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REVIEW ARTICLE

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Physical health interventions on adolescent mental health inpatient units: A systematic review and call to action

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Abstract

Aim: Physical health inequalities experienced by people with mental health conditions are labelled an international scandal; due to the 15 to 30-year gap in life expectancy, driven mostly by physical health conditions. Lifestyle interventions are recommended to prevent the onset of poor physical health in people with mental illness. Yet, there is less high-quality evidence for adolescents, particularly those in inpatient settings. We aimed to assess existing literature reporting physical health or lifestyle interventions conducted on adolescent mental health inpatient units.

Method: An electronic search of MEDLINE, PsycINFO, Embase, the Cochrane Central Register of Controlled Trials and AMED was conducted on 13th June 2019. Eligible studies included peer-reviewed English language research articles of physical health interventions delivered within child and adolescent mental health inpatient services. A narrative synthesis was conducted on the data.

Results: Only three studies were identified implementing health interventions for adolescent inpatients. The interventions consisted of two physical health interventions aiming to increase activity levels within routine care (one gym-based, one sports led) and a yoga intervention. Outcome measurements varied and benefits were observed in relation to overall health (HONOSCA), physical health (waist, hip and chest circumference) and behaviour.

Conclusions: Although preliminary results suggest lifestyle interventions may be feasible and beneficial for this group, more work is needed to fully understand the best way to implement these interventions within adolescent clinical settings. Adolescent inpatients are an important target for such interventions, affording the opportunity to prevent the onset of physical comorbidities.

KEYWORDS

adolescent, health services, inpatient, physical health, review

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1 | INTRODUCTION

People with mental health conditions experience significant physical health inequalities compared with the general population (Correll et al., 2017; De Hert, Schreurs, Vancampfort, & Van Winkel, 2009; Firth et al., 2019). They are more likely to suffer comorbid physical health conditions such as obesity, cardiovascular disease, type II diabetes and some cancers; resulting in a loss of life up to 30 years, (Correll et al., 2017; De Hert et al., 2009). The physical health disparities have been labelled a 'human rights scandal' (Shiers, Bradshaw, & Campion, 2015; Thornicroft, 2011) resulting in multiple national and international health bodies publishing new guidelines for reducing the incidence and impact of physical comorbidities in people with mental illness (NHS England, 2018; Public Health England, 2018; WHO, 2018). In addition, a recent Lancet Psychiatry Commission identified that addressing physical health in young people from the very onset of mental illness is critical, in order to prevent chronic physical health conditions from arising (Firth et al., 2019).

Several factors contribute to these physical health inequalities, including side-effects of medication, poor monitoring of physical health (such as fewer physical health assessments, inability to access adequate healthcare and prioritizing mental health care over physical health), and unhealthy lifestyles (Correll et al., 2017; Firth et al., 2019; Shiers et al., 2015). Those with serious mental illness (SMI) are significantly more likely to be inactive and consume obesogenic diets (Stubbs et al., 2016; Vancampfort et al., 2017). This increased risk for poor physical health occurs at an early stage, often during adolescence (Carney, Cotter, Bradshaw, Firth, & Yung, 2016; Carney, Cotter, Bradshaw, & Yung, 2017; Cordes et al., 2017; Lederman, Rosenbaum, Maloney, Curtis, & Ward, 2017; Preyde, Tran, Parekh, & Heintzman, 2018). People who require inpatient care experience additional risks of the 'obesogenic environment' (Faulkner, Gorczyński, & Cohn, 2009; Gorczyński, Faulkner, & Cohn, 2013). Restricted living space, containment, limited access to fresh, healthy food choices and easy access to nutritionally deficient foods, restrictions on cooking facilities and fewer opportunities to be active all pose significant challenges to living a healthy lifestyle while receiving inpatient care and treatment (Faulkner et al., 2009; Gorczyński et al., 2013).

Physical health interventions which increase activity levels and improve diet have shown profound benefits for mental health in both clinical (inpatient and outpatient) and non-clinical populations (Firth et al., 2019; Vancampfort et al., 2017). Lifestyle interventions can improve wellbeing, mood, anxiety, cognition and overall functioning, as well as improving physical health, cardiovascular fitness and ameliorating antipsychotic-induced weight gain (Curtis et al., 2016; Firth et al., 2019; Vancampfort et al., 2017). To date, there have been a plethora of studies highlighting the benefits of promoting a healthy lifestyle for children and young people (Biddle, Ciaccioni, Thomas, & Vergeer, 2018; Carter, Morres, Repper, & Callaghan, 2016; Curtis et al., 2016; Lubans, Plotnikoff, & Lubans, 2012; Parker & Bailey, 2018). However, the majority of this work has focussed on young people receiving community care, via specialist outpatient services or on general population studies conducted in schools. In addition, many of the

interventions that have been implemented on adult inpatient units may not be appropriate for child and adolescent mental health units, due to environmental factors and different needs of young people. Despite the benefits of exercise for adolescents and young people (Spruit, Assink, van Vugt, van der Put, & Stams, 2016), less attention has been given to those individuals in mental health inpatient units and there have been no reviews summarizing the evidence for physical health interventions for adolescent inpatients on mental health units.

1.1 | Aim

The aim was to assess existing literature reporting physical health or lifestyle interventions conducted on adolescent mental health inpatient units. We aim to synthesis the types of interventions that have previously been conducted and summarize the outcomes of these interventions for people's mental health, physical health and behavioural outcomes.

1.2 | Method

This review was conducted according to Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines for reporting systematic reviews (Moher, Liberati, Tetzlaff, & Altman, 2009), and informed by the guidance for reporting scoping reviews (Tricco et al., 2018). Due to the scoping nature of this review, the search strategy and inclusion criteria were kept intentionally broad.

1.3 | Eligibility criteria

Eligible studies were original research articles published in peer-reviewed English language journals. Eligible populations were from child/adolescent generic or secure mental health inpatient services. This included any inpatient or residential services where young people aged between 12 and 25 were receiving inpatient treatment for any mental health disorder. The upper age limit was identified in line with literature highlighting the growing evidence for young people's mental health services to extend up to age 25, and definitions of adolescence based on young people's cognitive development (Malla et al., 2016; Rickwood et al., 2019; Sawyer et al., 2012; Wilson et al., 2018). Studies which reported physical health interventions, defined as any form of activity designed to increase activity levels or improve diet quality, for example, sports, exercise, physical yoga, were all included. Trials of all design were eligible including non-randomized and uncontrolled interventions, and interventions delivered through routine care. Studies that reported interventions which had a psychological/therapeutic basis, without any focus on physical health were excluded, as were those containing only older populations (18 years plus), studies which included mixed samples including those under 25, but who could not be extrapolated from the remainder of the sample, or those which were purely qualitative studies.

1.4 | Search strategy

An electronic database search was conducted on 13th June 2019 using Ovid MEDLINE, PsycINFO, Embase, Cochrane Central Register of Controlled Trials and AMED. Search terms synonymous with 'inpatient settings', 'mental health', 'children and adolescents' and 'physical health interventions' were used (strategy available on request). A manual search of Google Scholar was conducted and reference lists were scanned to identify any additional papers. The search strategy was intentionally broad and included all publications from database conception until the date of the search.

1.5 | Study selection and data extraction

Reviewers independently screened articles for eligibility. Disagreements were resolved through discussion. An excel tool was developed to record: (a) study characteristics (author, year of publication, country of origin, study design); (b) sample demographics (sample size, gender, age); (c) clinical demographics (diagnoses, description of service, interventions offered); (d) physical health interventions (type, delivery, duration, content, control group, adherence); (e) pre-post measurements (physical measurements, for example, weight;

psychological measurements; behavioural outcomes); (f) summary of findings.

1.6 | Analyses

A narrative synthesis was conducted on the data. Systematically extracted data were combined to identify similarities and differences in the types of intervention, for example, duration, delivery of intervention and content. Tabulated data were created to summarize the key study characteristics. Quantifiable data were combined, and key outcomes were described for each paper, summarized according to measurement type, for example, physical outcomes.

2 | RESULTS

2.1 | Search results

Study selection and exclusion is summarized in Figure 1. Database searches returned 385 unique citations after removal of duplicates. At title-abstract stage, 358 papers were excluded and 27 full-texts were screened; of which two were eligible. Full-text papers were excluded

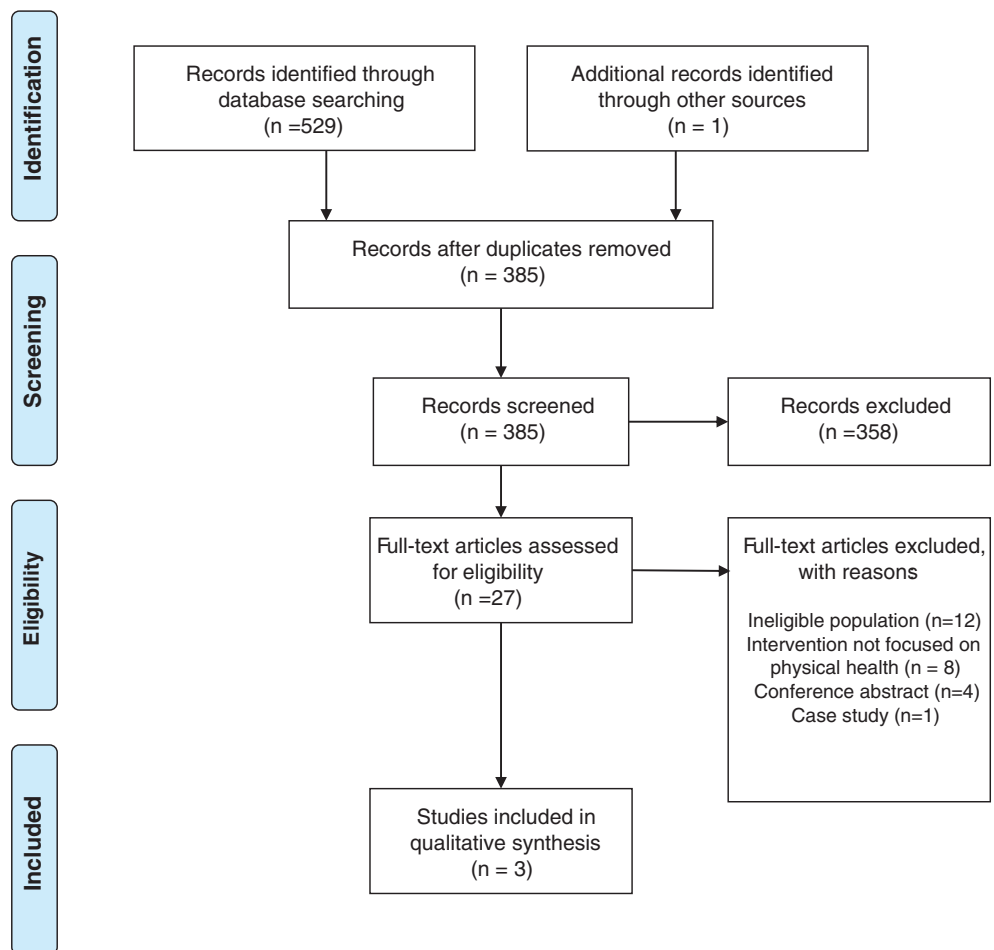


FIGURE 1 Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) 2009 flow diagram. For more information, visit www.prisma-statement.org. Source: Moher et al. (2009)

if they reported an ineligible population (eg, no mental health condition; $n = 12$), if they did not report any physical health interventions ($n = 8$), were conference abstracts which did not lead to a full text ($n = 4$) or individual case studies ($n = 1$). One further paper was identified through a manual search of Google Scholar. Studies were conducted in Australia ($n = 1$), the United States ($n = 1$) and New Zealand ($n = 1$). A summary of the studies can be found in Table 1.

2.2 | Clinical settings

The clinical setting varied, however, all individuals were receiving inpatient treatment for a diagnosed mental health condition. This included a specialized early intervention service providing inpatient treatment and crisis care (Woodhead et al., 2018), tertiary mental health facilities for young people with a severe psychiatric disorder (Bobier et al., 2009) and a locked residential unit for young people requiring inpatient therapeutic care (Public Health England, 2018). Services accepted individuals aged 15 to 25 (Woodhead et al., 2018), 16 to 18 years (Bobier et al., 2009) and 13 to 18 years (McIlvain et al., 2015).

2.3 | Summary of interventions

All studies employed a pre-post design. None of the studies had a control group, and all were made available to all of the individuals within the service. Two studies looked at physical health interventions, which were integrated as part of usual routine activities (Bobier et al., 2009; McIlvain et al., 2015), whereas one reported a new pilot intervention to be offered within the service as an adjunct to usual care (Woodhead et al., 2018). The content of the interventions varied (see Table 2). This included a multi-faceted lifestyle intervention delivered by Accredited Exercise Physiologists, a yoga programme focusing on movement and activity (rather than spirituality), and a routinely administered sporting intervention. However, the type of sport used in Bobier et al. (2009) could not be determined and was described as a routinely offered sport session making up generic ward-based activity. The duration of interventions ranged from 8 weeks to 6 months. Little information was available on how each of the interventions was developed and none of the studies reported using models of behaviour change or theoretical underpinning.

2.4 | Outcomes

Eligible studies reported a range of different outcomes.

2.4.1 | Psychological outcomes

The HONOSCA (Health of the Nation Outcome Scale for Children and Adolescents; (Gowers et al., 1999) was used by Bobier et al. (2009)

to show the impact of the intervention on behavioural, psychological, social and functional outcomes. Attendance at sporting sessions was significantly associated with improved scores on the HONOSCA. A significant positive relationship was observed between attendance at sporting sessions and improved HONOSCA scores, but only for individuals with psychosis (not mood disorders or mixed diagnoses).

2.4.2 | Behavioural outcomes

Behavioural outcomes were reported in one study. McIlvain et al. (2015) designed a numerical scale to provide feedback on behaviour using a cognitive behavioural approach (eg, assessing social interactions, meeting personalized goals). Higher scores were indicative of more desirable behaviour. A significant relationship was observed between participation and increased behavioural scores, yet, this was not consistent across the whole 8 weeks. McIlvain et al. (2015) also assessed restrictive behavioural interventions (including quiet time, personal restriction, time out initiated by staff, physical holds and focused therapeutic interventions). Total time spent engaged in yoga was related to fewer restrictive behaviour modifications during week one, three and four of the intervention, but not across any other weeks. The reason for this was unclear and may have been due to other environmental factors on the ward, or may be due to the statistical under powering of a small sample.

2.4.3 | Physical outcomes

Physical health measurements improved in relation to the 'Bod Squad' intervention (Woodhead et al., 2018). Body mass index (BMI) and waist, hip and chest circumference all decreased after the intervention. However, the sample of individuals who had pre-post outcomes was limited, therefore, conclusions were not based on any significant statistical tests nor any longitudinal follow ups. Physical activity levels or other lifestyle behaviours were not reported in any of the studies, despite the focus of each intervention being to improve physical activity and physical health.

2.4.4 | Feasibility of studies

The feasibility of the studies was assessed by looking at levels of adherence, which varied considerably. Older individuals and those with more severe mental health difficulties on admission were more likely to engage in weekly sporting sessions than younger individuals (Bobier et al., 2009). In addition, individuals with mood disorders (eg, depression) had lower levels of adherence than those with psychosis and mixed diagnoses (Bobier et al., 2009). Gender differences were only reported in one study, with females engaging in more minutes of yoga on average per week than males (McIlvain et al., 2015). Attendance at 'Bod Squad' sessions also varied with half of the sample attending on a weekly or more regular basis and others attending less

TABLE 1 Details of included studies

Study	Patient characteristics	Mean age	Gender	Setting	Average length of stay	Study type	Description of intervention	Study arms	Outcomes	Adherence	Key findings
Bobier, Dowell, & Swadi (2009), New Zealand	46 young people with a severe psychiatric disorder based on DSM-IV criteria including mood disorders (22, 48%), mixed disorders (15, 33%) and psychotic disorders (9, 19%)	16.41 (SD 0.8)	31 females (67%), 15 males (33%)	8-bed tertiary mental health facility for the assessment and treatment of youths 16–18 with a severe psychiatric disorder. Provides short-term intensive treatment for young people with SMI to achieve stability and remission for early discharge to outpatient management.	24 days	Cohort Study (pre- post)	Routinely delivered sport intervention offered as part of usual ward activities during the young person's time on the unit. Sessions offered weekly and were delivered by a multidisciplinary clinical team. Type of sport was not described.	46 Interventions; No control	HONOSCA	Frequency Score ² : All Individuals 2.01 (SD 4.29); Mood disorders 1.58 (1.27); Mixed disorders 2.70 (7.41); Psychosis 1.91 (1.46)	Positive association between attendance at weekly sporting sessions and a reduction in overall HONOSCA scores for individuals with psychosis (but not other disorders). There was a positive association between older individuals who engaged in sporting activity and a reduction in HONOSCA problem scores.
McIlvain, Miller, Lawhead, Barbosa-Leiker, & Anderson (2015), USA	Adolescents with psychiatric diagnoses including bipolar disorder (10, 46%), depression (5, 23%), oppositional defiant disorder (3, 13%), schizophrenia (2, 9%), not reported (2, 9%).	15 (SD 1.47)	14 females (64%), 8 males (36%)	Locked residential unit for 13–18 year olds who required a level of safe inpatient care in between acute psychiatric care and outpatient care. The unit offers a range of therapeutic and health interventions both on an individual, family and group therapy levels.	132 days (SD 42; range 70–238 days)	Cohort Study (pre- post design)	8 week physical yoga sessions delivered 2 times per week for 45 minutes as part of routine activities on the unit. The yoga intervention was taken from a pre-existing programme and delivered via a video on the unit.	22 Yoga Intervention; No control	TEIQue-ASF; CBT Behaviour Change Point Scale; Frequency of Behavioural Interventions	Mean time 60 minutes per week (SD 20). Females 65 minutes (SD 15), males 50 minutes (SD 15)	A physical yoga intervention was feasible within the locked residential unit and participation in the intervention was significantly related to increased scores on TEIQue-ASF. Increased time spent engaged in the intervention was associated with some reductions in restrictive interventions.

(Continues)

TABLE 1 (Continued)

Study	Patient characteristics	Mean age	Gender	Setting	Average length of stay	Study type	Description of intervention	Study arms	Outcomes	Adherence	Key findings
Woodhead, Hitch, Bolton, Albiston, & Killackey (2018), Australia	47 young people with a range of mental health diagnoses including FEP, bipolar disorder and depression. (Data only reported for 10 individuals)	20.92 (15-26)	9 females (19%), 38 males (81%)	Orygen Youth Health (OYH), an early mental health programme in Melbourne, that provides specialist services for young people aged between 15 and 25 including crisis intervention and assessment, and inpatient care.	Not reported	Cohort Study (pre- post design)	'Bod Squad' implemented within the service, mixture of group and individual sessions which aimed to increase people's activity levels, initial review of physical health and ability and personalized programmes were developed with their goals and interests in mind. Flexible programme which took into account lifestyle changes, activity goals for between sessions and ultimately transition to outpatient care.	No control	BMI; waist circumference; hip circumference; chest circumference; resting heart rate; qualitative experiences	Most attended between 1 and 3 sessions. Mean 3.6 (median 3, SD 2.96) For those with outcome data (n = 10): mean 6.4 sessions (range, 4-8), 5 attended weekly/fortnightly (other 5 irregular)	Variable attendance at 'Bod Squad' with some young people engaging well with the programme. Small sample with pre-post outcomes, which found slight decrease in physical health parameters.

Abbreviations: BMI, body mass index; CBT, Cognitive Behaviour Therapy; DSM-IV, Diagnostic and Statistical Manual of Mental Disorders version IV; HONOSCA, Health of the Nation Outcome Scale for Children and Adolescents; TEIQue-ASF, Trait Emotional Intelligence Questionnaire Adolescent Short Form.

^aFrequency score worked out as number of sessions attended per week divided by length of stay in weeks.

TABLE 2 Details of interventions

Study	Intervention delivered by	Duration and frequency	Content of intervention	Development of intervention	Summary of intervention
Bobier et al. (2009)	Multidisciplinary team including nurses, clinicians, and occupational therapists.	Weekly sessions (duration not reported)	Not reported	Routinely administered, unclear how it was developed.	Weekly sport sessions, individualized for each person.
Mcllvain et al. (2015)	Videos of professional yoga teachers were facilitated by recreational therapists	8 weeks, sessions delivered 2 × per week for 45 minutes each (total of 90 minutes)	Yoga focused on physical postures (mixture of standing and sitting sequences) and breathing, with no spiritual component. Interventions were delivered via a video on the unit and were selected from pre-existing yoga programmes.	The researchers reviewed existing yoga programmes and decided on the intervention which was suitable for beginners, contained a mixture of postures and did not have a spiritual component.	Twice weekly yoga sessions delivered on the unit in a group setting and added to the residential programme schedule.
Woodhead et al. (2018)	Exercise physiology students supervised by an accredited exercise physiologist.	2 × 1 hour sessions delivered over 6 months initially then extended to 12 months.	Individualized programme taking into account variables such as fitness, strength, mobility, injuries. Goal-based and activity intervention developed around the person's interests. Mixture of individual and group supervised sessions, with exercise plans created for use in between sessions.	Within the Exercise Physiology Department, based on previous lifestyle trials.	Exercise Physiology programme delivered within a youth mental health service. Group and individual sessions delivered to young people based on their activity preferences as an adjunct to their usual care.

frequently (Woodhead et al., 2018). This related to the observation that young people either engaged well with the intervention or they only attended a few sessions.

3 | DISCUSSION

The aim of this review was to identify studies that reported lifestyle interventions (physical activity and diet) administered within child and adolescent inpatient units. There is a paucity of evidence for the implementation of lifestyle interventions in this setting. However, preliminary work suggests lifestyle interventions may be feasible within routine inpatient care. Therefore, this could potentially benefit young people's mental and physical health, as observed in other populations and care settings (Bobier et al., 2009; Firth et al., 2019; Gordon & Lubitz, 2009; Mcllvain et al., 2015; Noetel et al., 2016; Van der Baan-Slootweg et al., 2014; Vancampfort et al., 2017; Woodhead et al., 2018). For example, increased social support, higher activity levels, improved behavioural and psychosocial functioning and physical health

improvements, have all been observed in the existing studies (Bobier et al., 2009; Mcllvain et al., 2015; Woodhead et al., 2018). However, relatively few studies have been conducted to date and there is a lack of high-quality research in this area, meaning we are unable to make any conclusions on the efficacy of existing interventions or specific variables which could improve efficacy and outcomes.

Despite the dearth of current studies, the few that were identified suggest lifestyle interventions may be beneficial for young people. For example, individuals who took part in the 'Bod Squad' intervention found having a personalized approach to looking after their mental and physical health was useful (Woodhead et al., 2018). Many also valued the social element of the intervention, and claimed it had empowered them to engage in more physical activity in their daily life. The remaining studies suggest activity-based interventions may be acceptable and feasible when offered routinely within child and adolescent services. Rather than treating physical health independently to mental health, implementing activity-based sessions as part of routine ward management has the potential to benefit outcomes for young people.

3.1 | Clinical implications

There is a clear evidence and implementation gap, which neglects the impact lifestyle interventions may have for young adolescents on inpatient units. Given the plethora of existing evidence within clinical populations (Firth et al., 2019; Vancampfort et al., 2017), it is surprising that this knowledge has not yet extended into child and adolescent research. There are many reasons to suggest lifestyle interventions will benefit young people in inpatient services. For instance, multiple meta-analyses in adult patients have already demonstrated that exercise, diet and broader lifestyle interventions can reduce weight gain and improve a broad spectrum of metabolic health outcomes in people with severe mental illness (Firth et al., 2019; Vancampfort et al., 2019). In recognition of this, lifestyle interventions are recommended by National Institute for Health Care and Excellence (NICE), for use within mental health services (National Collaborating Centre for Mental Health, 2014). However, a recent review found they are not consistently offered in mental health trusts in the UK (Swaby et al., 2017). None of the studies included in this review had a focus on nutrition or looked at nutritional outcomes or knowledge. Yet, nutritional needs are critical in inpatient environments where young people are often given little choice over the foods they are provided, or receive little psychoeducation on the foods they consume both on the unit and upon discharge (Faulkner et al., 2009; Gorczynski et al., 2013). Therefore, ensuring appropriate interventions are implemented in inpatient units, in line with evidence-based practice is an area of clinical importance which would minimize the potential for iatrogenic harm.

Adolescent inpatients are a particularly vulnerable group. They often present with risk factors for poor physical health which precede the onset of illness. For example, many have high BMI values on admission, which rapidly increase with duration of stay (Carney, Imran, Law, Folstad, & Parker, 2019). They also display pre-cursors to developing metabolic disorders and preventable physical health conditions, such as dysregulated blood metabolites and hyperprolactinemia (Carney et al., 2016; Carney et al., 2019; Cordes et al., 2017; Eapen et al., 2012; Vancampfort et al., 2017). This affords the opportunity to intervene to prevent the development of comorbid conditions. Adolescents with mental health conditions are also less likely to receive high-quality physical health care across both inpatient and community mental health services than the general population (Carney et al., 2016; Carney, Bradshaw, & Yung, 2018; Cordes et al., 2017; Eapen et al., 2012; Vancampfort et al., 2017). Previous evaluations have shown young people who are prescribed antipsychotic medication do not receive physical health monitoring according to NICE guidelines (Gnanavel & Hussain, 2018; Pasha, Saeed, & Drevrek, 2015). There is evidence that metabolic health is also poorly monitored in adolescent inpatient settings, and many difficulties often go unrecognized and untreated (Eapen et al., 2012).

Those admitted to adolescent inpatient units experience the additional risk of the 'obesogenic environment' (Faulkner et al., 2009; Gorczynski et al., 2013). This refers to the additional restrictions and barriers to living a healthy lifestyle; including reduced opportunities to

be active and increased access to high-calorie foods (Faulkner et al., 2009; Gorczynski et al., 2013). Many existing interventions have been conducted in community settings or specialist services for outpatient treatment (Biddle et al., 2018 (Biddle et al., 2018; Carter et al., 2016; Curtis et al., 2016; Lubans et al., 2012; Parker & Bailey, 2018; Vancampfort et al., 2017). Therefore, tailoring interventions for adolescent inpatient units is necessary to optimize the care young people receive and may even improve long-term mental and physical health outcomes.

3.2 | Strengths and limitations

To the best of our knowledge, this is the first review of physical health interventions on adolescent inpatient units. We have identified a gap in the evidence base and highlighted the need for more research in this area. The scope of this review was intentionally broad, and few eligible studies were identified. The heterogeneity of the studies, and various outcomes and methodologies used did not allow direct comparison or meta-analyses. In addition, outcome measurements were often not standardized (McIlvain et al., 2015), and were devised by the researchers for the purpose of the study, introducing further bias. Formal quality assessments were not conducted due to the limited amount of studies identified; two of which looked at routinely administered physical health interventions, rather than controlled trials. One further consideration is that many child and adolescent services might indeed be conducting physical health interventions routinely but have not been formally evaluated. Therefore, we cannot draw firm conclusions on the efficacy of existing interventions compared with treatment as usual. However, we can make the call for further research in this area.

3.3 | Future work

Future work should explore lifestyle interventions for this vulnerable group. High-quality studies are needed in this area to identify effective health promotion interventions for adolescent inpatients. Many existing interventions are not appropriate for young people, or do not take into account the additional considerations of an inpatient unit such as limited opportunities to exercise, staffing requirements, patient safety, risk concerns and high levels of psychological distress. It may also be that an individualized approach is needed, adapted to enhance engagement across the varied diagnoses observed on child and adolescent inpatient units. This is reflected in the studies included in this review showing people with low mood had lower levels of adherence than those with schizophrenia spectrum disorders (Bobier et al., 2009). Therefore, future research should address this and identify feasible ways to increase physical activity levels and improve dietary intake on adolescent inpatient units. Interventions should be developed using the MRC Framework for Developing Complex Interventions (Craig et al., 2008); ensuring there is a solid theoretical underpinning for behaviour change, and that any approaches taken

are appropriate for the target population. It will also afford the opportunity to explore mechanisms of action and change (Michie, Van Stralen, & West, 2011). Adopting a youth-friendly approach is important; one which is developed in collaboration with young people, and affords the opportunity for continued engagement after transition from inpatient mental health settings. Given the young age of this population, there is potential to explore wider interventions that continue outside of the ward environment, by including families or community-based health services.

4 | CONCLUSION

Physical health interventions may be useful, feasible and acceptable within routine inpatient care for adolescents. However, there is a paucity of high quality, robust evidence for the use of lifestyle interventions on adolescent inpatient units. Significantly more research is required in this area to identify the best ways to improve outcomes for young people. It is important that we seek to reduce the physical health inequalities experienced by people with serious mental illness, and do so at the earliest possible stage. Adolescent inpatient units represent a potential target to intervene early and alleviate the physical health disparities of this group. Therefore, ensuring appropriate lifestyle interventions are implemented in inpatient units, according to evidence-based practice is an area of clinical importance, to minimize the potential for iatrogenic harm.

CONFLICT OF INTEREST

All authors declare that there are no conflicts of interest.

AUTHOR CONTRIBUTIONS

All authors contributed to conception and planning of the review. Rebekah Carney led on the review and all authors were involved in the interpretation of the results. Shermin Imran and Sophie Parker provided clinical expertise and input. Rebekah Carney, Heather Law and Joseph Firth provided research expertise. Rebekah Carney wrote the first draft of the manuscript, all authors contributed to the revised drafts and approved the final write up of the completed manuscript.

DATA AVAILABILITY STATEMENT

Data sharing is not applicable to this article as no new data were created or analyzed in this study.

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