What impact can digitally delivered health care for complex obesity have on depression severity? A service evaluation

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This paper highlights how a digital, physical health setting might impact people living with obesity from a psychological perspective. Specifically, it focuses on changes across time in depression symptoms. It highlights the holistic benefits of digital innovation.
Keywords: *Depression; digital.*

Introduction

THE MAJORITY of adults in the UK, 67 per cent of men and 60 per cent of women, are overweight or obese. These figures include 26 per cent of men and 29 per cent of women that live with obesity (NHS Digital, 2020). Of all adults living with obesity, one in eight live with severe obesity, classified as a body mass index (BMI) of 40kg/m^2 (House of Commons Library, 2021).

The link between depression and obesity appears to be bi-directional: obesity seems to increase the risk of depression (Luppino et al., 2010), and depression can increase the risk of obesity. Poor mental health impairs health behaviour, including eating patterns

and maintaining a daily routine, and it seems that supporting clients to change their eating patterns leads to improvement in mental health (Bauer et al., 2016).

Tier 3 weight management services are specialist programmes designed for those living with severe, complex obesity or those with a BMI of >35kg/m² with co-morbidities who have not responded to previous Tier 2 interventions. Tier 3 services are multi-disciplinary, typically including a physician (consultant or GP with a particular interest in obesity), dietitians, clinical psychologists and provision of physical activity support (Public Health England, 2014).

The NHS Long Term Plan (NHS, 2019) aims to increase access to evidence-based digital NHS services. Preliminary research suggests that face-to-face and digital care offer non-significant differences in weight loss and service user acceptability scores from service users within a Tier 3 weight management programme (Huntriss et al., 2021; Appel et al., 2011). However, there is a lack of data regarding the impact of digital weight management services on depression within a complex obesity service.

Therefore, this service evaluation aimed to determine the effect of a digital weight management service on the depression scores of people living with complex obesity.

Methods

The intervention

The Tier 3 weight management programme accepts service users living with obesity who have a BMI of >35kg/m² with comorbidities. The programme is digitally enabled and offers support for up to 12 months. The intervention combines health coach support delivered via app, phone or video; educational resources available via the app and web platform; and an app with multiple integrated behaviour change components.

The app includes the key behaviour change techniques that are evidence-based to support change around eating and activity (Ashton et al., 2020): self-monitoring and feedback (for example, participants can track their food intake using the photo tool in the app and then share their food logs with their health coach); goal setting (using in-app tools including nudges), information on risk/outcomes and demonstration of the desired outcome (through digital learning content), and coach interaction (via phone, text chat or video calls) (Gotz, 2020). Educational material is provided in written, audio and video format and is designed to be highly interactive and engaging (e.g. using quizzes and interactive tools).

Participants are also supported by coaches trained in nutrition, motivational interviewing, behaviour change techniques (BCT) and communication skills. They facilitate behavioural activation in service users, provide education, and give feedback on behaviour to prevent relapse. The coaching and educational materials specifically target the psychological barriers to change that participants may be facing. This includes components of cognitive behavioural therapy, mindful eating training and psychoeducational input to support changes in emotional eating.

Procedures

Before starting the programme, all participants complete a range of questionnaires that provide vital information about their physical and mental health, as well as demographic information. Suitable participants then have two telephone assessments, one with a dietitian and the other a member of the psychology team. This triage identifies the appropriate level of support that is needed, with psychological wellbeing (alongside emotional/binge eating risk) being a key indicator.

Data collection

As part of this assessment, service users complete the self-reported PHQ-9, a well-validated and widely used measure of depression (Kroenke, 2002). Service users respond between 0 ('not at all) and 3 ('nearly every day') across nine items, and these scores are totalled to provide an overall PHQ-9 score (Kroenke, 2002). The cut-off scores categorise the severity of depressive symptoms: 0–4:

none; 5–9: mild; 10–14: moderate; 15–19: moderately severe; 20–27: severe. Total scores of 10 and above are clinically significant as the recommended cut-off has been reached (IAPT Therapies Manual, 2020); this is otherwise known as 'caseness' for depressive symptoms.

Service users were then asked to complete the PHQ-9 at three months and six months after starting the Tier 3 programme. Changes in scores throughout the programme were determined by comparing mean scores at baseline, three and six months and using a two-tailed paired t-test to assess the significance of the changes. The distribution of service users across the score categories was also tracked to evaluate any shift to less clinically severe categories within the cohort. Previous research has shown that at an individual level, a change of 5 points is clinically significant (Löwe et al., 2004); therefore, changes in the score at three and six months (compared to baseline) were assessed to determine the number of service users that had achieved this threshold.

Service users

Data was analysed from a subset of participants (N=54, 78 per cent female) engaged in a digital tier 3 weight management programme for complex obesity. All participants were referred to the service by their local NHS service provider, usually a GP. Participants were from across England and Scotland. The service users who accessed this programme, were from a range of cultural backgrounds 71 per cent (44 per cent being Bangladeshi, 11 per cent being British Black African Americans). All participants have been able to use the technology effectively and engage in remote telephone or text support.

Results

The average PHQ-9 score at baseline (N=54) was 9.33, at three months 7.33, and at six months 6.89. A decrease in an average score as service users progress through the programme can clearly be seen, and three and six month scores are significantly different from baseline (p = 0.0026 and 0.0022 respectively, two-tailed paired t-test).

At baseline, 50 per cent of the service users had a score of 10 or more; this decreased to 31.5 per cent at three months and 33.3 per cent at six months (Table 1 & Figure 1). There is a drop in the percentage of service users in all categories other than the least severe, showing that during the programme, service users shift from more to less severe categories, which brings about a decrease in clinical caseness.

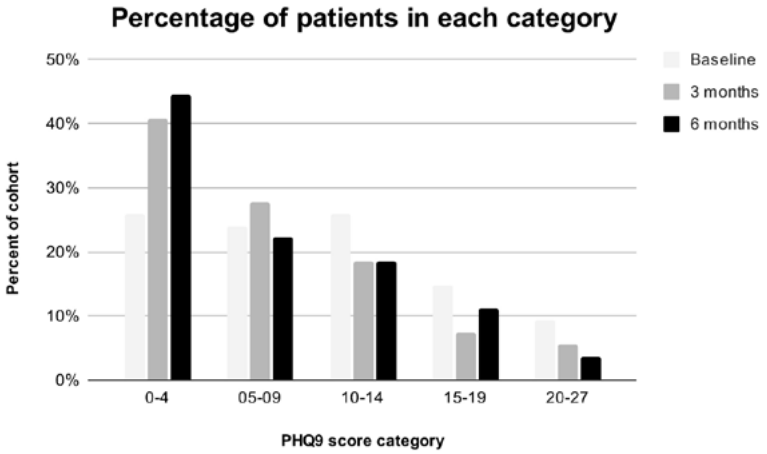
This shift to less severe categories is also seen when assessing the change in individual service users categories throughout the programme (Figure 1): at three months, 41 per cent of service users had moved to a lower category and 48 per cent at six months.

A reduction in score of 5 points indicates a clinically significant change. At three months, 20 per cent of service users had a decrease of 5 or more points from baseline and 37 per cent of service users at six months.

Table 1: Number and percentage of service users within defined PHQ9 score categories at baseline, 3 months and 6 months

	Baseline		3 months		6 months	
Score category	#	%	#	%	#	%
0–4	14	25.9%	22	40.7%	24	44.4%
5–9	13	24.1%	15	27.8%	12	22.2%
10–14	14	25.9%	10	18.5%	10	18.5%
15–19	8	14.8%	4	7.4%	6	11.1%
20–27	5	9.3%	3	5.6%	2	3.7%

Figure 1: Percentage of patients in each PHQ-9 category at baseline, 3 months and 6 months



Discussion

The results support the efficacy of remote blended-care multidisciplinary approaches for Tier 3 weight management and show its ability to reduce depression symptoms in people with complex obesity. These encouraging results and the positive holistic effects for service users suggest that it is helpful for weight management services to both target improvements in depression and track changes using a validated tool such as the PHQ-9.

Potential mechanisms explaining the observed results include previous research, which has shown that weight loss in itself can positively influence patients' self-perception improve self-confidence and mood (Stunkard et al., 2003), leading to decreased depression levels. Moreover, evidence suggests that healthy eating patterns and increased physical activity improve psychological wellbeing and, vice versa, improved psychological wellbeing also supports the maintenance of healthy lifestyle behaviours (Polivy & Herman, 2005). An additional component may be the app technology which offers easy and convenient access to care (Rao et al., 2018).

Limitations of the study include the small sample size and the resulting lack of generalisability of the findings. Future research utilising larger sample will be needed to understand the complex interplay of interventions in blended-care multidisciplinary approaches and assess their individual and combined effects for holistic health benefits (e.g. Michie & Johnston, 2012).

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