LETTER

Improved diabetes-related distress and self-efficacy outcomes in a self-management digital programme for people with type 2 diabetes, myDESMOND

The Long-Term Plan published in 2019 by National Health Service (NHS) England commits to better care, by urging the application of technology and digital solutions in the future of diabetes treatment.[1] Digital self-management programmes are becoming increasingly popular as a supplement resource to face-to-face diabetes self-management education and support (DSMES) programmes, showing the potential to improve biomedical outcomes such as HbA1c.[2,3] However, evidence on psychological outcomes remains limited.[4]

In the UK, the COVID-19 pandemic has put 'traditional' DSMES programmes on hold due to lockdown restrictions, enabling a number of digital DSMES programmes to rise to the occasion and provide remote support to people with type 2 diabetes. The influence of this social phenomenon has led to the increased uptake of many digital DSMES programmes, including myDESMOND, X-PERT and Changing Health to name a few.

In a recent Letter published in Diabetic Medicine,[5] we highlighted the importance of an implemented digital self-management programme, myDESMOND, in supporting people with type 2 diabetes during the COVID-19 pandemic.[6] The Letter was based on a survey conducted in 2020 (n = 803), which showed that the digital programme was widely used across the UK, with improvements reported in self-management activities, including food choices, physical activity and stress management.[5]

Overall, the stress and demands of living with type 2 diabetes can be challenging and overwhelming. These emotions can lead to high levels of diabetes-related distress and low levels of self-efficacy, which can ultimately act as a barrier to optimal diabetes self-management and self-care.[7,8] With this in mind, we wanted to explore the impact of myDESMOND on two key psychological outcomes, diabetes-related distress and diabetes management self-efficacy. As part of our service evaluation, two widely used and validated questionnaires were completed by myDESMOND users; the PAID-5 questionnaire to measure diabetes-related distress [9] and the DMSES questionnaire to measure self-efficacy.[10]

Between October 2019 and October 2020, 1,537 users of myDESMOND provided complete baseline and follow-up PAID-5 data while 1,671 users provided complete DSMES data at baseline and follow-up. Both samples of users were ethnically diverse. The majority of follow-up data was collected 4 weeks after users began using the myDESMOND programme, however due to logistical reasons, a small proportion of follow-up data was collected after 8 weeks (8.1% of users who provided follow-up PAID-5 data and 10.7% of users who provided follow-up DESMES data). As significant differences in both scores were observed in the 4-week and 8-week follow-up groups, data were merged and are presented as one dataset in Table 1.

Nonparametric tests were conducted to compare scores at baseline and follow-up, and logistic regression was used to assess the effect of covariates (sex, age and ethnicity) on the difference in scores between baseline and follow-up. All statistical analyses were conducted using STATA version 16.0 (Statacorp., College Station, TX, USA). A significant decrease in the prevalence of diabetes-related emotional distress was observed between baseline (56.7%) and follow-up (47.8%) ($p < 0.001$) in the total sample (Table 1). The reduction in the prevalence of distress was significant in both males and females, and in users from both age groups (<60 years, ≥60 years). However, the reduction was significantly greater among females compared to males (OR = 1.34, 95% CI: 1.06–1.70), and significantly smaller among users aged 60 years or over compared to those aged under 60 years (OR = 0.75, 95% CI: 0.60–0.95). Although a significant decrease in the prevalence of distress was observed in both the White and the Black/Asian ethnic groups, the prevalence of distress remained higher in the Black/Asian group compared to the White group at follow-up.

The prevalence of high self-efficacy significantly increased between baseline (39.1%) and follow-up (49.6%) ($p < 0.001$). A significant increase in high self-efficacy was observed in both males and females, although the increase was significantly smaller in females compared to males (OR = 0.67, 95% CI: 0.52–0.86). A significant increase was also reported by users from both age groups (<60 years, ≥60 years) and by users from both the White and Black/Asian ethnic groups. However, the prevalence of high self-efficacy remained lower in the White group compared to the Black/Asian group at follow-up.

The results of this service evaluation showed significant improvements in self-efficacy and diabetes-related distress.

TABLE 1 Median baseline and follow-up scores for diabetes-related emotional distress and diabetes management self-efficacy in the total sample, and prevalence of distress and high self-efficacy in the total sample and categorised by sex, age group and ethnicity

Diabetes-related emotional distress

	Number of users	Total score, median (IQR) Baseline	Follow-up	p value[a]
Total Sample	1537	9 (4–12)	7 (3–11)	<0.001

	Number of users	Prevalence of distress (%) Baseline	Follow-up	p value[b]
Total Sample	1537	57%	48%	<0.001

	Number of users	Prevalence of distress (%) Baseline	Follow-up	p value	Odds Ratio (95% CI)[c]
Sex					
Male	754	47%	40%	0.001	1.00 (ref)
Female	748	67%	56%	<0.001	1.34 (1.06, 1.70)*
Age Group					
<60 years	776	65%	55%	<0.001	1.00 (ref)
≥60 years	761	48%	41%	<0.001	0.75 (0.60, 0.95)*
Ethnicity					
White	1,261	55%	46%	<0.001	1.00 (ref)
Black/Asian	192	69%	58%	0.014	1.34 (0.95, 1.90)
Other/Mixed	50	56%	60%	0.480	2.07 (1.07, 4.02)*

Diabetes management self-efficacy

	Number of users	Total score, median (IQR) Baseline	Follow-up	p value[a]
Total Sample	1671	93 (75–113)	100 (80–119)	<0.001

	Number of users	Prevalence of high self-efficacy (%) Baseline	Follow-up	p value[b]
Total Sample	1671	39%	50%	<0.001

	Number of users	Prevalence of high self-efficacy (%) Baseline	Follow-up	p value	Odds Ratio (95% CI)[d]
Sex					
Male	842	44%	56%	<0.001	1.00 (ref)
Female	809	35%	44%	<0.001	0.67 (0.52, 0.86)*
Age Group					
<60 years	865	36%	47%	<0.001	1.00 (ref)
≥60 years	806	42%	52%	<0.001	1.08 (0.84, 1.38)
Ethnicity					
White	1,396	39%	49%	<0.001	1.00 (ref)
Black/Asian	204	42%	52%	0.002	1.02 (0.70, 1.50)
Other/Mixed	52	46%	50%	0.727	0.75 (0.36, 1.56)

95% CI, 95% confidence interval; IQR, interquartile range.

[a]Wilcoxon signed rank test comparing median baseline and follow-up scores.

[b]McNemar's test comparing prevalence at baseline and follow-up.

[c]Adjusts for presence/absence of distress at baseline.

[d]Adjusts for presence/absence of high self-efficacy at baseline.

*$p \leq 0.05$.

Although the follow-up period of this evaluation may be considered short compared to a standard trial follow-up and the absence of a control group may limit the conclusions that can be made from the results, the significance of these findings nevertheless contributes to the growing evidence of digital self-management programmes' role in type 2 diabetes emotional management. These preliminary findings challenge existing evidence that undermine the impact of digital programmes on diabetes care and strengthen the argument that such programmes can improve not only the medical and behavioural aspects of type 2 diabetes management, but the psychological also.

With barriers to uptake increasing over time, particularly during the COVID-19 pandemic, face-to-face DSMES programmes delivery is becoming even more challenging. Thus, it is important to ensure that evidence-based digital self-management programmes are considered for the NHS digital transformation plan to enhance self-management support and promote better type 2 diabetes care.

Michelle Hadjiconstantinou[1] ⓘD
Mary M. Barker[1]
Chris Brough[2]
Sally Schreder[2]
Alison Northern[2]
Bernie Stribling[2]
Kamlesh Khunti[1,2] ⓘD
Melanie J. Davies[1,2] ⓘD

[1]*Diabetes Research Centre, College of Life Sciences, University of Leicester, Leicester, UK*
[2]*Leicester Diabetes Centre, University Hospitals of Leicester NHS Trust, Leicester, UK*

Correspondence
Michelle Hadjiconstantinou, Diabetes Research Centre, College of Life Sciences, University of Leicester, Leicester, UK.
Email: mh333@le.ac.uk

ORCID
Michelle Hadjiconstantinou ⓘD https://orcid.org/0000-0003-2827-0988
Kamlesh Khunti ⓘD https://orcid.org/0000-0003-2343-7099
Melanie J. Davies ⓘD https://orcid.org/0000-0002-9987-9371

REFERENCES
1. NHS England. The Top 5 diabetes long term highights, 2020 [Available from: https://www.england.nhs.uk/blog/the-top-5-diabetes-long-term-highlights/.
2. Hadjiconstantinou M, Byrne J, Bodicoat DH, et al. Do web-based interventions improve well-being in type 2 diabetes? A systematic review and meta-analysis. *J Med Internet Res*. 2016;18(10):e270.
3. Pal K, Eastwood SV, Farmer A, et al. Computer-based interventions to improve self-management in adults with type 2 diabetes: a systematic review and meta-analysis. *Diabetes Care*. 2014;37:1759-1766.
4. Celik A, Forde R, Sturt J. The impact of online self-management interventions on midlife adults with type 2 diabetes: a systematic review. *British Journal of Nursing*. 2020;29(5):266-272.
5. Quinn LM, Davies MJ, Northern A, et al. Use of MyDesmond digital education programme to support self-management in people with type 2 diabetes during the COVID-19 pandemic. *Diabet Med*. 2020;n/a(n/a):e14469.
6. Hadjiconstantinou M, Schreder S, Brough C, et al. Using intervention mapping to develop a digital self-management program for people with type 2 diabetes: tutorial on MyDESMOND. *J Med Internet Res*. 2020;22(5):e17316.
7. Martinez-Vega IP, Doubova SV, Pérez-Cuevas R. Distress and its association with self-care in people with type 2 diabetes. *Salud Mental*. 2017;40(2):47-55.
8. Owens-Gary MD, Zhang X, Jawanda S, Bullard KM, Allweiss P, Smith BD. The importance of addressing depression and diabetes distress in adults with type 2 diabetes. *J Gen Intern Med*. 2019;34(2):320-324.
9. McGuire B, Morrison T, Hermanns N, et al. Short-form measures of diabetes-related emotional distress: the Problem Areas in Diabetes Scale (PAID)-5 and PAID-1. *Diabetologia*. 2010;53:66-69.
10. Sturt J, Hearnshaw H, Wakelin M. Validity and reliability of the DMSES UK: a measure of self-efficacy for type 2 diabetes self-management. *Prim Health Care Res Dev*. 2010;11(4):374-381.