


Evaluation of an exercise physiology service in a youth mental health service

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Background. Individuals who experience serious mental health disorders are at an increased risk of physical illness co-morbidity and early intervention is crucial. Recommendations to embed an exercise physiologist service into a mental health service have not been fully evaluated.

Objectives. This study aimed to determine (i) demographics and clinical characteristics of the young people referred to exercise physiology, (ii) adherence to metabolic monitoring, (iii) baseline physical health and (iv) level of engagement after referral.

Methods. This is a naturalistic cohort study and included all young people referred to the exercise physiology service between 2015 and 2019 at Orygen, a specialist youth mental health service in the north-western region of Melbourne.

Results. During the study period of 45 months, 312 young people were referred to exercise physiology, and of those, 51.3% were male. The mean age was 19.8 years. In regard to primary diagnoses, 47.4% had a psychotic disorder and 33.7% an affective disorder. Baseline weight measurements were completed for 71.8% of young people. The proportion of young people who were classified as overweight or obese increased from 55.1% to 70.4% ($p < 0.001$). For those referred, 61.5% attended either an individual session or a group session. A total of 29.5% did not attend their appointment following referral.

Conclusions. As over half of young people had poor physical health at presentation, integrating an exercise physiology service into a youth mental health service is a novel and needed intervention. However, there still needs to be an emphasis on metabolic monitoring and engagement.

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Introduction

Individuals who experience serious mental illness (SMI) are at an increased risk of physical illness co-morbidity and can die up to 20 years earlier than the general population average (Lawrence *et al.* 2013). The main reason for this increase in mortality and morbidity is due to an increased risk of developing metabolic and cardiovascular disease (Newcomer & Hennekens 2007), including diabetes, metabolic syndrome, chronic heart disease or obstructive pulmonary disease (Leucht *et al.* 2007; Oud & Meyboom-de Jong 2009).

The reasons for the increased risk of developing these diseases for those with SMI are manifold. Individuals with SMI can experience side effects from psychotropic medication, including weight gain, and dysregulation of glucose and lipids, and they have much higher rates of smoking than the general population (Lawrence *et al.* 2009). They are also less likely to engage in physical activity (Nyboe & Lund 2013) and

have poorer dietary intake compared to the general population (Hahn *et al.* 2014; Teasdale *et al.* 2019). Furthermore, stigma in medical settings can impact on the ability of people with SMI to access physical health care (Lawrence & Kisely 2010).

A large proportion of mental health disorders develop during early adulthood; therefore, this is a critical time in which to intervene in order to prevent, delay or address physical illness morbidity in this population. There is a growing international awareness of the need to intervene early. In 2013, the international physical health in youth working group developed the HEAL (Healthy Active Lives) declaration, which is an international consensus statement that aims to encourage practitioners to consider physical health when treating youth with psychosis and sets out an ambitious 5-year target to ensure their physical health is not compromised compared to their peers (International Physical Health in Youth (iphYs) Working Group 2013). The Lancet has recently published 'A blueprint for protecting physical health in people with mental illness' which is an in-depth summary of evidence in five areas of interplay between physical health and mental illness. The importance of a multi-disciplinary

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approach and the integration of a physical health intervention service in mental health care are discussed prominently (Firth *et al.* 2019).

Further, recent research highlights the importance of physical health interventions in recovery from mental health disorders (Rosenbaum *et al.* 2015), as well as in reducing physical morbidity and improving mental health symptoms. Research suggests that there is a role for accredited exercise physiologists (EPs) in the treatment of mental disorders (Lederman *et al.* 2015). EPs are allied health professionals who specialise in exercise prescription, behaviour change, motivational interviewing and providing health education and lifestyle advice, for the overarching goal of preventing, treating and managing chronic diseases and injuries (Lederman *et al.* 2015). Their focus is typically not to target weight loss.

In this context, Orygen, a youth mental health service, integrated an exercise physiology service into the clinical programme to assist in addressing the physical health of young people affected by mental health disorders. While this practice has been recommended, it is a relatively new recommendation and there has been little evaluation of the effect of such integration in a youth mental health setting. This study aimed to: (i) describe the demographics and clinical characteristics of the young people attending a youth mental health service who were referred to exercise physiology, (ii) determine the adherence to metabolic monitoring, (iii) describe the physical health of participants and (iv) determine engagement with the service by evaluating reasons for referral, attendance rates and reasons for discharge from the exercise physiology service.

Methods

Setting

The study took place at Orygen, a state government-funded youth mental health service for young people, aged 15–25, residing in north-western to western metropolitan Melbourne, Australia. Orygen operates across four streams of care in the community: First episode psychosis (Early Psychosis Prevention and Intervention Centre (EPPIC)) (McGorry *et al.* 1996), ultra-high risk for psychosis (Personal Assessment and Crisis Evaluation (PACE)) (Yung *et al.* 2007), borderline/severe personality disorder (Helping Young People Early (HYPE)) (Chanen *et al.* 2014) and mood disorders (Youth Mood Clinic (YMC)) (Rice *et al.* 2017), and also operates a 16-bed inpatient unit.

Participants

All young people referred to the exercise physiology service between 29th of May 2015 and 6th of March

2019 were included in the study. Referrals to the exercise physiology service were made by the case manager in the community clinics and by clinical ward staff on the inpatient unit. The reasons for referral to the exercise physiology service were determined by the referrer in consultation with the young person.

Study design

The study design is a naturalistic cohort study in which data were collected prospectively and electronic files were also reviewed to obtain demographic and clinical information.

Physical health interventions

The exercise physiology service provided individual and group sessions for those young people referred. The individualised exercise physiology programme involved a baseline assessment (including previous and current physical activity levels, and cardiorespiratory fitness) and the development of an individualised programme. Follow-up assessments were conducted as part of the routine metabolic monitoring within the clinical programme. The individualised programme was designed to balance the need to achieve sufficient activity intensity and volume that was challenging, with the need for the activity to be enjoyable. Some examples of individualised programmes included the EP supervising weights training at a local gym or working with the young person on a body weight routine. Group programmes were run at the three clinical sites at Orygen and involved attendance at a gym, yoga or boxing group.

Protocol for metabolic monitoring

The study evaluated the adherence to metabolic monitoring of the young people who were referred to the exercise physiology service. This was evaluated against the current metabolic monitoring policy used at Orygen, referencing an internal policy of North Western Mental Health (under the clinical governance of which Orygen operates), outlining the importance of physical monitoring in the holistic care of consumers and stating that ‘All consumers will receive Metabolic Monitoring (baseline observations) undertaken at the time of admission into a service’. A copy of this internal policy can be provided if required.

Definitions and cut-offs

BMI (National Health and Medical Research Council 2013)

A body mass index (BMI) is calculated by dividing the weight in kilograms by the height in metres, squared.

The classification for a BMI of less than 18.5 is underweight. A healthy weight range is classified as a BMI of 18.5–24.9. A BMI of 25–29.9 is classified as overweight, and a BMI more than 30 is classified as obese.

Waist circumference (International Diabetes Federation 2006)

The waist circumference is measured in centimetres in accordance with the International Diabetes Federation (IDF) guidelines. For males, the measurement is classified as above healthy range if it is ≥ 94 cm, while for females, if it is ≥ 80 cm. Measurements below these cut-offs are classified as being within the healthy range.

Statistical analysis

Data analysis was carried out in SPSS v24. Paired *t*-tests were conducted to determine if there was a difference between baseline and follow-up measures of weight. As the distribution of waist circumference was not normally distributed, non-parametric tests were used and the Wilcoxon signed-rank test was used to determine if there was a difference in the median of paired measurements. Chi-square tests (χ^2) were used to determine if differences existed between categorical variables.

Results

Demographics and clinical characteristics

During the study period of 45 months, 312 young people were referred to exercise physiology and of these, 51.3% ($n = 160$) were male and 48.7% ($n = 152$) were female. The mean age was 19.8 years (± 2.9). A total of 79.8% ($n = 249$) were born in Australia, while 18.3% ($n = 57$) were first generation migrants. In regard to primary diagnoses, 47.4% ($n = 148$) had a psychotic disorder, 33.7% ($n = 105$) an affective disorder and 11.2% ($n = 35$) a personality disorder. Table 1 shows further breakdown of numbers of young people referred per referral clinic and spread of diagnoses from each clinic. A total of 34.9% ($n = 109$) had a concurrent substance abuse disorder.

Adherence to metabolic monitoring

At the time of entry to the youth mental health service, adherence to metabolic monitoring was 71.8% ($n = 224$) for weight, 80.8% ($n = 252$) for height and 49.7% ($n = 155$) for waist. At the time of referral to the exercise physiology service, 64.4% ($n = 201$) had their weight measured and 50.9% ($n = 153$) had their waist circumference measured. At 6 months follow-up after attending the EP, 39.4% ($n = 123$) had measurements for weight and 29.2% ($n = 91$) had waist measurements.

Table 1. Diagnoses of young people referred, by referral clinic

	% in clinic	<i>n</i>	% of total	<i>n</i>
First episode psychosis clinic			59.3	185
Schizophrenia	31.4	58		
Schizoaffective	5.9	11		
Schizophreniform	16.2	30		
Unspecified non-organic psychosis	16.2	30		
BPAD with psychotic features	16.7	31		
MDD with psychotic features	7.1	13		
Other diagnoses	6.2	12		
Ultra-high risk for psychosis clinic			12.5	39
Schizophrenia ^a	5.1	2		
Schizophreniform disorder ^a	5.1	2		
Unspecified non-organic psychosis ^a	28.2	11		
BPAD	10.3	4		
MDD	30.8	12		
Other diagnoses	20.7	8		
Complex mood disorders clinic			12.2	38
BPAD	10.5	4		
MDD	63.2	24		
OCD	15.8	6		
Other diagnoses	10.4	4		
Specialist personality disorders clinic			15.7	49
BPD	61.2	30		
MDD with BP traits	30.6	15		
Other diagnoses with BP traits	8.1	4		

BPAD, bipolar affective disorder; MDD, major depressive disorder; OCD, obsessive compulsive disorder; BPD, borderline personality disorder; BP, borderline personality.

One participant did not have a documented diagnosis.

^a Progression of symptoms while engaged in the clinic, resulting in full threshold psychotic illness.

Physical health of young people referred to exercise physiology

Time of referral

The mean weight of the total cohort at the time of referral ($n = 201$) was 84.1 kg (± 25.0) and it was 88.2 kg (± 24.6) for males and 79.3 kg (± 24.8) for females. A measurement of height was available for 97.5% ($n = 196$) of those who had a weight measurement, and therefore, a BMI could be calculated. A total of 34.2% ($n = 67$) had a BMI within the healthy range, 31.6% ($n = 62$) were overweight and 32.1% ($n = 63$) were obese. A total of 2.0% ($n = 4$) were underweight. There was no difference in the proportion of young people who were overweight

or obese according to sex ($\chi^2 = 2.91$, $df = 3$, $p = 0.41$) or clinic ($\chi^2 = 12.64$, $df = 9$, $p = 0.18$) (Table 2). The median waist circumference for males was 93.0 (Interquartile range (IQR) 83.4–106.3) and for females was 88.0 cm (IQR 83.0–107.0). Of those young people who had waist measurements at the time of referral, the proportion which exceeded the healthy range was 62.1% ($n = 95$).

Six months post-referral paired analysis

Of the 201 young people who had a measurement of weight at the time of referral to the exercise physiology service, there was a follow-up measurement of weight for 47.2% ($n = 95$). It was found that there was a mean increase of weight by 3.68 kg (± 7.64) over the 6 months, as the mean weight increased from 86.3 kg (± 27.2) to 90.0 kg (± 27.6) ($t = -4.7$, $df = 94$, $p < 0.001$). For the 56 young people who had measurements of waist circumference at referral and at 6 months follow-up, there was an increase from a median of 95.3 cm (IQR 83.3–110.8) to 100.5 cm (IQR 88.0–109.8) and this was not statistically significant ($Z = -1.28$, $p = 0.20$). In regard to BMI, there was a significant increase in the proportion of young people who were overweight or obese from 64.1% ($n = 59$) to 71.7% ($n = 66$) ($\chi^2 = 57.3$, $df = 1$, $p < 0.001$).

Engagement and attendance with exercise physiology

Reason for referral

A documented reason for referral was provided for 166 young people and of these, 44% ($n = 73$) were to increase fitness/exercise/strength, 35.5% ($n = 59$) for weight management and 6.0% ($n = 10$) to access the group activity programme. Further reasons for referral (below 5% of documented referrals) are presented in Table 3.

Attendance

For all the 312 young people referred, 61.5% ($n = 192$) attended an individual session or a group session while a further 9.0% ($n = 28$) attended both. A total of 29.5% ($n = 92$) did not attend their appointment following referral.

Reason for discharge

Of the 237 documented reasons for discharge from the exercise physiology service, 10.5% ($n = 25$) declined the referral, 13.9% ($n = 33$) never attended, 48.1% ($n = 114$) disengaged after initial attendance, 16.5% ($n = 39$) completed their episode of care at the mental health service and 5.9% ($n = 14$) completed their goals. Further reasons for discharge (below 5% of documented discharges) are found in Table 3.

Table 2. BMI categories at referral according to sex and clinic

	Normal range (18.5–24.9)		Overweight (25–29.9)		Obese (>30)		Underweight (<18.5)		Statistical test of difference	p
	%	n	%	n	%	n	%	n		
Male	32.1	34	35.8	38	29.2	31	2.8	3	$\chi^2 = 2.91$	0.41
Female	36.7	33	26.7	24	35.6	32	1.1	1		
Total	34.2	67	31.6	62	32.1	63	2.0	4	$\chi^2 = 12.64$	0.18
Clinic										
EPPIC – First episode psychosis	31.8	41	34.1	44	32.6	42	1.6	2		
PACE – Ultra-high risk	41.2	7	11.8	2	35.3	6	11.8	2		
YMC – Youth Mood Clinic	37.5	6	37.5	6	25.0	4	0	0		
HYPE – Personality disorders	38.2	13	29.4	10	32.4	11	0	0		
Total	34.2	67					2.0	4		

Table 3. Engagement with the exercise physiology service

	%	n
Reasons for referral		
Weight management	35.5	59
Increase fitness/exercise/strength	44.0	73
Supervised group activity	6.0	10
Social/fun	4.8	8
Routine and activity	4.8	8
Symptom management	3.0	5
Injury	1.8	3
Total	100	166
Reasons for discharge		
Declined referral	10.5	25
Never attended	13.9	33
Medically unwell or not appropriate	2.5	6
Disengaged after initial attendance	48.1	114
Linked to other services	2.6	6
Discharged from Orygen	16.5	39
Goals completed	5.9	14
Total	100	237

Discussion

Summary

The integration of exercise physiology into routine mental health care is a relatively new practice and has not yet been subject to evaluation. In this study, we found that a large number of young people who were referred to the service had poor physical health and unfortunately in some aspects, such as BMI, there was a worsening over time. Approximately 70% attended the service following referral; however, engagement was not optimal. It has been shown that weight gain is associated with the initiation of antipsychotics (Allison *et al.* 1999), and the worsening over time of BMI further underscores the importance in early intervention and better engagement to address potentially preventable weight gain.

Limitations

Our study has focused on the anthropometric measurements; however, exercise physiology interventions do not simply target weight loss but rather a host of other factors, such as improvement in mental health symptoms, engagement in routine and activity, and improvement of fitness and exercise tolerance (Lederman *et al.* 2015). Due to the data available, it was not possible to evaluate the effectiveness of the exercise physiology intervention in terms of these other factors. While an increase in body weight was observed, this was an observational study and therefore the extent of the

weight gain without the intervention is unknown. Furthermore, there may have been a selection bias, in that metabolic monitoring was conducted on young people in whom it was already evident that they were gaining weight.

Clinical implications

The study showed that approximately 72% of those young people referred had baseline weight measurements. While guidelines advise a 100% rate of metabolic monitoring completion at baseline, our data are comparable to outcomes of previous studies in this area, where the rates of minimum metabolic monitoring were close to 80% after 18 months of a comprehensive intervention (Thompson *et al.* 2011). The study showed that despite being referred to the exercise physiology service, a large number of young people did not remain engaged and only a very small percentage was discharged (from the exercise physiology service) due to achieving their goals. This implies that further work needs to occur to engage young people in the exercise physiology service after the initial referral is completed. In line with this finding, Orygen is currently running a randomised control trial to determine if employing a dedicated physical health nurse assists participants to engage in physical monitoring and interventions (O'Donoghue *et al.* 2019).

Conclusion

There is research supporting the embedding of an exercise physiology service within a mental health setting; however, our study showed that further work needs to occur to improve baseline metabolic monitoring prior to referral, as well as improving engagement with the exercise physiology service to ensure that young people benefit from the offered interventions.

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Conflict of interest

All 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.

Ethical approval was granted by the Melbourne Health Human Research Ethics Committee (QA2019037).

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