

Physical health interventions for patients who have experienced a first episode of psychosis: a narrative review

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Objectives: Service users with severe psychiatric illnesses, such as schizophrenia, major depressive disorder and bipolar disorder, are more likely to suffer from ill health. There is evidence that lifestyle interventions, for example, exercise, dietary advice and smoking cessation programmes for service users with severe mental illness can be of health benefit. This review was carried out to identify the literature pertaining to physical health interventions for service users who have experienced a first-episode psychosis (FEP), to examine the nature of the interventions which were carried out and to assess these interventions in terms of feasibility and efficacy.

Methods: A narrative review was conducted in August 2019 by searching 'Pubmed' and 'Embase' electronic databases. Studies investigating the effect a physical health intervention had on service users who had experienced a FEP were included in the review.

Results: Fifteen studies met inclusion criteria: 12 quantitative studies and 3 qualitative. Exercise, dietary advice, smoking cessation and motivational coaching were some of the physical health interventions utilised in the identified studies. Positive effects were seen in terms of physical health markers wherever they were investigated, particularly when the intervention was delivered *early*. The impact on psychiatric symptoms and longer-term impacts on health were less frequently assessed.

Conclusions: Physical health interventions have a positive impact on service users who have experienced a FEP. More research is warranted in this area in Ireland. These studies should include controls, have longer follow-up periods and should assess the impact on psychiatric health.

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Introduction

Background

Service users with severe psychiatric illnesses, such as schizophrenia, major depressive disorder and bipolar disorder, are more likely to suffer from ill health. They are at a higher risk of developing several metabolic problems. The rate of mortality is approximately 2–3 times that of someone with no health issues and their life expectancy is approximately 13–30 years shorter (De Hart *et al.* 2011). The reasons for this are multifaceted, including but not limited to antipsychotic medications, unequal access to services, higher rates of inactivity, higher rates of smoking and substance abuse. Antipsychotic medications are used as first-line treatment in this service user cohort. They are associated with metabolic side effects, such as rapid weight gain, increased appetite and lethargy

(Foley and Morley 2011). Studies also suggest that service users suffering from severe mental illnesses are more than twice as likely to develop diabetes than the general population (Vancampfort *et al.* 2015). Though some of the reasons for reduced health in this cohort is the use of such pharmacological interventions, there is increasing evidence suggesting that modifiable risk also contributes significantly. These service users report a more sedentary lifestyle compared to the general population (Stubbs *et al.* 2016) and also report lower levels of physical activity (WHO 2017). In fact, people with first-episode psychosis (FEP) are at an increased risk of developing diabetes independent of antipsychotic medication treatment (Pillinger *et al.* 2017) and are more likely to suffer from dyslipidaemia even in the absence of treatment with antipsychotics (Kolenic *et al.* 2018). As well as this, smoking is more prevalent in service users with schizophrenia and FEP compared to the general population, where rates are 70–80% and 25–30%, respectively (De Leon *et al.* 2002). Lifestyle modifications

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may play a role in reducing these health issues as well increasing this cohort's worryingly low life expectancy.

Considerable literature has highlighted the benefits of exercise interventions (Naslund *et al.* 2016), dietary advice (Teasdale *et al.* 2019a) and smoking cessation programmes (Ashton *et al.* 2013) for service users with severe mental illness. Since that literature has been published, it has been understood that the earlier you intervene after a FEP, the better the long-term clinical outcomes are likely to be McGorry *et al.* (2008). It therefore stands to reason that the impacts of these lifestyle interventions are greatest delivered early in the course of illness.

A number of literature reviews have looked at a variety of lifestyle interventions for service users who have schizophrenia or other serious mental illness (Firth *et al.* 2015; Teasdale *et al.* 2017). However, few have focused solely on people who have experienced a FEP. Furthermore, previous reviews have mainly explored the impact that one lifestyle intervention has on mental health, for example, smoking cessation or nutritional advice. This review is different as it sets out to identify all studies which explored the impact of a lifestyle intervention on the health of people with a FEP.

Rationale for review

In Ireland, Early Intervention in Psychosis (EIP) is one of the National Clinical Programmes in the Health Service Executive (HSE). The EIP 'Model of Care' was launched by the Minister for Mental Health and Older People in June 2019 (HSE 2019). Developed in collaboration with the College of Psychiatrists of Ireland, the Model of Care provides a blueprint for the development of EIP services nationally for everyone (aged 14–65 years). A core tenant of the EIP Model of Care is an increased focus from the outset on physical health. Responsive Early Intervention for Psychosis Service (RISE) in Cork is one of three demonstration sites in Ireland for EIP. The RISE service was launched in May 2019 and is developing an evidence-based physical health and lifestyle intervention for people with a FEP. The research question was designed to support a broad-based physical health and lifestyle intervention programme specifically for FEP. The Lancet Psychiatry Commission reported that the poor physical health of people with mental illness is a multifaceted, transdiagnostic, and global problem. People with mental illness have an increased risk of physical disease, as well as reduced access to adequate health care. As a result, physical health disparities are observed across the entire spectrum of mental illnesses in low-income, middle-income, and high-income countries (Firth *et al.* 2019).

In this narrative review, we set out to explore what physical health and lifestyle interventions have demonstrated efficacy in improving health outcomes in people experiencing a FEP.

Objectives

The objectives of this review are

1. To identify the published literature on physical health and lifestyle interventions for service users who have suffered FEP.
2. To explore the nature of these interventions, for example, dietary advice, exercise and smoking cessation.
3. To assess the feasibility of lifestyle interventions in FEP.
4. To assess the impact these interventions have on physical and mental health.

Methods

Search strategy

Electronic database searches were performed on 'PubMed' and 'Embase' to identify literature which addressed the research objective. Articles were identified on 'PubMed' using the following search terms: 'Lifestyle intervention' OR 'Physical health intervention' AND 'First Episode Psychosis'. Articles were identified on 'Embase' using the following search terms: 'Lifestyle intervention' OR 'Physical health intervention' AND 'First Episode Psychosis'.

The 'Embase' search excluded the 'Pubmed' database and so accounts for the small number of duplicates identified. The search was restricted to papers published in the English language only. There was no cut-off date included in the search.

The search was carried out on 8 August, 2019.

Inclusion criteria

Studies were included if:

1. There was a physical health intervention or lifestyle intervention implemented. Studies were not included if they focused primarily on a medical issue with a pharmacological intervention.
2. The cohort of service users was exclusively service users with FEP.
3. The paper was published in English

Exclusion criteria

Studies were excluded if:

1. The paper found was a systematic review or meta-analysis.
2. The paper was a narrative review.

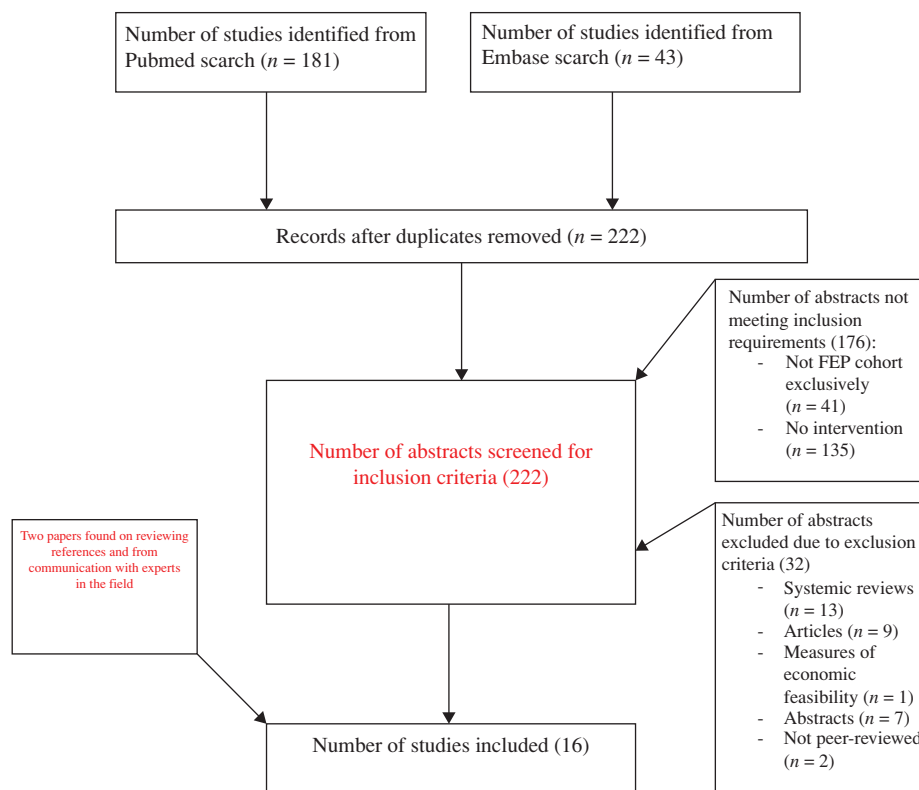


Fig. 1. Flowchart describing identification of papers for inclusion in the analysis.

3. The study looked at the economic feasibility of the study.
4. The studies found were abstract submissions.
5. The studies found were not published in peer-reviewed journals.

The above papers and the references lists were then reviewed and any further papers that were deemed suitable for inclusion were included.

Results

Introduction

A total of 181 articles were identified on 'PubMed' and a total of 43 articles were identified on 'Embase'. In total, 224 papers were found between the two searches. Two duplicates were removed. Then, 176 were removed as they did not meet inclusion criteria and 32 were removed as they met exclusion criteria. This left 14 papers. Two additional papers were included upon review of reference lists and upon recommendations from experts in the field leaving a total of 16 papers. See Fig. 1 and Table 1.

Of these 16 papers, 3 were qualitative and 13 quantitative studies. Of the 13 quantitative studies, there were 7 non-controlled interventional studies, 4 randomised control trials, 1 prospective controlled trial and

1 closed-loop audit. There were 12 original studies, with 2 of these having follow-up qualitative articles (Firth *et al.* 2016b; Pedley *et al.*, 2018). One randomized control trial (RCT) had a longer-term 6-month follow-up after an initial 10-week RCT (Firth *et al.* 2016c). One qualitative article included in the review (Larsen *et al.* 2019) stemmed from an unpublished RCT (Clinicaltrials.gov. 2019) which was not included.

The largest study was an RCT carried out in Italy ($n = 326$). This study had 169 in the treatment group and 157 controls (Bonfioli *et al.* 2017). The smallest study identified was a qualitative study carried out in Denmark ($n = 9$) (Larsen *et al.* 2019). It looked at service users' experiences of the Copenhagen OPUS trial, a physical health randomised control trial which was also carried out in Denmark (Clinicaltrials.gov. 2019). The results of the initial study have not yet been published and so this was not included in the review. However, the results of a qualitative follow-up study stemming from the initial study have been published and these are included in the review (Larsen *et al.* 2019).

Five were carried out in the UK, four in Australia, two in Sweden and one in each of Italy, New Zealand, Denmark, Hong Kong and Canada. The majority of these studies had age limits applied to them and focused on younger demographics. Eight studies had a lower age limit of 18 years old with seven studies

Table 1. Summary of studies included in the review

Design	Intervention and control	Number of participants (intervention/control)	Duration of intervention	Timing of assessments	Results
Firth <i>et al.</i> (2016 a)	RCT Ninety minutes of moderate-to-vigorous exercise per week.	31/7	10 weeks	Baseline and at 10 weeks	- Recruitment was 94%. Retention was 81%. PANSS scores in the intervention group reduced by 13 points. Physical health measures, depression, anxiety or social functioning were unchanged.
Hallgren <i>et al.</i> (2018)	Open-label, intervention study Up to three supervised training classes per week	91	12 weeks	Baseline and at 12 weeks	- Improvements noted in processing speed, visual learning and visual attention with small-to-moderate effect sizes were evidenced. - Seventy-eight per cent of participants completed 1 or more exercise sessions, with almost half of these attending 12 or more sessions.
Firth <i>et al.</i> (2016b)	Qualitative analysis following from Firth <i>et al.</i> (2016) Semi-structured interviews carried out following exercise intervention	19	10 weeks	At 10 weeks and again at 6 months	Three main themes emerged: 1. Exercise alleviated psychiatric symptoms. 2. Improved self-perception following exercise. 3. Barriers to exercise participation.
Firth <i>et al.</i> (2016c)	Prospective interventional study Twice weekly accompaniment to exercise of their own choice.	20	10 weeks	At baseline, 10 weeks and 6 months.	- Eleven of 20 participants had continued to exercise weekly. - Significant improvements after exercise noted with regard to all symptoms. - Social functioning was the only outcome to show continued improvements, increasing by 7.8%. - Cognitive improvements were maintained at 6-month follow-up.
Lovell <i>et al.</i> (2014)	RCT Coaching, dietetic support and exercise prescription	54/51	12 months	Baseline and at 12 months	- Ninety-three service users (89%) were followed up at 12 months. - Between-group difference in change in BMI was not significant (effect size = 0.11). The effect of the intervention was larger (effect size = 0.54, not significant) in 15 intervention (28%) and 10 treatment as usual (20%) participants.
Larsen <i>et al.</i> (2019)	Qualitative analysis following a prospective interventional study Moderate to high-intensity exercise training inspired by CrossFit..	9	8 weeks	Baseline and at 8 weeks	Three main themes emerged: 1. Motivation and expectations for enrolment. 2. New demands and opportunities. 3. Looking ahead – reflections on impact.

(Continued)

Table 1. (Continued)

	Design	Intervention and control	Number of participants (intervention/control)	Duration of intervention	Timing of assessments	Results
Lambden <i>et al.</i> (2018)	Pre-post experimental trial	Three to five sessions per week with a total duration of approximately 1 hour.	94	12 weeks	Baseline and at 12 weeks	<ul style="list-style-type: none"> - Autonomy unchanged. - Statistically significant reduction in needs -0.61 (95% CIs $-0.22, -1.00$). - The largest reduction was in the group who attended >12 sessions -0.72 (95% CIs $-1.41, -0.04$). No significantly larger reduction compared to the lower attendance group suggesting no evidence of a dose-response effect.
Thompson <i>et al.</i> (2011)	A pre-intervention audit	Provision of monitoring equipment, interactive educational events, reminders/prompts and embedding processes for monitoring within team structure.	106	18 months	Baseline and 18 months	<ul style="list-style-type: none"> - Improvements in both the screening of metabolic indices and the monitoring of indices. Improvements in the number of active interventions offered to clients by clinicians. Guideline concordant monitoring remained low.
Abdel Baki <i>et al.</i> (2013)	Pre-post interventional study	Aerobic interval training twice weekly. This included a 5-minute warm-up, 20 minutes of interval training at varying heart rates and a 5-minute warm-down.	25	14 weeks	Baseline and at 14 weeks	<ul style="list-style-type: none"> - The group of 16 which completed the intervention had reduced waist circumference, reduced heart rate and increased maximal oxygen uptake upon completion. - There was no significant change in blood pressure, lipid profile, glucose metabolism or psychiatric measures.
Usher <i>et al.</i> (2019)	RCT	Mindfulness meditation; cooking classes; field trips to a supermarket and a low-cost fast-food restaurant nutrition education; exercise (walking, home exercises, taiko drumming and jiu-jitsu); and moderated group discussion.	17/16	6 weeks	Baseline, 6 weeks and 12 weeks	<ul style="list-style-type: none"> - Eighty-eight per cent (15/17) of participants met adherence criteria. Compared with the controls, M³ participants showed significant improvement in positive psychotic symptoms ($p = 0.002$).

(Continued)

Table 1. (Continued)

	Design	Intervention and control	Number of participants (intervention/control)	Duration of intervention	Timing of assessments	Results
Teasdale <i>et al.</i> (2014)	Pre-post interventional study	- Individualised sessions, each lasting between 30 and 60 minutes. - Weekly shopping tours and cooking groups.	30	8 weeks	Baseline and at 8 weeks	- Reduction in waist circumference following the intervention; however, only those that attended all the classes had a statistically significant reduction in waist circumference.
Curtis <i>et al.</i> (2018)	Pre-post interventional study	Motivational interviewing and behavioural change techniques as well as some pharmacological interventions.	41	12 weeks	Baseline and at 12 weeks	- 41/61 eligible took part. - The nine participants who completed the study reduced number of cigarettes smoked, nicotine dependence and exhaled CO, while readiness to quit and confidence to quit increased.
Pedley <i>et al.</i> (2018)	Qualitative study following an RCT	Coaching, dietetic support and exercise prescription.	25	12 weeks	Interviews were carried out following the completion of their final 12-month trial assessment.	Three main themes emerged: 1. Creating momentum to change habits. 2. The centrality of the Support Time Recovery Worker. 3. Non-physical impacts, for example, social, psychological and behavioural.
Curtis <i>et al.</i> (2015)	Prospective controlled trial	Keeping the Body In Mind lifestyle intervention.	16/11	12 weeks	Baseline and at 12 weeks	- Weight gain was less in the intervention group compared to controls. - In the intervention group, there was no significant increase in waist circumference, blood pressure, high density lipoprotein (HDL), low density lipoprotein (LDL), triglycerides, total cholesterol and fasting blood glucose. - Clinically significant changes were observed in aerobic fitness (VO ₂ max; $p = 0.01$) and energy intake ($p < 0.001$) in the intervention group.
Bonfioli <i>et al.</i> (2017)	RCT	Psychoeducation sessions on diet and physical activity and regular participation in walking groups	169/157	6 months	Baseline and at 6 months	- An improvement in one or more of the WHO criteria over baseline was observed in 25.4% of experimental group subjects and in 12.2% of control group subjects.

(Continued)

Table 1. (Continued)

Design	Intervention and control	Number of participants (intervention/control)	Duration of intervention	Timing of assessments	Results
Lin <i>et al.</i> (2015) RCT	Comparison between a yoga programme, an aerobic fitness programme and a control group	48/46/46	12 weeks	Baseline and 12 weeks and 18 months later.	<ul style="list-style-type: none"> - Both yoga and aerobic exercise groups demonstrated significant improvements in working memory ($p < 0.01$) with moderate-to-large effect sizes compared with the waitlist control group. - The yoga group showed additional benefits in verbal acquisition ($p < 0.01$) and attention ($p = 0.01$). - Both types of exercise improved overall and depressive symptoms (all $p \leq 0.01$). - Small increases in hippocampal volume were observed in the aerobic exercise group compared with waitlist ($p = 0.01$).

applying a maximal age limit of 35 years old. Only one study included female participants and they ranged in age from 16 to 60 years (Lin *et al.* 2015). One study had an upper age limit of 65 years old (Bonfioli *et al.* 2017). This study was also, by far, the largest study in terms of population. The mean age of participants within this study was 46 years old.

Three articles within our review stemmed from the same interventional study (Firth *et al.* 2016a, 2016b, 2016c). This intervention group contained 31 participants who participated in a moderate-to-vigorous exercise programme for 10 weeks (Firth *et al.* 2016a). A qualitative article then looked at 19 participants' opinions on the intervention thereafter (Firth *et al.* 2016b). Lastly, Firth *et al.* (2016c) looked at maintenance of exercise participation in the longer term for 20 participants 6 months post-intervention.

Many studies identified primary and secondary outcomes. Some of the more common primary outcomes assessed were body mass index (BMI), waist circumference, changes in physical fitness and other anthropometric measures (Abdel-Baki *et al.* 2013; Lovell *et al.* 2014; Teasdale *et al.* 2014; Curtis *et al.* 2016). Retention, recruitment and feasibility were other primary outcomes assessed (Firth *et al.* 2016a; Usher *et al.* 2019). Lin *et al.* (2015) looked at cognitive functions, including memory and attention as primary outcomes.

Positive and negative symptoms of psychosis were assessed as a secondary outcome in several studies (Abdel-Baki *et al.* 2013; Lin *et al.* 2015; Firth *et al.* 2016a). Some secondary outcomes identified levels of physical activity and anthropometric changes (Lovell *et al.* 2014; Curtis *et al.* 2016; Usher *et al.* 2019). y-QUIT looked at smoking cessation as the primary outcome and number of cigarettes smoked, exhaled carbon monoxide, nicotine dependence, readiness to quit and confidence to quit as secondary outcomes.

The qualitative articles explored service users' experiences of the lifestyle intervention from the respective original studies (Firth *et al.* 2016b; Pedley *et al.* 2018; Larsen *et al.* 2019).

Although no time restriction was placed upon the search, all but two of the studies were published within the last 5 years.

Methodologies

Four RCTs were included in this study. The largest RCT had 326 participants (Bonfioli *et al.* 2017) and the smallest had 33 participants (Usher *et al.* (2019)). Two of these studies were carried out in the UK (Lovell *et al.* 2014; Firth *et al.* 2016a), one was carried out in Italy (Bonfioli *et al.* 2017) and one was carried out in Hong Kong (Lin *et al.* 2015). The most

statistically significant had a large population size, evenly distributed between treatment group and control group (Bonfioli *et al.* 2017). Lovell *et al.* (2014) also contained a large population size ($n = 105$). One prospective, non-randomised article was included within the review (Curtis *et al.* 2015). This stemmed from the Keeping the Body in Mind (KBIM) programme discussed below. Lin *et al.* (2015) used three separate groups to compare outcomes: a yoga intervention group, an aerobic fitness intervention group and a control.

Seven non-controlled intervention studies were included in the review. One of these was carried out under the KBIM programme, including one nutrition-based article from this initial study (Teasdale *et al.* 2014). There was only one smoking cessation study identified and it was a two-stage non-controlled interventional study (Curtis *et al.* 2018). 'Meals, Mindfulness and Moving forward' (M³) was another multidisciplinary pre-post intervention study (Usher *et al.* 2019). The FitForLife intervention was utilised in two non-controlled studies to look at service users' autonomy and cognition post-intervention (Lambden *et al.* 2018; Hallgren *et al.* 2018). Only one non-controlled study looked at longer-term practicality and efficacy of physical health interventions (Firth *et al.* 2016b).

Two qualitative studies carried out in the UK interviewed FEP service users who had completed a physical health intervention. Both of these studies used semi-structured interviews to collect data. The first study carried out interviews immediately after intervention and after 6 months (Firth *et al.* 2016c). The other study only carried out interviews immediately after completion of the intervention (Pedley *et al.* 2018). In comparison, Larsen *et al.* (2019) used semi-structured interviews, a focus group and observations of these focus groups to form their qualitative analysis.

One 'closed-loop audit' (meaning the full audit cycle was completed) demonstrated measurable changes in metabolic screening and appropriate interventions and was included in this review (Thompson *et al.* 2011).

Interventions

It is important to note that a number of studies identified in this review utilised the same intervention programme. Four Australian studies were devised utilising the KBIM programme (Teasdale *et al.* 2014; Curtis *et al.* 2015, 2018; Pedley *et al.* 2018). KBIM was a district-wide programme based in Sydney for service users who had experienced a FEP. KBIM uses an evidence-based 12-week individualised programme to support changes to diet, exercise, smoking, sleep and stress and equip consumers with skills to sustain changes (NSW Health-South Eastern Sydney Local

Health District, 2019). Though this programme had a multidisciplinary approach, the four studies included in this review looked at how the intervention affected different domains of quality of life, for example, physical health, diet or sleep.

M³ also used a multidisciplinary approach. M³ was based on holistic behaviour intervention models that teach practical ways of improving wellness in daily life. One study identified used this intervention. Mindfulness; meditation; cooking classes; field trips to a supermarket and a low-cost fast-food restaurant for hands-on learning; nutrition education; exercise (walking, home exercises, taiko drumming and Jiu-jitsu); and moderated group discussion were utilised to facilitate healthier living (Usher *et al.* 2019).

Three articles (Firth *et al.* 2016a, 2016b, 2016c) were derived from the same intervention. The participants within this study were provided with a 10-week intervention. The aim of the exercise provision was that participants would achieve 90 minutes of moderate-to-vigorous exercise per week available at community leisure centres throughout the UK. Included within the intervention were two supervised sessions, with researcher assistants present.

The FitForLife intervention also contributed two papers (Hallgren *et al.* 2018; Lambden *et al.* 2018). In this intervention programme, participants received usual care plus a 12-week supervised circuit training programme, consisting of high-volume resistance exercises, aerobic training and stretching. One study had participants engaging in 14 weeks of aerobic interval training (Abdel-Baki *et al.* 2013). These studies used high-intensity exercise as their interventions. One RCT carried out in the UK (Lovell *et al.* 2014) was followed up by a qualitative study (Pedley *et al.* 2018) which was based on the same intervention of coaching, dietetic support and exercise prescription over a 12-month period. Bonfioli *et al.* (2017) also carried out their intervention over a longer time frame of 6 months. During this time, the participants were provided with seven 1-hour health education group sessions (two on physical activity and five on nutrition) delivered by two trainers and two dietitians; weekly 1-hour group walking sessions under the guidance of an expert trainer and prompting by telephone or in person to promote adherence.

One audit was included in the review which utilised provision of resources in the form of local guideline development, education, service changes and monitoring equipment as an intervention, carried out of an 18-month period (Thompson *et al.* 2013).

The y-QUIT study was the only study to look at smoking cessation as a means of improving physical health (Curtis *et al.* 2018). The intervention was two-pronged utilising both pharmacological and

non-pharmacological methods over a 12-week period. The non-pharmacological element included intensive tobacco dependence intervention involving the delivery of sessions of motivational interviewing and behavioural change techniques, either over the phone or face to face. The pharmacological interventions included nicotine replacement therapy as transdermal patches, oral gum, nicotine inhaler or a combination, and varenicline.

The frequency/intensity of the interventions varied across the identified studies. Five studies provided weekly sessions as part of their intervention (Larsen *et al.* 2019; Teasdale *et al.* 2014; Curtis *et al.* 2015; Hallgren *et al.* 2018; Lambden *et al.* 2018). Four studies provided the interventions twice weekly (Abdel-Baki *et al.* 2013; Firth *et al.* 2016a, 2016b, 2016c). One study provided three times weekly, 1-hour sessions (Lin *et al.* 2015). The y-QUIT smoking cessation study provided four sessions for those part-taking in the full intervention and one to two sessions for those included in the brief intervention (Curtis *et al.* 2018). The study by Pedley *et al.* (2018) provided eight sessions within a 12-week-long intervention. The closed-loop audit's intervention was a series of didactic and interactive seminars run over a 2-year period as well as guideline provision and ensuring monitoring equipment was available, for example, weighing scales, tape measures. (Thompson *et al.* 2011). The study by Bonfioli *et al.* (2017) involved weekly walking sessions and seven health education sessions over a 6-month period. Two studies included in this review did not describe the frequency of interventional sessions (Lovell *et al.* 2014; Usher *et al.*, 2019).

Outcomes measures

The majority of studies looked at changes in physical health as their primary outcome. The most commonly reported primary outcomes were weight change, waist circumference and BMI change. Seven studies included in this review looked at one of these three outcomes.

Others looked at metabolic markers, such as systolic blood pressure, diastolic blood pressure, triglycerides, high density lipoprotein, low density lipoprotein, total cholesterol or fasting glucose, as primary outcomes measures (Curtis *et al.* 2015). While some looked at aerobic capacity (VO₂) to assess the efficacy of the interventions (Abdel-Baki *et al.* 2013; Curtis *et al.* 2015; Lin *et al.* 2015).

Of the two studies which provided dietary interventions, one looked at energy intake as the primary outcome (Teasdale *et al.* 2014), while Bonfioli *et al.* 2017 used two WHO recommendations on diet and exercise (World Health Organization 2004) as primary outcomes. These recommendations were

1. Take at least five servings of fruits and/or vegetables a day.

2. Engage in moderate physical activity (e.g. brisk walking) for at least 30 minutes on at least 5 days a week.

Improvement over baseline in at least one WHO recommendation at the final assessment was defined as a successful lifestyle change.

Autonomy was the primary outcome measured by Lambden *et al.* (2018). Cognition was also looked at as a primary outcome measure in the FitFor Life study (Hallgren *et al.* 2018) as well as the study carried out by Lin *et al.* (2015). Smoking cessation was the primary outcome measure assessed in one study (Curtis *et al.* 2018).

Many studies did not assess psychiatric well-being as a means of assessing the efficacy of their intervention. Some, however, did look at psychiatric well-being as a secondary outcome measure, including the M³ study which used the Quick Scale for Assessment of Positive Symptoms (QSAPS) to assess psychiatric health both prior to and following the intervention (Lin *et al.* 2015; Firth *et al.* 2016a). These studies used the Positive and Negative Symptoms Scale (PANSS), which is a medical scale used for measuring symptom severity of service users with schizophrenia. Another study looked at longer-term psychiatric outcomes as an outcome measure (Firth *et al.* 2016b).

Feasibility

Before examining the nature and efficacy of lifestyle interventions in the treatment and care of service users who have experienced a FEP, it is important to assess the feasibility of such interventions. Many of the studies included in this review combine an assessment of feasibility and efficacy. The National Institute for Health Research defines feasibility studies as studies used to estimate important parameters that are needed to design the main study (NIHR 2019). For this review in particular, parameters examined included consent/recruitment, retention, completion and replication. The main lifestyle intervention examined within the feasibility studies was exercise. One such study examined consent, retention and completion as a means of gauging feasibility (Firth *et al.* 2016a). Thirty-three service users were invited to take part in this study and of them, 94% or 31/33 consented to take part. The intervention was 10-week exercise intervention. Retention rates were high with 81% or 25/31 participants completing the 10-week course. Completion was defined as carrying out 90 minutes or more of exercise every week throughout the 10 weeks. Over half the participants completed the intervention. The primary factors which contributed to service users discontinuing the course or not achieving the targeted exercise goals were physical and mental health problems. Of note, the majority of the exercise was completed during

supervised, *individualised* gym classes. Another study looked at recruitment and retainment as measures of feasibility (Larsen *et al.* 2019). This was a qualitative study which recruited 81% or 13/16 of the target population and retained 69% or 9/13 of the participants. The 8-week intervention was praised by its service users due to the non-clinical environment in which the service was provided, similar to the aforementioned study. In contrast to Firth *et al.* (2016a), the majority of the exercise provision was carried out in *group* sessions, which participants found sociable. 'Meals, Mindfulness and Moving forward' was another study which assessed feasibility by looking at a combined lifestyle intervention, including dietary advice, meditation and exercise as a form of treatment. They looked at numbers that consented and completed to measure feasibility (Usher *et al.* 2019). Seventy-five per cent or 33/44 consented to take part and 88% or 15/17 (17 intervention/16 controls) completed the targeted amount of exercise of attending four or more of the six exercise sessions. The combination of lifestyle interventions, similar to the isolated exercise interventions, proved to be attractive to service users and amenable to a feasible intervention.

It is evident from the literature that such lifestyle interventions are feasible, whether they be solely exercise or multicomponent interventions. The elements which seemed to encourage participation and continuation of the study appear to be sociability, the non-clinical environment and the positive effects the service users feel from taking part.

Efficacy

The three studies which focused on psychiatric symptoms as an outcome measure both reported positive and impactful results for their participants. The intervention group in M³ had a significantly decreased QSAPS compared to controls. The intervention group also had a trend in BMI attenuation but no significant improvements in cardiometabolic parameters (Usher *et al.* 2019). With regard to Firth *et al.* (2016a), the greatest differences between the intervention and control group were observed in negative symptoms, which were reduced by 33% in the intervention group ($p = 0.013$). The intervention group reduced their PANSS scores by an average of 13 compared to 3.3 in the control group. There was no significant difference in physical health or functional capacity and among the cognitive domains, verbal short-term memory showed the greatest change, increasing from 6.2 to 8.1 words ($p = 0.001$). Significant improvements were also observed in psychosocial functioning and verbal short-term memory. Increases in cardiovascular fitness and processing speed were positively associated with

the amounts of exercise achieved by participants. When service users were followed up at 6 months, however, only 55% of those who took part in the study continued to exercise regularly and positive effects on psychotic symptoms, social functioning, verbal memory and waist circumference were only maintained in the cohort who continued to exercise. Lin *et al.* (2015) found that overall symptom severity improved both in yoga ($p < 0.01$) and aerobic exercise ($p = 0.012$) groups. Negative symptoms improved in the yoga group ($p < 0.01$). Depressive symptoms improved in both yoga ($p < 0.01$) and aerobic exercise ($p < 0.01$) groups after the 12-week intervention. These effects on clinical symptoms were stable at the 18-month follow-up in both intervention groups.

The KBIM intervention which focused on dietary intervention had positive results in terms of the physical health of the participants, whereby an intention-to-treat analysis revealed a statistically significant reduction in waist circumference ($p = 0.04$). Similar results were found for the 14 participants who attended all eight sessions (mean waist circumference reduction = 2.9 ± 4.7 cm (Teasdale *et al.* 2014).

The results of the y-QUIT smoking cessation study were also notable (Curtis *et al.* 2018). This study was a two-stage investigation. Firstly, the prevalence of smoking among this cohort was established with approximately 48.2% reporting being smokers. Following this, the number who engaged in a smoking cessation programme, the number who achieved smoking cessation and the number who achieved secondary outcomes from smoking cessation were assessed. Sixty-six per cent engaged in a smoking cessation programme with 28.6% of those who undertook the full smoking cessation programme achieving complete cessation at 1 year. This study showed that smoking cessation is not only an important matter for this cohort but also a feasible lifestyle change.

Lastly, a number of qualitative studies included in this review highlighted the efficacy of these studies from the subjective viewpoint of the service users. Pedley *et al.* (2018) was a qualitative analysis following an RCT in the UK. The primary themes which emerged from their analysis were factors which facilitated lifestyle change, such as goal setting and self-motivation, the psychological and social impact of exercise (similar to the aforementioned study) and the importance of an *individualised* support system. Once again the themes which emerged showed the effectiveness of these interventions. Larsen *et al.* (2019) was another such study carried out in Denmark. The themes which emerged in this qualitative review were motivation and expectations for enrolment, new demands and opportunities which came from taking part and reflections on the long-term impact of the intervention on their lives.

Lastly, Firth *et al.* (2016c) was a qualitative analysis carried out in the UK. The primary themes that emerged from these interviews were the way in which exercise can alleviate psychotic symptoms, the use of exercise in improved self-perception and factors affecting training participation including having a training partner and the use of an *individualised training programme*. Analysis of such themes highlights the effectiveness of these interventions.

Discussion

Key findings

RCTs, non-controlled pre-post intervention studies, qualitative assessments of participants' experiences and one closed-loop audit were included in this review. Many of the studies were linked using the same intervention but different methods of study. Exercise, nutritional advice, cookery classes, grocery shopping trips, wellness and mindfulness coaching, motivational interviewing, behavioural changing techniques, psychoeducation and service provision were all interventions utilised to improve the physical health of these people with a FEP. Physical health was reported to improve as a result of all of the intervention studies identified in this review. These results mirror the primary findings of the Lancet Psychiatry Commission (Firth *et al.* 2019), indicating that in the FEP population it is critically important that physical health issues are identified early, for example, cardiometabolic issues, obesity, sedentary lifestyle, that modifiable factors for example, exercise, diet, tobacco consumption are addressed as a priority in mental health services and that there is ongoing research into new ways to enhance and protect physical health in people experiencing a FEP.

Only a small number of studies looked at the impact of lifestyle or physical health interventions on people with a FEP. The data from this review also indicate that the long-term positive effects of these interventions are only maintained if the service users have continued support, for example, dietetic input, exercise provision. The studies which assessed feasibility looked at consent/recruitment, retention, completion and replication. They found that these studies were feasible, uptake of the interventions was good and service users valued and appreciated the impact of the interventions.

Methodological considerations and limitations

The EIP 'Model of Care' was launched by the Minister for Mental Health and Older People in June 2019 (HSE 2019). A key feature of this Model of Care is physical health provision for service users after a FEP. We set out to review the literature pertinent to this subject

matter. Though a systematic review of the literature was not completed, two comprehensive databases were utilised in order to give a broad and comprehensive literature based on which to conduct the review. We also considered the references of the papers originally included in the search so as to not exclude any relevant literature. By conducting a narrative review looking at this topic, we strived to achieve a balance between selecting papers relevant to the topic and providing systematic coverage of the studies within this field. In simpler terms, we aimed to examine the significant literature with regard to the aims of our paper, rather than completing an entire systematic review.

The fact that only two databases were utilised in the initial search strategy may be considered a limitation of this narrative review. However, we believe that a wide spectrum of relevant papers were identified using this search and furthermore, more papers were identified and included upon review of the reference lists within.

Another limitation to be noted within this review is the fact that the search term 'physical health interventions' was not broken down into its elemental components (i.e. exercise, diet, smoking and alcohol cessation and perhaps most notably sexual health, as this was completely omitted from the review). Leaving the search terms open-ended may have resulted in specific 'exercise' or 'diet'-related studies not being included. However, the overall premise of this study was to look at physical health interventions as a whole, which was achieved through the aforementioned search strategy as it identified any paper with physical health measures forming the basis of a study.

Comparisons with previous literature

Similar to this review was another such narrative review looking at the importance of sports specifically in the recovery of service users with FEP (Brooke *et al.* 2018). This review concluded that sports in FEP recovery are beneficial and important; where sports encourages physical activity, teaches life skills and fosters social connectivity, these all form part of a holistic recovery plan for a person with FEP. One of the qualitative studies within our review highlighted the importance of the social aspect of physical activity (Pedley *et al.* 2018). Another of the qualitative studies described the impact physical activity had on relieving psychotic symptoms (Firth *et al.* 2016c).

Another impactful review looking at the topic of physical health interventions for service users who have experienced a FEP was published in the Lancet in 2015 (Gates *et al.* 2015). This review found there to be a reversal of the initial successes of

these interventions in the longer-term if the interventions were not sustained. This also mirrors the finding of some of the studies in this review (Curtis *et al.* 2015).

Gates *et al.* (2015) found that very little research had been done on the feasibility of physical health interventions. However, a number of studies identified in our narrative review did explore feasibility in some detail and reported that physical health and lifestyle interventions were well tolerated and feasible in a FEP population (Firth *et al.* 2016a; Usher *et al.* 2019; Larsen *et al.* 2019). A noteworthy study of an Irish population is currently underway. It explores the role of key workers to support physical health monitoring and intervention in an Irish FEP population (McCombe *et al.* 2019). Studies have highlighted that the majority of the ill effects on physical health occur in the period shortly after the FEP (Liebermann *et al.* 2001). Accordingly, it is probable that the effectiveness of lifestyle interventions are most beneficial soon after diagnosis. Gates *et al.* (2015) also commented 'Interventions that prevent the development of physical health problems given early in the course of the illness are likely to be more effective than interventions which are administered once physical health has already deteriorated'. The truth of this statement is reflected in the positive results seen in so many of the studies included in this review.

Critical appraisal

The four studies which used the KBIM programme looked at a broad spectrum of outcomes already discussed above. They also used RCTs as a methodological approach. Furthermore, they offered *individualised* interventions, something which was highlighted repeatedly within the qualitative analysis as an important feature for participants. However, what they universally lacked was assessment of psychiatric well-being at baseline and at follow-up. This is compared to other studies that explored the impact of physical health interventions on psychiatric health in addition to physical health (Lin *et al.* 2015; Firth *et al.* 2016a; Usher *et al.* 2019). In general, the studies which assessed feasibility demonstrated that these studies are practical and that reasons for drop-out are normally beyond the control of the participants, as discussed above. The majority of studies included in this review were smaller studies with many having cohort sizes of less than 30. Larger studies with controls for comparison would be useful in further assessing the usefulness and efficiency of these lifestyle interventions for service users who have suffered a FEP. Bonfioli *et al.* (2017) was by far the largest study in terms of participants. This is likely due to the fact they applied a much higher age limit of 65 years old.

Conclusions and implications for future research and practice

Despite major improvements in the care of service users with FEP, addressing the morbidity and mortality associated with chronic illnesses remains a challenge. This review indicates that delivering interventions to address modifiable risk factors is feasible among service users with FEP. Furthermore, it is undeniable that there is a need for such lifestyle interventions given the poor physical outcomes in this population. A wide range of interventions have been reported (e.g. exercise programmes, motivational coaching, cookery classes). What appears crucial with regard to the efficacy of these interventions is the importance of *early* intervention. Just as pharmacological treatment utilised early in psychosis improves prognosis where mental state and functional status are concerned (Rasmussen *et al.* 2016), it may also be true that the earlier lifestyle interventions are implemented the more efficacious they can be. The studies identified in this review indicate that physical health and lifestyle interventions have a positive impact on physical health in the FEP population. However, what many of these studies did not explore was the impact of physical health interventions on psychiatric symptoms, social functionality and cognition. This is an area that requires further exploration. In addition, the benefits of these interventions appear to be lost for many people if there is not a more sustained element of support afterwards. How this should be delivered, how frequently and for what duration requires further study. Physical health screening and evidence-based physical health and lifestyle interventions need to be key components of EIP care in all services.

Sexual health was not included in any of the studies identified in this review. Previous literature has described the association between service users who had suffered FEP and poor sexual health (Brown *et al.* 2011). Although this association seems to have been established within previous literature, sexual health interventions for this cohort are uncommon compared to interventions concerned with exercise, diet and smoking cessation.

The HSE National Clinical Programme for EIP outlines the irrefutable importance of early intervention in the treatment of people presenting with FEP. The aim of the National Clinical Programme is that everybody in Ireland who develops a FEP will have easy access to an EIP service which provides access to responsive, expert assessment, assertive key worker and team engagement and provides access to an array of evidence-based interventions, including psychological interventions, family interventions, vocational support and physical health monitoring and interventions (HSE 2019). This review

reinforces the critical role physical health and lifestyle interventions must play in any EIP Service.

Conflict of interest

Authors have no conflicts of interest to disclose.

Ethical standards

The authors assert that all procedures contributing to this work comply with the ethical standards of the relevant national and institutional committee on human experimentation with the Helsinki Declaration of 1975, as revised in 2008.

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