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[Qualitative Protocol]

Factors that influence participation in physical activity for anxiety or depression: a synthesis of qualitative evidence

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Editorial group: Cochrane Common Mental Disorders Group.

Publication status and date: New, published in Issue 3, 2020.

Citation: McCartan CJ, Yap J, Firth J, Stubbs B, Tully MA, Best P, Webb P, White C, Gilbody S, Churchill R, Breedvelt JJF, Davidson G. Factors that influence participation in physical activity for anxiety or depression: a synthesis of qualitative evidence. *Cochrane Database of Systematic Reviews* 2020, Issue 3. Art. No.: CD013547. DOI: [10.1002/14651858.CD013547](https://doi.org/10.1002/14651858.CD013547).

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ABSTRACT

This is a protocol for a Cochrane Review (Qualitative). The objectives are as follows:

Main objective: To identify the factors that create barriers or facilitate physical activity for people with a diagnosis of anxiety or depression from the perspectives of service users, carers, service providers and practitioners to help inform the design and implementation of interventions that promote physical activity.

The overall aim of this review is to identify, appraise, and synthesise qualitative research evidence on the barriers and facilitators to engaging in physical activity in general lifestyle settings or as part of an intervention designed to increase physical activity for people with anxiety and depression. This will allow us to identify factors that create barriers and facilitators of physical activity in this population to inform the development, design, and implementation of future interventions. We will also integrate the findings from the QES with the two associated effectiveness reviews (Cooney 2014; Larun 2006). We will communicate our findings to public health commissioners and other stakeholders.

BACKGROUND

Physical activity is good for you, but recent figures report that around 20 million adults (39%) in the UK are physically inactive ([British Heart Foundation 2017](#)). Worldwide, 1400 million people do not meet the weekly recommendations for physical activity established by the World Health Organization (WHO) ([WHO 2010](#)). Physical inactivity increases the risk of many adverse health conditions and is a significant cause of premature mortality ([Lee 2012](#)). Conservative estimates suggest that in 2013, physical inactivity cost healthcare systems USD 53,800 million worldwide, contributed to USD 13,700 million in loss in productivity, and was responsible for GBP 13.4 million Disability Adjusted Life Years (DALYs) ([Ding 2016](#)). Being physically active has the potential to protect against depression ([Schuch 2018](#)) and lower the risk of breast cancer, colon cancer, diabetes, ischaemic heart disease, and ischaemic stroke. Larger reductions in risks, however, require significantly higher levels of physical activity than the minimum recommended level of 600 metabolic equivalent minutes per week ([Kyu 2016](#)). Recommended activity levels are higher for children and young people than adults ([WHO 2012](#)). High levels of sedentary behaviour in the youth population and its association with poorer physical and mental health is an area of concern ([Hoare 2016](#)). Sedentary behaviour, independent of physical activity, increases the risk of diabetes, cardiovascular disease, and cardiovascular and all-cause mortality ([Wilmot 2012](#)). While many public health strategies continue to promote the importance of physical activity, they are also beginning to acknowledge the role physical activity can play in promoting better mental health ([NHS 2018](#)).

Mental health problems contribute significantly to the overall disease burden worldwide and are major causes of disability, suicide, and ischaemic heart disease. People with mental ill health report lower levels of physical activity, and physical activity levels for those with anxiety and depression are considerably lower than the general population ([de Wit 2010](#); [Vancampfort 2017](#)). People with anxiety and depression are at greater risk of chronic health conditions such as cardiovascular disease and obesity, and many have co-occurring medical conditions (comorbid conditions) caused by lifestyle behaviours (e.g. smoking, hazardous alcohol use, sedentary behaviour) that can lead to poor health outcomes ([Cohen 2015](#); [Strine 2008](#)). People living with mental health conditions, including depression and anxiety, are also more likely to experience poverty ([Bivanco-Lima 2007](#); [Elliott 2016](#)). The multi-dimensional effects of poverty can have an influence on judgement and decision-making about important lifestyle behaviours, including personal choices about exercise and nutrition ([Mullainathan 2013](#); [Wilkinson 2019](#)).

While there may be a range of social and genetic determinants of mental health disorders ([Cross-Disorder Group 2013](#); [WHO 2014](#)), being physically active can have positive benefits and may help improve the mental and physical health of those with some disorders ([Ströhle 2008](#)). Physical activity can improve self-esteem ([Firth 2016a](#); [Lubans 2016](#)), cognitive functioning and help reduce symptoms ([Ashdown-Franks 2019](#); [Firth 2016a](#); [Gerber 2014](#); [Stubbs 2018](#); [WHO 2010](#)). Based on secondary analysis of available data, physical activity has been shown to be potentially as effective as many drug interventions (e.g. statins, beta blockers) at preventing cardiovascular disease mortality ([Naci 2013](#)). Physical activity is cited in the National Institute for Health and Care Excellence (NICE) clinical guidelines as a potential treatment option for people with

persistent subthreshold depressive symptoms or mild to moderate depression ([NICE 2018](#)) and generalised anxiety disorder and panic disorder ([NICE 2019](#)). The European Psychiatric Association (EPA) has also made clinical practice recommendations for physical activity as a treatment for mild-moderate depression ([Stubbs 2018](#)). Not engaging in sufficient physical activity is also a risk factor for developing depression and anxiety in children and adults ([Abu-Omar 2004](#); [Goodwin 2003](#); [Motl 2004](#); [Reed 2009](#); [Schuch 2018](#); [Zahl 2017](#)).

A number of barriers to physical activity are identified in the qualitative literature. They include low levels of motivation, poor self-perception and inexperience/lack of competence ([Cole 2010](#); [Glowacki 2017](#)). Practical issues such as cost (unemployment) and access (transport) can create barriers ([Wynaden 2012](#)). Aspects that help facilitate physical activity include the recognition of the psychological and physical benefits ([Firth 2016b](#)), and good social and peer support networks ([Schuch 2016](#)). Gaining mastery and growing competency also encourages people to continue participation ([Carless 2008](#); [Firth 2016b](#); [Hodgson 2011](#)). For young people, many of these barriers and facilitators are shared (e.g. cost, time, transport, infrastructure, social support, motivation), but additional barriers may be faced ([Martins 2015](#)). These can include negative associations with the competitive nature of physical activity within schools and the pressure of winning/losing in front of their peer group or vested adults ([Yungblut 2012](#)). Activity often reduces as children age ([Dumith 2011](#)) and the transition periods, between primary to high school (10-12 years old) and high school to labour market entry (16-18 years old), may be significant ([Bélangier 2011](#); [Coleman 2008](#)).

Anxiety and related disorders

Anxiety disorders are typically characterised by persistent and excessive worry and can have a range of potentially debilitating physical and psychological symptoms ([Lader 2015](#)). These can present as excessive fear, muscle tension, fatigue, irritability, cautious or avoidant behaviours, and related behavioural disturbances and must have a duration of at least six months to meet the criteria for diagnosis ([APA 2013](#)). There are a range of different types including agoraphobia, generalised anxiety disorder (GAD), panic disorder and social anxiety disorder and other phobic disorders, and disorders associated with child populations (separation anxiety and selective mutism). Associated conditions also include trauma- and stressor-related disorders (e.g. post-traumatic stress disorder (PTSD) or acute stress disorder) and obsessive-compulsive and related disorders (e.g. obsessive-compulsive disorder (OCD)) ([Kupfer 2015](#)).

Anxiety disorders are common; lifetime prevalence is estimated to be as high as 33.7% of the population ([Bandelow 2009](#)), with the global prevalence rate estimated to be 3.6% ([WHO 2017](#)). A recent UK prevalence survey reported that 7.2% of 5-19 year olds had an anxiety disorder ([Sadler 2017](#)). They are more common among females than males ([WHO 2017](#)). The age of onset is typically in childhood or adolescence, and the course is often chronic-recurrent ([Kessler 2009](#)). Prevalence rates do not vary greatly between age groups, but there is a trend towards lower prevalence among older people ([WHO 2017](#)). Anxiety disorders are the sixth-leading cause of disability globally and are associated with an elevated risk of comorbid cardiovascular diseases ([Batelaan 2016](#); [Roest 2012](#)). They are highly comorbid with each other and other psychiatric conditions ([Bandelow 2009](#); [Noyes 1998](#)), particularly

mood disorders (Maser 1990) and autistic spectrum disorders in childhood and adolescence (de Bruin 2007; Kerns 2015; van Steensel 2011). Impairment of quality of life is comparable to other chronic medical conditions like diabetes (Andrews 1998; Kessler 1999; Olfson 1997; Rubin 2000). Twin studies have identified that genetics generate a significant risk of developing a disorder along with individual environmental factors (Hettema 2001). Research has also shown that individuals engaging in low levels of physical activity have a higher chance of experiencing anxiety (Stubbs 2017).

Depression

Depression, often comorbid with anxiety (Sartorius 1996), can have a range of physical and psychological symptoms. It can affect a person's mood, generate negative feelings of self-concept, and create regressive and self-punitive thoughts; and may also manifest changes to the body (somatic changes) and reduce motivation and energy levels (Beck 2009). At its most extreme, depression can lead to suicide (Reddy 2010; WHO 2017). An individual must experience five or more symptoms during a two-week period including at least one symptom of depressed mood or loss of interest or pleasure. Other symptoms are debilitating and can negatively impact on work, social, family, academic, and other important areas of functioning. These symptoms include: significant weight loss when not dieting or weight gain; a noticeable slowing down of thought and reduction in physical movement; fatigue; feelings of worthlessness or excessive guilt; diminished ability to think or concentrate or indecisiveness; and recurrent thoughts of death and suicidal ideation without a specific plan (APA 2013). Depressive disorders include two main subcategories: major depressive disorder (MDD)/depressive episode and persistent depressive disorder, a persistent or chronic form of mild depression.

In 2015, the proportion of the global population estimated to have depression was 4.4%; it is more common in females (5.1%) than in males (3.6%) (WHO 2017). A recent UK prevalence survey reported that 2.1% of 5-19 year olds had a depressive disorder (Sadler 2017). Depression is the leading cause of disability measured by Years Lived with Disability (YLDs) and is the fourth-leading contributor to the global burden of disease (WHO 2017). Depression results from a complex interaction of social, psychological, and biological factors. Epidemiologic studies show that about 50% of the risk of depression is genetic (Fava 2000; Sanders 1999), but non-genetic factors are also considered to be important. Adverse life events, stress, or viral infections can increase the risk of developing depression, and the disorder is also prevalent in other medical conditions such as endocrine (relating to the glands that make and release hormones into the blood) and cardiovascular diseases, Parkinson's disease, head injuries, some cancers, asthma, diabetes, and stroke (Nestler 2002; WHO 2017). Lower levels of physical fitness have been observed in patient groups with depression (Martinsen 1989) and an association has been established between sedentary lifestyles and depression in both adults and adolescents (Buckworth 2002; Sund 2004).

Description of the topic

Physical activity is defined as any bodily movement produced by the contraction of skeletal muscle that increases energy expenditure above a basal level (Caspersen 1985). This includes walking, cycling, sports, and other active forms of recreation (e.g. dance, gardening, yoga, Tai Chi). Exercise, a subcategory of physical activity, is defined as planned, structured, and repetitive physical

activity that is aimed at improving or maintaining one or more components of physical fitness (Caspersen 1985; Garber 2011; US Dept of HHS 2008). Physical inactivity is a global problem, and understanding the reasons behind the motivation to be active forms part the WHO's 2018-2030 technical package to increase physical activity (WHO 2018); however, activity rates are much lower for people with depression and anxiety than for the general population (Martinsen 1989). Cross-sectional, community-based data from the World Health Survey established that the prevalence of low physical activity in those with and without anxiety was 22.9% versus 16.6% ($P < 0.001$) and that individuals engaging in low physical activity had 1.32 (95% CI = 1.17 to 1.47) times higher odds for anxiety than those with higher physical activity levels (Stubbs 2017). A systematic review and meta-analysis of physical activity and sedentary behaviour in people with major depressive disorder found that adults with MDD engaged in low levels of physical activity (SMD = -0.25, 95% CI = -0.03 to 0.15) and high levels of sedentary behaviour (SMD = 0.09, 95% CI = 0.01 to 0.18) compared with controls (Schuch 2017). Further exploration of the bidirectional relationship between anxiety and depression and physical activity is necessary (Azevedo Da Silva 2012), but it is clear that physical activity has the potential to play a role in both the prevention and treatment of mental health conditions whilst generating positive benefits for general physical health.

Physical activity is relatively easy to deliver in home-based, clinical, or community settings. It carries a relatively low risk of negative side effects (Wright 2009), although these can include addiction to physical activity, 'muscle dysmorphia', and associated risks with the use of anabolic-androgenic steroids, intense exercise and mood disturbances and overtraining syndrome (Peluso 2005). A number of methodological shortcomings in randomised controlled trials have made it difficult to assess how effective it is in a clinical setting (Krogh 2011), and two systematic reviews concluded that evidence was lacking for the optimum type, frequency, duration, and setting for effective interventions (Cooney 2014; Stanton 2014). Bailey and colleagues' systematic review of physical activity for treating depression in adolescents and young adults also drew similar conclusions but recommended that physical activity was a promising and acceptable intervention for this age group (Bailey 2018). A more recent meta-review informing the European Psychiatric Association (EPA) guidelines for physical activity did recommend, on the basis of good-quality evidence, that an intervention delivered 2 to 3 times per week of supervised aerobic and/or aerobic and resistance training of 45 to 60 minutes duration would achieve optimal outcomes and less attrition (Stubbs 2018). Studies evaluating the efficacy of physical activity interventions as treatment for anxiety or depression disorders, or both, generally find a reduction in anxiety or depressive symptoms (Carek 2011; Jayakody 2014), and that exercise may be as effective as antidepressant treatment (Stubbs 2018). The overall health benefits of being more active can also have a positive impact on quality of life and well-being. Physical activity is increasingly used in consultant, allied health professional, and general practitioner referrals as a treatment option or as a complementary therapy (Price 2018), and exercise referral schemes are outlined in public health guidance by NICE and recommended as treatment by the EPA (NICE 2014; Stubbs 2018).

Many factors can create barriers or facilitators in physical activity, and these can be increased for people experiencing anxiety and depression. Better understanding of what motivates or inhibits

individuals to be physically active could help practitioners to work more effectively with this client group (Wheeler 2018) and help to establish realistic exercise goals within a treatment programme (Ehrlich 2015; Young 2017). Although there is substantial evidence for the positive impact that physical activity has on mental health (Penedo 2005), some criticism has been levelled at the potential risk of bias, lack of control groups, and results from randomised controlled trials that are neither clinically nor statistically significant (Cooney 2014; Kvam 2016). However, more recent meta-reviews have reported more robust evidence of the benefits of physical activity for depression and anxiety (Ashdown-Franks 2019; Stubbs 2018).

This qualitative evidence synthesis (QES) will synthesise the qualitative evidence for the factors that create barriers or facilitators of physical activity for people with anxiety or depression and indicate what may help people with lived experience of these conditions to be more active in order to benefit their physical and mental health. This QES will complement another that will consider the facilitators and barriers for people with bipolar disorder (McCartan (in press)).

Why is it important to do this synthesis?

Very low levels of physical activity remain a public health concern. Understanding more about the factors that create barriers or facilitate physical activity could help inform the design and development of interventions to improve the physical and mental health of children, young people and adults with anxiety and depression. This QES will use the Health Belief Model (HBM) to examine these factors and outline what may help people with lived experience of anxiety or depression to be more physically active. The HBM is a theory of behaviour change developed to explain and help predict health-related behaviours, particularly related to the uptake of health services. The HBM has been used as a conceptual framework in health behaviour research since the 1950s to explore why people fail to participate in programmes designed to prevent and detect disease (Glanz 2010; Hochbaum 1958; Rosenstock 1960; Rosenstock 1974). It can help explain the change and maintenance of health-related behaviours and has been used as a guiding framework for many health-behaviour interventions (Jones 2014). This QES will examine how factors such as age, gender, class, ethnicity, mental health diagnosis and co-morbidities affect participation. It will consider people's perceptions about their physical and mental health needs and identify the barriers and facilitators to physical activity. It will also consider which cues influence people to take action. It will seek to understand why interventions work (or not), why people engage (or not) and how carers, service providers and health professionals view, support or influence treatment engagement.

A QES can help to identify the factors influencing the success of interventions including the attitudes and experiences of service users, their carers, service providers, and the health professionals involved in their care. A number of intervention effectiveness reviews have concluded that exercise is an acceptable intervention for anxiety and depression, drawing evidence from measures including treatment attendance/completion, self-esteem and quality of life scales, and adverse event metrics (Cooney 2014; Meekums 2015; Stubbs 2016), but this evidence tells us little about the motivations, barriers, and facilitators to engaging in physical activity. Meta-analyses have also explored factors associated with lower attrition, including interventions supervised

by physiotherapists or exercise physiologists, inpatient settings, those already taking antidepressant medication; however, we also know that people with anxiety and depression face a range of barriers to regular physical activity including higher depressive symptoms, higher body mass index (BMI), somatic comorbidities, and lower self-efficacy (Vancampfort 2015), and early dropout can be a particular problem (Cooper 2015). Firth and colleagues conducted a systematic review and meta-analysis of quantitative data on the motivating factors and barriers for exercise in serious mental illness (Firth 2016b), but less is known about findings from qualitative studies. Developing a more nuanced understanding of how accessible physical activity is for people with anxiety and depression could bring important knowledge to the design, development, and implementation of interventions. QES provides the opportunity to add rich and contextual data and contribute to the knowledge base to help understand why and how best to increase physical activity levels among people with anxiety and depression. It will provide qualitative evidence to complement the findings of two Cochrane Reviews that have investigated the effectiveness of [Exercise for depression](#) (Cooney 2014) and [Exercise in prevention and treatment of anxiety and depression among children and young people](#) (Larun 2006). These reviews concluded that exercise is moderately more effective than a control intervention for reducing symptoms of anxiety and depression, but the evidence is limited in both quantity and quality. A QES will provide greater insight exploring the lived experience of service users, carers, service providers, and practitioners to help highlight common beliefs, misconceptions and fears, and benefits of physical activity participation.

How the intervention might work

Physical activity has been shown to help prevent and reduce symptoms of anxiety and depression (Asmundson 2013; Martinsen 2008; Wright 2009), and has contributed to remission in some patients (Blumenthal 2007). Physical activity may help to alleviate symptoms in a number of different ways. It is hypothesised that it may stimulate the serotonergic system and increase feelings of well-being (Basso 2017), and can have a significant antidepressant effect (Josefsson 2014; Schuch 2016). It is often argued that physical activity results in positive neurobiological effects (e.g. increased levels of atrial natriuretic peptide (ANP) or brain natriuretic peptide (BNP)) and the release of endorphins, although evidence for this is lacking (Dishman 2009). The biological mechanisms are still not fully understood, but evidence points to a complex interaction of hormones, neurotrophines, inflammation biomarkers, oxidative stress, and cortical plasticity and activity (Schuch 2016). Physical activity can also boost mood in anxious or depressed patients by reducing fatigue (Herring 2011), improving sleep and helping with insomnia (Martiny 2012; Rethorst 2013). Being physically active can also contribute to physical changes (Bartels 2018), which in turn can increase self-esteem, improve feelings about body image and positive perceptions of oneself. Physical activity can help deliver positive social experiences (Carless 2008); group-based activities can extend social networks and support systems for people who may have felt isolated because of their illness and feelings of low self-worth. Being active has also been linked to increased ratings of quality of life, pleasure, and motivation (Carta 2008; Greer 2016; Stubbs 2018). Improvements in cognitive functioning have also been observed (Mandolesi 2018). Evidence has also been reported for the effectiveness of physical activity as an adjunct

to pharmacotherapy, [Carneiro 2015](#); [Kvam 2016](#), or therapeutic interventions such as cognitive behaviour therapy ([Hallgren 2016](#)).

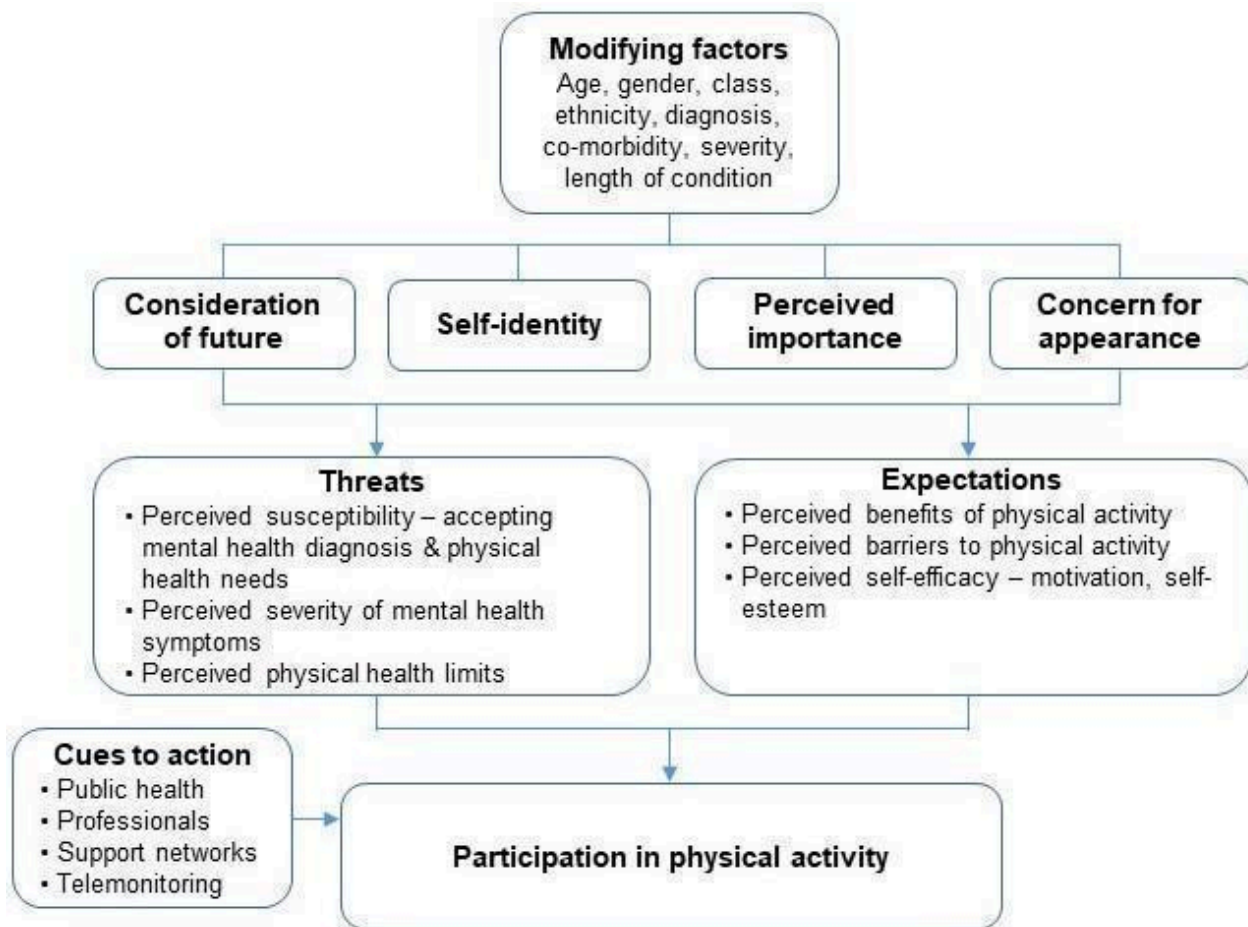
Increasing physical activity to prevent and treat anxiety and depression will often require specific behavioural changes (such as a decrease in sedentary behaviour and an increase in physical exertion). We want to understand how people with anxiety and depression adopt or reject positive physical activity behaviours. Applying a theoretical model of behaviour change can help understand the sequence of these mechanisms and identify what factors trigger positive change. This will identify which physical activity interventions are likely to be effective; to date, insufficient attention has been given to analysing behaviour change theories as a starting point for developing an intervention ([Johnston 2008](#)).

The Health Belief Model (HBM) consists of six key concepts that predict why people will take action to prevent, screen for, or control illness conditions ([Champion 2008](#)), and acknowledges the range of modifying variables such as demographic, socio-economic, and structural factors that may also influence behaviour. It has been validated in a range of domains and populations ([Carpenter 2010](#); [Janz 1984](#)). Although this model has its critics ([Orji 2012](#)), it can be a useful way to frame the barriers and facilitators for physical activity in anxiety and depression. The theoretical model identifies six domains that categorise the potential threats and expectations of a health behaviour and consider the cues or stimuli that will lead to action. Four additional domains were developed by Orji and colleagues to improve its predictive power ([Orji 2012](#)): concern for appearance, consideration of future consequences, perceived importance, and self-identity. The six key concepts are as follows.

1. **Perceived susceptibility:** the perceived risk of getting a condition or disease. This will include a person's awareness and acceptance of their mental health diagnosis and any comorbid physical health needs.
2. **Perceived severity:** the probability that a person will change their behaviour to avoid the consequence depends on how serious a condition they consider the consequence to be. How serious is the physical health condition when mental health is often the primary diagnosis? Does the service user understand the physical health risks associated with their mental health condition?
3. **Perceived benefits:** the perception of the good things that could result from participating in specific behaviours. What is in it for the participant? People do not want to give up something they enjoy if they do not get something in return.
4. **Perceived barriers:** the perception of the difficulties and costs of performing behaviours. This could relate to both intrinsic (shame, stigma, perceived lack of ability, lack of appropriate skills and knowledge) and extrinsic factors (cost, equipment, impact of medication, comorbid conditions).
5. **Cues to action:** exposure to factors that lead to action: public health messages, relationships with healthcare professionals, support from social/family systems, physical health checks, reminders, telemonitoring.
6. **Self-efficacy:** confidence in one's ability to take action. Low levels of motivation and self-esteem.

See [Figure 1](#).

Figure 1. Health Belief Model for participation in physical activity for people with anxiety and depression



Perceived susceptibility and severity of physical health problems

Perceptions about the susceptibility and severity of physical health problems in anxiety and depression may be affected by current healthcare delivery. People with severe and enduring mental health problems may not be aware of all of their physical health needs - these can be neglected (Fagiolini 2009; Kisely 2007; Mitchell 2009; Tidemalm 2008) and there are inequalities in access to, use and delivery of healthcare in this population (Lawrence 2010; de Hert 2013). People with severe mental illness are less likely to receive health promotion interventions and other forms of preventive care such as routine cancer screening (Naylor 2016) and smoking cessation treatments (Gilbody 2019).

Perceived benefits

Improvements in general physical health, fitness and body image and the psychological benefits of improved sleep, stress reduction, mood management and increased self-confidence have all been identified as perceived benefits (Firth 2016b). Positive feelings relating to a sense of achievement, acquiring new skills and developing mastery have also been cited in the literature (Carless 2008; Hodgson 2011; Wynaden 2012).

Perceived barriers

Many of the qualitative studies that consider the perceived barriers to engaging in physical activity cover intrinsic mechanisms that hinder involvement. These include low motivation or energy levels, which can often be symptomatic of an illness (Cole 2010; Firth 2016b), or sometimes a side effect of a particular medication or other health characteristics including high BMI or cigarette use. Psychological factors including embarrassment, poor perception of self, and guilt can also have a negative impact (Glowacki 2017), as well as general anxiety for social reasons, lack of experience, or perceived lack of ability or poor body image (Cole 2010; Firth 2016b). Some studies also consider the counter effects of exercise participation; where patients do not successfully initiate or maintain an exercise activity, this can negatively affect their self-esteem (Searle 2012). Patient expectations of the impact of raised activity levels may also need to be managed (Jones 2005). Physical activity may not have the desired affects for everyone; a review by Schuch and colleagues found that half of patients with mild depressive disorder did not respond to exercise (Schuch 2016). Other issues to consider relate to practical difficulties including navigating public transport, high cost, and having no one to accompany them (Wynaden 2012).

Cues to action

Cues to action such as having appropriate social support systems in place can help encourage people to become more active and can also have benefits beyond the intervention setting (Carless 2008);

they can also help tackle patients' motivation and anxiety that may have prevented them from engaging in the past. This can be achieved over the phone or by other means such as telemonitoring as well as by face-to-face contact (Argent 2018; Crone 2008; Searle 2014). Having someone to help familiarise them with the setting and activities at the start of a programme can also be of great value (Firth 2016b). Having peer support systems in place can help people engage (Firth 2016b; Oman 2003), and programmes that promote physical health, fitness, and body image outcomes can motivate involvement (Firth 2016b).

Self-efficacy

Higher levels of self-efficacy evident in people who are already physically active or involved in sport are more likely to benefit (Dishman 1985), as will people who have higher levels of self-esteem, perceived physical condition and body attractiveness.

OBJECTIVES

Main objective: To identify the factors that create barriers or facilitate physical activity for people with a diagnosis of anxiety or depression from the perspectives of service users, carers, service providers and practitioners to help inform the design and implementation of interventions that promote physical activity.

The overall aim of this review is to identify, appraise, and synthesise qualitative research evidence on the barriers and facilitators to engaging in physical activity in general lifestyle settings or as part of an intervention designed to increase physical activity for people with anxiety and depression. This will allow us to identify factors that create barriers and facilitators of physical activity in this population to inform the development, design, and implementation of future interventions. We will also integrate the findings from the QES with the two associated effectiveness reviews (Cooney 2014; Larun 2006). We will communicate our findings to public health commissioners and other stakeholders.

METHODS

Review author reflexivity

Throughout the data synthesis, the review authors will reflect on their own positions and assess how these could influence the study design, search strategy, inclusion decisions, data extraction, analysis and synthesis, and interpretation of the findings. We are aware of our own professional backgrounds, and one of the strengths of the team is the diversity of disciplines it includes (including advocacy, mental health social work, psychiatry, physiotherapy, service user participation, service delivery, sports psychology), alongside clinical or research experience, or both. The review authors have multiple perspectives, but all support the principle that being physically active can have benefits for both physical and mental well-being and that intervention design and implementation strategies should be sensitive to the needs and experiences of service users, carers, service providers, and healthcare professionals. Progress will be discussed regularly and decisions that are made will be explored critically. As lead author, CMcC will keep a reflexive journal throughout the process to document and reflect on progress and record discussions and decisions made. Stakeholder consultation will also provide additional opportunities to reflect on review author decisions.

Criteria for considering studies for this synthesis

Types of studies

This is a systematic review of qualitative primary studies designed to increase physical activity participation in order to reduce the symptoms of anxiety or depression (reduction in feelings of depression, anxiety). We will include primary studies that use qualitative study designs such as ethnography, phenomenology, case studies, grounded theory studies, and qualitative process evaluations. We will include studies that use both qualitative methods for data collection (e.g. focus group discussions, individual interviews, observation, diaries, document analysis, and open-ended survey questions) and qualitative methods for data analysis (e.g. thematic analysis, framework analysis, grounded theory). We will exclude studies that collect data using qualitative methods but do not analyse these data using qualitative analysis methods (e.g. open-ended survey questions where the response data are analysed using descriptive statistics only). We will include studies irrespective of their publication status and language of publication. Mixed-methods studies where qualitative findings can be extracted separately will also be included.

A second element to the synthesis will link findings from two effectiveness reviews to the QES and explore in more detail some of characteristics of the acceptability of interventions and effect on symptoms reported in Cochrane Reviews for depression and anxiety (Cooney 2014; Larun 2006). The review by Cooney and colleagues considered treatment adherence, completion, and quantitative ratings of quality of life and self-esteem, but also examined other barriers and facilitators. Both effectiveness reviews also reported changes in symptoms and adverse events. The findings from these two reviews will be integrated with the QES findings.

We will not exclude any studies based on our assessment of methodological limitations, but will utilise this information to assess our confidence in the synthesis findings.

Topic of interest

We will include studies that focus on the experiences and attitudes of service users, caregivers, service providers, and healthcare professionals towards physical activity for anxiety and depression. We will look for evidence of the factors that create barriers to or facilitate participation in physical activity. We will include all approaches to increasing physical activity, supervised or unsupervised, in individual or group settings for people with anxiety or depression for physical or mental health benefits. We will exclude yoga, Tai Chi, and other mind-body interventions because although these involve physical activity, the therapeutic benefits are theoretically derived from components of the intervention that are distinct from the physical activity itself. For instance, yoga is closely related to meditation and mindfulness, which share common practices and therapeutic principles grounded in religion/spirituality that may offer benefits distinct from a purely physical activity intervention (Breedvelt 2019).

Types of participants

We will include studies where the primary focus is the experience of children, young people or adults (there will be no age restrictions) with a primary clinical diagnosis (Diagnostic and Statistical Manual of Mental Disorders, 5th edition (DSM-5) (APA 2013)/International

Statistical Classification of Diseases and Related Health Problems, 10th Revision (ICD-10)(WHO 1992)) of depression (ICD-10 codes F32-39), anxiety or related disorders (ICD-10 codes F40-43, F93-94), their carers, service providers, and associated health professionals, as follows.

- Agoraphobia
- Generalised anxiety disorder (GAD)
- Panic disorder
- Selective mutism
- Separation anxiety
- Social anxiety disorder (SAnD)
- Social phobia
- Obsessive-compulsive disorder (OCD)
- Post-traumatic stress disorder (PTSD)
- Major depressive disorder (MDD)
- Seasonal affective disorder (SAD)
- Dysthymia
- Postnatal depression
- Specific phobias
- Treatment Resistant Depression (TRD)

OCD and PTSD, although no longer categorised as anxiety disorders under DSM-5 (Kupfer 2015), will be included. We will exclude mental health conditions that do not have a clinical diagnosis and age-related conditions (i.e. conditions or diseases that increase in incidence/prevalence with ageing such as dementia). We will include participants with other comorbid conditions such as cardiovascular disease, stroke, and diabetes or other mental health conditions as long as there is a primary diagnosis of depression or anxiety. We will include studies that provide qualitative evidence of the views and experiences of service users, carers, service providers, and healthcare professionals. Participants may be service users, paid (care assistants, home helps) or unpaid carers (including family members, friends), service providers (e.g. voluntary and community sector organisations delivering mental health services), and healthcare professionals (e.g. social workers, general practitioners, community mental health nurses, occupational therapists, physiotherapists, key workers, consultant psychiatrists).

Search methods for identification of studies

Electronic searches

We will develop search strategies for each database, using guidelines developed by the Cochrane Qualitative Research Methods Group, Harris 2008, for searching qualitative evidence as well as modified versions of the search developed for the two related effectiveness reviews, Cooney 2014; Larun 2006, plus other (more recent) systematic reviews and meta-analyses. We won't apply any restrictions on date, language or publication status to the searches.

Search terms

(i) Preliminary searches

Identifying search terms for the intervention, those which address the barriers and facilitators to enable people with anxiety or

depressive disorders to increase their levels of physical activity and/or start exercising are difficult to identify from scratch.

We will perform an initial search on the following databases:

- Ovid MEDLINE (1946 onwards) (Appendix 1);
- Ovid PsycINFO (all years).

The preliminary searches will be based on population (anxiety/depressive disorders) combined with broad, top-level terms for the intervention (*barriers/facilitators*) and a sensitive list of terms for outcome (*physical activity*).

Two review authors will screen the search results to identify relevant primary studies and reviews (quantitative and qualitative). The review authors will screen the bibliographic records, looking at the title words, author-assigned keywords, key phrases, search strings, and subject headings for the intervention. We will use these terms to enrich the remaining searches (and if necessary amend the preliminary MEDLINE/PsycINFO searches, as appropriate). We will also run a search for systematic reviews and meta-analyses of effectiveness reviews (targeting exercise for the treatment or prevention of affective disorders) and check the included studies for qualitative (follow-up) data.

(ii) Main searches

We will conduct additional searches of the following databases:

- Ovid Embase (1980 onwards);
- Wiley Cochrane Library (current issue);
- Web of Science Science Citation Index Expanded (SCIE) (all available years);
- Web of Science Social Science Citation Indexes (SSCI) (all available years);
- EBSCO Cumulative Index to Nursing and Allied Health Literature (CINAHL) (1980 onwards);
- ProQuest International Bibliography of the Social Sciences (IBSS) (1951 onwards);
- ProQuest Sociological Abstracts (1952 onwards);
- EBSCO SPORTDiscus (1982 onwards);
- NCBI PubMed NOT MEDLINE subset (all years).
- Social Policy and Practice

The additional searches will be based on the following structure: population (*anxiety/depressive disorders*) AND intervention (*barriers or facilitators*) AND outcome (*physical activity*) OR population and types of intervention 'enabling' exercise.

(iii) Searching other resources

We will check the reference lists of effectiveness studies included in intervention reviews in order to identify any qualitative studies that are linked to these studies.

We will contact the authors of included studies to clarify reported published information and to seek unpublished results/data. We will contact researchers with expertise relevant to the synthesis topic to request potentially eligible studies.

Once records have been screened and studies selected for inclusion, we will perform forward and backward citation searching. We will check the reference lists of all included

studies and relevant systematic reviews to identify additional studies missed from the original electronic searches (for example unpublished or in-press citations). We will use the Web of Science and Google Scholar to conduct forward citation searching. We will also perform cluster searching (Booth 2013) and use PubMed's related references feature.

(iv) Grey literature

We will conduct a grey literature (literature that is not published in sources such as books or journal articles) search to identify studies not indexed in the databases listed above.

- OpenGrey (www.opengrey.eu/)
- ProQuest Dissertations & Theses Global
- DART-Europe E-theses Portal (www.dart-europe.eu/)
- EThOS - the British Library's e-theses online service (ethos.bl.uk/)
- Open Access Theses and Dissertations (oatd.org)

Stakeholder involvement

Stakeholders will be involved before, during, and after the review. We will draw on the expertise of an Advisory Group of people with lived experience and professionals working in the area who will be involved in the problem-framing stage, and who will be consulted to expand the search to include grey literature, relevant websites, and regarding knowledge of programmes that have been delivered.

Data collection, management, and synthesis

Selection of studies

Records identified from different sources will be imported into EndNote and duplicates removed (EndNote 2019). Two review authors from a team of six (JB, PB, GD, CMcC, PW, JY) will independently screen the title and abstracts of the retrieved records to determine their potential eligibility. We will retrieve the full text of all papers identified as potentially relevant by one or both review authors. Two review authors will then independently assess these papers for inclusion in the review. Any disagreements will be resolved via discussion or by seeking a third review author's opinion when necessary. Where appropriate, we will contact the study authors for further information. We will include any qualitative 'sibling' studies from the two relevant effectiveness reviews (Cooney 2014; Larun 2006), and link factors that created barriers or facilitators using subgroup analysis where possible (Noyes 2016).

We will include a table listing the studies excluded from our synthesis at the full-text stage and the main reasons for exclusion.

Where the same study, using the same sample and methods, is presented in different reports, we will collate these reports so that each study, rather than each report, is the unit of interest in the review.

We will include a PRISMA flow diagram illustrating our search results and the process of screening and selecting studies for inclusion.

Translation of languages other than English

For papers that are published in a language not understood by the review authors (i.e. languages other than Dutch, French, German,

Italian, Portuguese, and Spanish), the abstract will be subject to initial translation through open source software (Google Translate). If this indicates inclusion, or if the translation is inadequate to permit a decision, we will ask members of the multilingual networks associated with the research teams of the review to translate the full text. If this cannot be done, we will categorise the study as 'awaiting classification' to ensure transparency in the review process.

Sampling of studies

We will select a sample of studies if more than 40 studies are eligible for inclusion. We will use a purposive sampling approach and apply maximum variation sampling with the aim of extracting the broadest possible variation within the eligible studies (Patton 2002). This approach has been demonstrated successfully in two other QES reviews (Ames 2017; Karimi-Shahanjari 2019), and can help deal with large quantities of data that could potentially impair the quality of analysis (Glenton 2013). Included studies will be selected based on their direct relevance and which address the contextual factors important for the review question including the perspective, population, the phenomenon of interest and the setting. We will also apply the GRADE-CERQual guidance to assess the contextual factors and relevance of the evidence to inform the sampling of studies (Noyes 2018).

Data extraction

Two review authors from a team of four (GD, CMcC, JY, PW) will independently extract data from each included study using a data extraction form (see Appendix 2). The relevance of the research will be assessed using GRADECERQual. The data extraction template is based on the HBM, which includes specific information about: modifying factors (age, gender, socio-economic status, ethnicity, diagnosis, comorbidity, severity or length of condition); perceived seriousness and susceptibility (consideration of future, self-identity, perceived importance, concern for appearance); threats; expectations; cues to action; and outcomes relating to participation in physical activity. Any theoretical frameworks used to analyse the data will also be recorded. Where additional themes are identified, these will be discussed by the review team. We will also extract additional contextual and methodological information from the included studies detailing information about the country, study design, setting, population, participants, and a description of the intervention (if delivered) (logic model, number, frequency and duration of sessions). We will record methods used to identify and recruit the sample, data collection and analysis, relevant quantitative findings, supporting quotations, conclusions, and any relevant tables, figures, or images. We will agree a priori framework using the Template for Intervention Description and Replication (TIDierR) checklist and guide (Hoffman 2014) and data will be coded from the included studies against this framework. Any disagreements will be resolved by discussion or by seeking the views of a third review author when necessary.

Data synthesis

We will use an adapted version of the HBM (Figure 1) as a basis for a 'best fit' framework synthesis (BFFS) approach to analyse and synthesise qualitative evidence (Booth 2015; Booth 2016; Carroll 2013). The HBM has been used to explore health beliefs and physical activity in a range of populations, Gristwood 2011; Hosseini 2017; Kasser 2012, and informed the development of physical activity interventions (Shao 2018). The selection of the

HBM drew on the Cochrane Methods guidance for selecting a theory for complex intervention reviews (Noyes 2015); the model has the ability to consider complex interventions and has been validated and used in other systematic reviews. The review team are also familiar with its application.

We chose the BFFS approach because it can be useful for designers of interventions, policymakers, and practitioners and is capable of describing and interpreting what is happening in a particular setting using a pragmatic approach to integrating data and engaging with existing theory (Booth 2016). It can be used to analyse and synthesise both primary and secondary data and to integrate quantitative and qualitative data (Booth 2015). However, should we deem the BFFS approach unsuitable as we begin to extract and code the data, we will use an alternative inductive thematic synthesis approach (Thomas 2008). BFFS requires the preliminary identification of a priori themes in order to map data from studies. Where any relevant data do not translate into the pre-existing constructs of the HBM, additional themes will be created as needed based on the emerging data. We will tailor the theoretical model to develop a 'best fit' theory (Noyes 2015). The HBM will provide a basis for the synthesis but will be "built-upon, expanded upon, reduced or added to by these new data" as described by Carroll and colleagues (Carroll 2011, p.4). Data extraction and categorisation or coding of data will be discussed and agreed upon by the team at regular intervals. How modifying factors such as gender, race, and age affect participation will be discussed regularly to build the framework model. The BFFS approach will test the a priori framework and re-test it using sensitivity analysis to explore how different modifying factors such as gender, race, age, and study quality affect the interpretation of the data (Booth 2015). It will also be important to capture the range of different perspectives (service user, carer, service provider, health professional) and assess whether an alternative explanation of engagement or non-engagement in physical activity is presented in the data, and add this to the final model if appropriate. A consensus will be reached on the final list of themes.

The BFFS follows seven steps of synthesis, as follows:

1. identify a clearly formulated review question;
2. (a) systematically identify relevant primary research studies; and (b) identify relevant ('best fit') publications of frameworks, conceptual models, or theories (e.g. HBM). We intend to use the HBM as our 'best fit' framework. If this is not usable during data extraction, we will seek an alternative approach;
3. (a) extract data on study characteristics from the included studies and appraise the quality of studies; and b) generate the a priori framework from the modified HBM based on the thematic analysis of the identified publication(s). We will extract data using a data extraction form. We will appraise study quality using the Critical Appraisals Skills Programme (CASP) tool. We will generate an a priori framework from the analysis;
4. code evidence from the included studies against the a priori framework;
5. create new themes by performing secondary thematic analysis or thematic synthesis on any evidence that cannot be coded against the framework;
6. produce a new framework composed of a priori and new themes supported by the evidence; and

7. revisit evidence to explore relationships between themes or concepts, thus creating a model. 'Test' this synthesis and model by exploring the issues of dissonance and the impact of variables such as quality.

We will develop a 'Summary of qualitative findings' table from the synthesised findings once data extraction and analyses are completed.

Assessment of the methodological limitations in included studies

Two or more review authors (GD, CMcC, PW, JY) will independently assess methodological limitations for each study using the CASP Qualitative Checklist (www.casp-uk.net) to appraise the quality of the included studies and the GRADE-CERQual. For studies where information is unclear or missing from reports, we will attempt to contact the authors for further clarification. Any disagreements between review authors will be resolved through discussion or by involving a third review author (PB, JF). We will assess methodological limitations according to the following domains.

- Are the results valid?
- Is a qualitative methodology appropriate?
- Was the research design appropriate to address the aims of the research?
- Was the recruitment strategy appropriate to the aims of the research?
- Were the data collected in a way that addressed the research issue?
- Has the relationship between researcher and participants been adequately considered?
- Have ethical issues been taken into consideration?
- Was the data analysis sufficiently rigorous?
- Is there a clear statement of findings?
- How valuable is the research?

We will report our assessment of methodological limitations for each study in the 'Characteristics of included studies' tables. A further assessment of methodological limitations of the body of data supporting each review finding will also be reported (Munthe-Kaas 2018).

Assessment of heterogeneity

A QES can be a valuable way of investigating the reasons why an intervention is effective (or not). Sensitivity analyses in the linked effectiveness reviews looked at intervention type and dose. We will also consider the variability in theory of change, outcomes, study designs, populations, interventions, and settings based on the available evidence. We will address clinical and methodological heterogeneity by including explicit and detailed methods for the identification, selection, and rating of the quality of individual studies and overall evidence. The 'best fit' framework analysis approach is more likely to make heterogeneity between studies and issues of quality appraisal more transparent (Barnett-Page 2009).

Assessment of confidence in the synthesis findings

We will use the CERQual (Confidence in the Evidence from Reviews of Qualitative research) approach to assess our confidence in the review findings (Colvin 2013; Glenton 2013; Lewin 2018; Munthe-Kaas 2018; Noyes 2018). This approach, building on the

GRADE approach and the Cochrane tool for assessing risk of bias (GRADE Working Group 2004; Higgins 2017), is becoming the standard to assess confidence in the findings from qualitative evidence syntheses (Ames 2017; Bohren 2017; Colvin 2013; Munabi-Babigumira 2017). Four review authors (GD, CMcC, JY, PW) will independently assess the included studies. Any disagreements will be discussed amongst review authors and an additional review author (PB, JF) consulted if necessary. The CERQual approach assesses the following four concepts (Lewin 2018).

1. **Methodological limitations of included studies:** the extent to which there are concerns about the design or conduct of the primary studies that contributed evidence to an individual review finding. Confidence in a finding may be lowered by substantial methodological limitations.
2. **Coherence of the review finding:** an assessment of how clear and cogent the fit is between the data from the primary studies and the review finding that synthesises the data. 'Cogent' refers to a well-supported or compelling fit. Variations in data across the included studies without convincing and cogent explanations may lower the confidence in a review finding.
3. **Adequacy of the data contributing to a review finding:** an overall determination of the degree of richness and quantity of data supporting a review finding. Confidence in a finding may be lowered if a finding is supported by results from only one or a few of the included studies, or when the data supporting a finding are very thin.
4. **Relevance of the included studies to the review question:** the extent to which the body of evidence from the primary studies supporting a review finding is applicable to the context (perspective or population, phenomenon of interest, setting) specified in the review question. Confidence in a finding may be lowered when contextual issues in a primary study used to support a review finding are different to the context of the review question.

After assessing each of the four components, we will make a judgement about the overall confidence in the evidence supporting the review finding. We will judge confidence as high, moderate, low, or very low. The final assessment will be based on consensus amongst the review authors. All findings start as high confidence and will be graded down if there are important concerns regarding any of the CERQual components.

'Summary of qualitative findings' table

We will present the findings in a 'Summary of qualitative findings' table, which will include an assessment of confidence in the evidence, as well as an explanation of this assessment, based on the GRADE-CERQual approach (Lewin 2018).

Linking the synthesised qualitative findings to a Cochrane Intervention review

We will use the findings from the qualitative synthesis and combine these with findings from the two effectiveness reviews

using a synthesis matrix outlining the barriers, facilitators, and implied recommendations against the actual interventions that have been implemented and evaluated, as described by Thomas and colleagues (Thomas 2004). We will draw on the original interventions in the included trials to see if any of them match recommendations emerging from the qualitative synthesis including the following.

- Which interventions match recommendations derived from views and experiences of service users, carers, service providers, or health professionals?
- Which recommendations have yet to be tried in soundly evaluated interventions?
- Do those interventions that match recommendations show bigger effect sizes or explain heterogeneity?

This information will be used to assess whether there is good-quality effectiveness evidence from trials and to identify gaps in the evidence. The interventions that have not been evaluated well but are identified as building on a potential facilitator will be recommended for more rigorous evaluation.

ACKNOWLEDGEMENTS

This review will inform research funded by the Disability Research on Independent Living and Learning (DRILL), which will involve the development of a co-produced physical activity intervention for people with lived experience of severe and enduring mental illness. CMcC was funded for 0.5 days per week over a three-month period to develop this protocol.

We thank the Cochrane Qualitative & Implementation Methods Group for providing guidance during protocol development; and the editorial team of the Cochrane Common Mental Disorders (CCMD) Group including Sarah Dawson (Information Specialist) who helped develop the search strategies, Jessica Hendon and Sarah Hetrick.

The authors and the CCMD Editorial Team, are grateful to the peer reviewers for their time and comments including: Alan Bailey, Karen Morley, and Jane Noyes. They would also like to thank copy editor, Lisa Winer.

Cochrane Group funding acknowledgement: The National Institute for Health Research (NIHR) is the largest single funder of the Cochrane Common Mental Disorders Group.

Disclaimer: The views and opinions expressed herein are those of the authors and do not necessarily reflect those of the NIHR, National Health Service (NHS), or the Department of Health and Social Care.

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APPENDICES
Appendix 1. MEDLINE search
Ovid MEDLINE(R) and Epub Ahead of Print, In-Process & Other Non-Indexed Citations and Daily (1946 onwards)

1. anxiety disorders/ or agoraphobia/ or anxiety, separation/ or neurocirculatory asthenia/ or neurotic disorders/ or obsessive-compulsive disorder/ or hoarding disorder/ or panic disorder/ or phobia, social/
2. (anxiety disorder? or ADNOS or agoraphobi* or general* anxi* or GAD or separation anxiety or neurocirculatory asthenia or neurotic disorder? or obsessive compulsive or OCD or hoarding disorder? or panic or phobi* or (social* adj2 (anxi* or fear)) or mute? or mutism or (school adj2 (fear or refusal))).ti,ab,kf.
3. (anxi* adj2 (adult* or infant? or child* or adolesc* or p?ediatric* or teen* or young* or youth or school? or preschool* or middle age? or old age? or elder* or geriatri* or late* life)).ti,ab,kf.
4. (anxiety adj5 (autism or autistic)).ti,ab,kf.
5. anxiety.mp. and (child development disorders, pervasive/ or autism spectrum disorder/ or autistic disorder/)
6. anxiety.ti.
7. exp phobic disorders/
8. (aerophobi* or acrophobi* or arachnophobi* or claustrophobi* or cynophobi* or mysophobi* or ophidiophobi* or (fear adj2 (flying or flights or height? or spider? or snake? or dog? or ((small or restrict*) adj space?) or germ? or bacteri* or contaminat*))).ti,ab,kf.
9. (dentophobi* or h?emophobi* or trypanophobi* or aichmophobi* or (fear adj2 (dental or dentist? or blood* or injection? or needle?))).ti,ab,kf.
10. "trauma and stressor related disorders"/ or adjustment disorders/ or stress disorders, traumatic/ or combat disorders/ or psychological trauma/ or stress disorders, post-traumatic/ or stress disorders, traumatic, acute/
11. (acute stress or traumatic stress or (stress adj2 disorder?) or adjustment disorder? or combat disorder? or (psychological adj1 trauma* or (posttrauma* adj1 stress*) or (post trauma* adj1 stress*) or PTSD).ti,ab,kf.
12. Mood Disorders/
13. depression/ or depressive disorder/ or depressive disorder, major/ or dysthymic disorder/
14. (depress* adj3 (acute or clinical* or diagnos* or disorder* or major or unipolar or illness or scale* or score* or adult* or infant* or child* or adolesc* or p?ediatric* or teen* or young or youth? or middle age? or old age? or elder* or geriatri* or late* life or patient* or participant* or people or inpatient* or in-patient* or outpatient* or out-patient*)).ab.
15. (depress* and (Beck* or BDI* or DSM* or (Statistical Manual adj2 Mental Disorders) or Hamilton or HAM-D or HAMD or MADRS or (International Classification adj2 Disease?) or ICD-10 or ICD-9)).ab.
16. "with depressi*".ab.
17. dysthymi*.ti,ab,kf.
18. (depress* or mood).ti,kf.
19. Seasonal Affective Disorder/
20. (seasonal affective disorder* or ((seasonal* or winter) adj3 (depress* or mood* or affective disorder* or affective symptom*)) or SIGH-SAD).ti,ab,kf
21. Depressive Disorder, Treatment-Resistant/
22. (depress* adj3 (refractor* or resistan* or chronic* or persist* or relaps* or recurr*)).ti,ab,kf.
23. Depression, Postpartum/

24. ((postpartum* or post partum* or postnatal* or post natal* or perinatal* or peri natal* or puerp* or intrapartum* or intra partum* or antepartum* or ante partum* or antenatal* or ante natal* or prenatal* or pre natal*) adj3 (depress* or adjustment disorder* or mood disorder* or affective disorder* or affective symptom*)).ti,ab,kf.
25. *mental disorders/
26. mental health/
27. *mentally ill persons/
28. (mental* adj2 (disorder? or health* or ill*)).ti.
29. or/1-28
30. ((access* or attitude? or barrier? or obstacle? or facilitat* or motiv* or preference? or predict*) adj3 (exercis* or (physical* adj (activit* or fit* or health)) or games or sport*)).ti,ab,kf.
31. (access* or attitude? or barrier? or obstacle? or facilitat* or motiv* or preference?).ti.
32. *Life Style/ or Healthy Lifestyle/ or *Health Behavior/ or Sedentary Behavior/
33. (health promotion or lifestyle intervention? or (promot* adj2 health*)).ti,ab,kf,sh.
34. Motivation/
35. or/31-34
36. exp Exercise/
37. Exercise Therapy/
38. Physical Exertion/
39. Physical Fitness/
40. Leisure Activities/
41. exp Recreation/
42. exp Sports/
43. (exercise or games or sport? or sporting or ((leisure or recreation*) adj activ*)).ti,ab,kf.
44. (running or jogging or hopping or skipping or sprinting or park run? or treadmill? or treadmill?).ti,ab,kf.
45. (hiking or tramping or mountaineer*).ti,ab,kf,hw.
46. (skiing? or snowboarding or snow boarding or iceskat* or ice skat* or skating).ti,ab,kf,hw.
47. bicycling.sh. or (bike? or biking or bicycl* or ((recreational or distance) adj cycling)).ti,ab,kf.
48. (water sports or ((aqua* or water) adj (activit* or fit*)) or swimming or sailing or boating or yachting or canoeing or kayaking or surfing or sailboard* or sail board*).ti,ab,kf,hw.
49. (team game? or football* or rugby or cricket or rounders or baseball or netball or volleyball or tennis or squash or badminton).ti,ab,kf,hw.
50. (physical adj (activit* or conditioning or training)).ti,ab,kf.
51. ((weight? adj1 (lift* or train*)) or ((strength or resistance) adj training)).ti,ab,kf.
52. exercise movement techniques/ or breathing exercises/ or qigong/ or dance therapy/ or tai ji/ or yoga/ or kinesiology/
53. (qigong or qi gong or ch'i kung or Tai Chi or Taiji or Tai Chi Chuan or Taichi Quan or Taijiquan or Shadowboxing or Shadow Boxing or Tai Chi Chih or T'ai Chi Chuan or yoga or yogic or pilates or kinesiology).ti,ab,kf,ot.
54. ((moderate* or graded) adj2 activit*).ti,ab,kf.
55. (aerobics or keep* fit or fitness training).ti,ab,kf.

- 56. (walking or walks or pedometer* or fitbit? or fit bit? or ((fitness or activit*) adj track*) or (steps adj2 (count* or track* or monitor*))).ti,ab,kf.
- 57. (ballet or dance or dancing or salsa or zumba).ti,ab,kf.
- 58. (gardening or horticultur* or allotment* or ((nature or animal) adj2 therap*)).ti,ab,kf,hw.
- 59. Fitness Trackers/
- 60. "Physical Education and Training"/
- 61. fitness centers/
- 62. (gymnasium? or ((fitness or leisure or wellness) adj (cent* or facility or facilities))).ti,ab,kf.
- 63. ((activity adj2 (amount* or increas* or level? or measur* or monitor*)) not (drug activity or active drug?)).ti.
- 64. (health promotion or lifestyle intervention?).ti,ab,kf,sh.
- 65. or/36-64
- 66. 29 and 30
- 67. 29 and 35 and 65
- 68. 66 or 67
- 69. exp animals/ not humans.sh.
- 70. (mice or mouse or murine or rat or rats or rodent*).ti,kf.
- 71. 68 not (69 or 70)

Appendix 2. Data extraction template

Data extraction template – qualitative synthesis

Background Information
Author
Micro context: population (any specific characteristics, perspectives or subgroups?)
Micro context: setting (setting e.g. hospital, private provider, timeframe of interest)
Micro context: place (geographical location, political system e.g state-funded health-care)
Meso-context: intervention (description of intervention, recruitment, dose, duration, delivery)
Macro-context (policy, political issues, social climate or legislation)

(Continued)

Data collection methods

(e.g. focus group, face to face interviews, observation)

Theory of change/logic model

Data analysis methods

e.g. thematic analysis, grounded theory

Relevant quantitative findings

Purposive sampling category

<i>Popula- tion</i>	<i>Diagnosis</i>	<i>Methods</i>	<i>Interven- tion</i>	<i>Quality</i>
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Participants

Sample size

Perspective

Service users, carers, service providers, health professionals

<i>Service users</i>	<i>Carers</i>	<i>Service providers</i>	<i>Health professionals</i>
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Modifying factors

(for each participant category viewpoint: service user, carers, service providers, health professionals)

Age

Gender

Socio-economic status (SES)

Ethnicity

Place of residence

Occupation

Education

Social capital

Primary diagnosis

Anxiety Disorder

Depression

(list specific diagnosis)

Co-morbidity

Severity

Length of condition

Perceived seriousness & susceptibility

(Continued)

Consideration of future

Self-identity

Perceived importance

Concern for appearance

Other perceptions of seriousness & susceptibility

Threats

Perceived susceptibility – accepting mental health

diagnosis & physical health needs

Perceived severity of mental health symptoms

Perceived physical health limits

Other threats

Expectations

Perceived benefits of physical activity

Perceived barriers to physical activity

Perceived self-efficacy – motivation, self-esteem

Other expectations

Cues to Action

Public health messages

Professionals

Support networks

Telemonitoring

Other

Outcomes

Participation in physical activity

Additional themes

(Continued)

CONTRIBUTIONS OF AUTHORS

CMcC and JY conducted the initial literature review to prepare the protocol. JB, RC, GD and SG advised on the scope of the protocol. JB liaised with DRILL to request funding support. CMcC drafted the protocol. PB, GD, JF, BS, MT, PW and CW provided feedback on the protocol.

DECLARATIONS OF INTEREST

Claire J McCartan: no conflicts of interest

Jade Yap: no conflicts of interest

Paul Best: no conflicts of interest

Joseph Firth: is supported by a National Institute of Complementary Medicine (NICM) and Blackmores Institute Fellowship.

Mark A Tully: no conflicts of interest

Paul Webb: no conflicts of interest

Chris White: no conflicts of interest

Simon Gilbody: no conflicts of interest

Brendon Stubbs: no conflicts of interest

Rachel Churchill: leads and has responsibility for Cochrane Common Mental Disorders, which has supported parts of the review process and is largely funded by a grant from the National Institute for Health Research (NIHR) in the UK.

Josefien Breedvelt: no conflicts of interest

Gavin Davidson: is employed as the Praxis Chair of Social Care at Queen's University Belfast. This position is part funded by Praxis Care, a mental health service provider.

SOURCES OF SUPPORT

Internal sources

- Queen's University Belfast, UK.
- University of York, UK.

External sources

- Disability Research on Independent Living and Learning (DRILL), UK.

Funding was provided for CMcC's salary for 0.5 days per week over a three-month period to help complete this protocol.

- National Institute of Complementary Medicine (NICM) and Blackmores Institute, Australia.

JF is supported by a NICM-Blackmores Institute Fellowship

- Praxis Care, UK.

GD's post at Queen's University Belfast is part funded by Praxis Care