

# Use of Personalized Goals and Challenges in a Digital Health Tool to Amplify Patient Engagement with the ADCES7 Self-care Behaviors

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## BACKGROUND

Diabetes is primarily a self-managed condition requiring individuals to perform and track multiple daily tasks as outlined in the Association of Diabetes Care and Education Specialists' self-care behaviors framework, the ADCES7 Self-Care Behaviors®<sup>1</sup> (Figure 1). Diabetes self-management is challenging with only about half of those diagnosed meeting American Diabetes Association (ADA) treatment targets<sup>2,3</sup>. Unique physical characteristics, emotional concerns and environmental circumstances impact an individual's ability and willingness to self-manage their condition<sup>4</sup>. Digital innovations can help to individualize care to best match the lifestyle needs and circumstances of each person supporting them as they live their daily lives with diabetes<sup>5</sup>. Digital health can also provide actionable data for the care team giving them a window into the person's self-management journey and insights to optimize the care plan on a timely basis.

Figure 1: ADCES7 Self-Care Behaviors®



## SPECIFIC AIMS/PURPOSE

We analyzed the data from a cohort of digital health users with both type 1 and type 2 diabetes, to compare the digital engagement levels with key ADCES-7 self management behaviors for those who set goals and app engagement challenges versus those who did not set goals or accept app engagement challenges. A goal is defined as a clinical outcome objective, such as a targeted reduction in average glucose value, blood pressure value, or weight value. In contrast, a challenge is defined as an engagement threshold with a specific function category in the app, e.g., the number of food entries made, the number of exercise entries made, etc. Our objective was to quantify the effect of setting goals and challenges on overall digital health engagement with the stipulated ADCES-7 self-management behaviors.

## METHODS

Digital health engagements for a cohort of N=464 people with diabetes (Male 37%; T2D 90%; age 18-39: 12%; 40-64: 59%; >65: 29%) were tabulated by aligning each of the digital engagement features with an ADCES-7 core self-management behavior. Outliers were removed using Z-score methods. Average total engagements (across all ADCES-7) per person over the 90-day period were then compared for groups with all combinations of goals and challenges (e.g., neither goals nor challenges, goals but no challenges, no goals but challenges, and both goals and challenges). Figure 2 shows a sample digital engagement screen as well as an example each of a goal and challenge.

## RESULTS

Figure 2: Screenshots of the Digital Health Solution

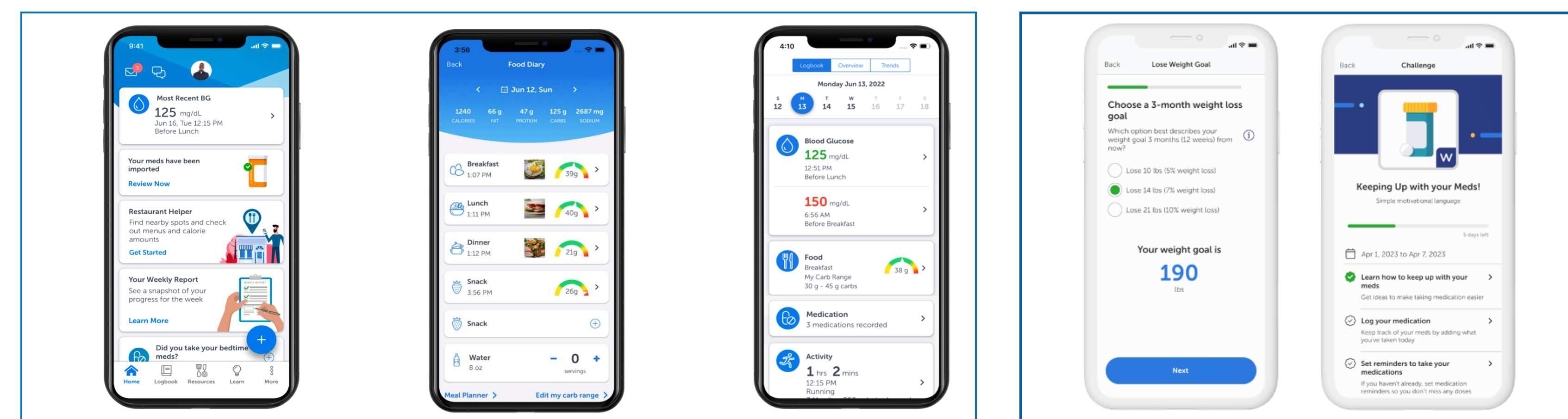


Figure 3: Average Total Engagements by Permutations of Goals and Challenges

	No Challenges, No Goals	Challenges, No Goals	No Challenges, Goals	Challenges, Goals
N	315 (68%)	27 (6%)	61 (13%)	61 (13%)
Average Engagements per User in 90-day Observation Period	12	21	43	93
p-value* when compared with group with no goals, no challenges, * 2-tail t-Test unequal variance	N/A	0.32	0.002	0.0053

Figure 4: Average Individual ADCES-7 Engagements by Group

	No Goals, No Challenges	Challenges, No Goals	No Challenges, Goals	Goals, Challenges
N	315 (68%)	27 (6%)	61 (13%)	61 (13%)
Average Engagements per User in 90-day Observation Period	12	21	43	93
Problem Solving	0.8	1.3	1.5	4.5
Reducing Risks	2.4	2.0	4.6	7.1
Monitoring	2.6	9.2	9.1	14.6
Taking Meds	0.1	0.5	0.7	5.9
Healthy Eating	0.5	4.3	6.9	29.0
Healthy Coping	0.0	0.0	0.0	0.3
Being Active	5.2	3.3	20.6	31.8

As seen in Figure 3, there is an almost “geometric” effect of adding in-app challenges and goals on total engagement with ADCES-7 self management behaviors. The addition of a challenge nearly doubles the engagement from baseline levels with no challenges or goals. The addition of a goal nearly quadruples the engagement level and adding both a challenge and a goal increases engagement by nearly 8X. The addition of just a goal as well as both challenges and goals led to statistically-significant differences in engagement levels vs. that of the baseline case, suggesting the importance of goal setting in a digital health app.

Figure 4 explores the micro-effect of goals and challenges on individual ADCES-7 behaviors. As seen, the addition of challenges alone seems to affect monitoring and healthy eating the most, while the addition of goals seems to affect healthy eating, followed by being active and monitoring. The addition of both challenges and goals seem to affect taking medications and eating the most, followed by problem solving and reducing risks. Overall, there seems to be a positive effect of setting goals and challenges within a digital health tool on the ADCES-7 self management behaviors

## CONCLUSIONS

Digital health tools have shown promise to improve health outcomes for people with diabetes<sup>6</sup>. The addition of both personalized challenges and goals has the potential to significantly impact the frequency by which persons with diabetes interact with and execute on the recommended ADCES-7 self-management behaviors. Future work can use advanced regression and AI modeling techniques such as Shapley value analysis to further identify “micro-goals” and “micro-challenges” within the ADCES-7 framework that can lead to improved and more personalized self-management behaviors and ultimately, better health outcomes. Such tools and modeling techniques can prove to be valuable to the ADCES community in their quest to impart diabetes self-management best practices to their respective patient groups.

## REFERENCES

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