms and that it is important to consider the subjective feelings of what motivates or interests the individual to take part in physical activity, as a part of their treatment. This conclusion further supports Grant's (2000) national physical activity recommendations for the prescription of physical activity in the treatment of people with mental health disorders and to include physical activity into the treatment plans of people with mental health problems. The common benefits associated with physical activity are based on physical factors such as decreased risk of developing diabetes, heart disease, and high blood pressure amongst other common and disabling chronic conditions (Richardson *et al.*, 2005). Promoting physical activity for those with schizophrenia needs to be realistic in terms of what they want to personally achieve out of it, whether it is to improve their fitness (Carless, 2008), enhance their social skill and competence (e.g., Adams, 1995; Duraiswamy *et al.*, 2007; Faulkner & Sparkes, 1999), for enjoyment (Crone, 2007), or to improve their body/self-image (e.g., Racinet & Chevrollier, 1997; Rosenthal & Beutall, 1981). These aims and objectives are used in an instrumental fashion as the patient uses physical activity to help them pursue other areas of their lives which they see as meaningful (Carless & Douglas, 2008) and for general enjoyment (Crone, 2007). Some people may however see the physical activity as enjoyable in its own right. An initial assessment would therefore include a questionnaire which considers the patients preferences towards the type of physical activity that they would be interested in whilst also ensuring that the patient's physical health is checked before participating in physical activity to prevent the risk of any exercise-related deaths. These assessments are an approach that has already been adopted in a number of mental health trusts within the UK.

There were specific conclusions drawn on the dose response issues of physical activity interventions for those with schizophrenia. It has been suggested that a minimal of 20–30 min exercise sessions or a less structured alternative of accumulating healthier

life-style approaches throughout the day to maintain minimal physical fitness (Richardson *et al.*, 2005). Previous findings have however found that neither the intensity, frequency, duration, nor the type of physical activity (resistance or aerobic) are associated with the magnitude of symptom reduction for those with depression and anxiety (Kesaniemi *et al.*, 2001). This may also be accountable for other mental health disorders such as schizophrenia.

It may be important to consider that the physical activity that they take part in is easy for them to access once they leave acute care. This will not only allow the individual to continue with their chosen physical activity participation but will also promote social integration within their community therefore helping to maintain a good quality of life which may be beneficial in preventing relapsing, or a return to acute care.

Lastly, it is important to mention that this systematic review has only investigated the effects of physical activity on the psychological mechanisms associated with schizophrenia. There is however other factors which need to be taken into consideration when using physical activity as a treatment for those with mental health disorders. Unhealthy life-style factors, such as higher rates of smoking and poor diet, which are commonly associated with people with mental health disorders (Cormac, Martin, & Ferriter, 2004) may be addressed through the promotion of physical activity. However, life-style change is a complex and requires intensive support for it to be sustained, thus posing problems to health promoters from all fields, to further encourage physical activity within this population. Furthermore because antipsychotic medication has such an impact on eating habits and weight gain in this group of service users (Allison *et al.*, 1999) a holistic and strategic approach to promoting these behaviours should be undertaken (Crone *et al.*, 2004). A multiplicity of factors should be considered, for example, the biological, physiological, psychological, and environmental factors which may affect physical activity recommendations as an adjunct treatment for those with severe mental health disorders such as schizophrenia.

### **Future research**

There are specific gaps in the findings of the studies within this review which have highlighted future research questions that require addressing. These include the methodological implications which have arose from the findings of this review which could improve the credibility of the evidence base in future research.

Firstly, future research should focus more specifically on participants with schizophrenia as opposed to including schizophrenia and associated disorders. A total of 24 studies were excluded from the review as a result of the participant sample including disorders other than schizophrenia. This may however be due to ethical requirements that hinder researchers accessing full clinical notes of the patients which may be a result to why some studies do not define the participant's mental health disorder. Future studies could also increase the homogeneity of participants in terms of their age and gender. There was a larger ratio of males compared to females within the included studies. Samples of the included studies also were of a broad age range. More focus on target samples of same age or sex would increase the credibility and practical applicability of research findings. It is hard to generalize these findings as the samples were of such a diverse demographical population. The severity of schizophrenia and how it is best treated may be affected by the age or gender of the patients. There may also be a relationship between physical activity type and gender, for example, as there

are known physical activity preference differences between asymptomatic populations (Vilhjalmsson & Kristjansdottir, 2003).

The studies in the review included a broad range of physical activities, of both leisure and occupational. The diverse nature of different physical activities can make it hard to generalize how effective they are in comparison to one another. Future research could investigate the effect of specific types of physical activity or exercise for people with schizophrenia.

The wide range of psychological instruments used within the included quantitative studies meant that it was impossible to carry out any statistical tests to measure the degree of significance between studies results. It would be useful for future studies to use a standardized psychological instrument to measure the effectiveness of interventions on symptoms and psychological well-being. It is however important to mention that the wide variety of psychological tests must be credited to the differences in the dates when the studies were carried out. Future research should also consider the continued developments in psychological instruments, for example, being regularly updated as the process of research moves forward with new and more contemporary findings. This will result in the measurement of psychological outcomes improving constantly, but may also lead to a more uniform approach adopted by researchers.

The use of a mixed methods approach in future studies would also be useful for investigating not only the reduction or improvement of symptoms and psychological well-being by quantitative measures but to also compliment these findings with the patients perceptions and experiences of the physical activity intervention. This will allow these findings to be discussed collectively and provide further understanding on the processes involved in the relationship and their interactions. These recommendations further support Faulkner and Biddle (1999) who suggested the use of experimental single case study designs alongside qualitative methodologies to compliment one another. However, there as yet appears to either be a lack of recognition of this, or adoption to intertwine these two research approaches.

Physical activity has proven to be more cost effective in comparison to other more common treatments such as antipsychotic medication and psychological therapies (Ellis et al., 2007). It would be useful to investigate the cost effectiveness as well as the clinical effectiveness of specific physical activities in comparison to one another; this may increase the profile and therefore promotion, of physical activity interventions, within mental health care in the future.

It is concluded that addressing these research implications may help to tackle some of the methodological limitations related to the studies included within the review and will therefore help to improve future studies in order to 'bridge the gaps' from previous research findings. This will therefore provide further evidence upon which to develop recommendations for the use of physical activity in the treatment and holistic health promotion of people with schizophrenia.

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