

# Determinants of Engagement in Digital Health: What Makes it Stick?

Daniel Henderson, MD, MPH<sup>3</sup>, Malinda Peeples, RN, MS, CDE, FAADE<sup>1</sup>, Janice Macleod, MA, RDN, LDN, CDE, FAADE<sup>1</sup>, Vinayak Shenoy,<sup>1</sup> Stephen Lynch<sup>3</sup>, and Mansur Shomali, MD, CM<sup>1,2</sup>

<sup>1</sup>WellDoc, Inc., Columbia, MD, <sup>2</sup>MedStar Union Memorial Hospital, Baltimore, MD, and <sup>3</sup>The Ambulatory Practice of the Future, Massachusetts General Hospital, Boston, MA

2018 Diabetes Technology Meeting, Bethesda, MD, USA, November 9, 2018

## Introduction

Digital therapeutics show tremendous promise for improving care of chronic conditions. By enabling highly-tailored patient self-management, as well as continuous information exchange with care teams, such platforms can improve healthcare value in ways not previously possible. However, engagement determines effectiveness, and digital therapeutics, sometimes called “software as medicine,” present new kinds of “adherence” challenges. In particular, digital therapeutics represent a radical disruption of traditional care delivery, and patients may vary in their readiness for alternatives to the pills, lab tests, and doctor visits they have come to expect. To paraphrase a tech adage: One patient’s feature is another patient’s bug.

While implementing BlueStar, the FDA-cleared digital therapeutic produced by Welldoc, Inc., in a primary care clinic, we sought to examine factors that might predict strong uptake, in order to better meet the needs of patients getting started with BlueStar. By understanding the determinants of digital therapeutic engagement, we intend to better target patients likely to succeed, as well as to tailor outreach efforts to overcome barriers to effective use. In addition to improving the health of the patients, we worked diligently to create a process that would not increase burden on the providers and their office staff.

## Methods

Beginning in October 2017, we implemented BlueStar in an innovative primary care practice in Boston, with our first patients trying BlueStar in January 2018. Patients were selected according to BlueStar’s FDA indications for use, i.e. adults with type 2 diabetes. Early on, we noticed variation in the degree of engagement. Some patients quickly became robust users, while others struggled to get going or stick with it. Many of these trajectories were unexpected, and so we sought to systematically assess patient characteristics (putative determinants) that might influence uptake or attrition.

We defined eight factors that seemed likely to drive uptake, and asked PCPs to assess patients on the basis of these factors, the sum of which provided a simple onboarding score, against which we compared the outcome of engagement with BlueStar within the first 3 months after activation.



MASSACHUSETTS  
GENERAL HOSPITAL



## Composition of onboarding score

1. General health motivation
2. Salience of diabetes specifically to the user
3. New diagnosis (last 12 months)
4. Technology savviness
5. Relational connectedness with the provider
6. Richness of onboarding communication
7. Degree of follow up prodding
8. Lack of competing comorbidity

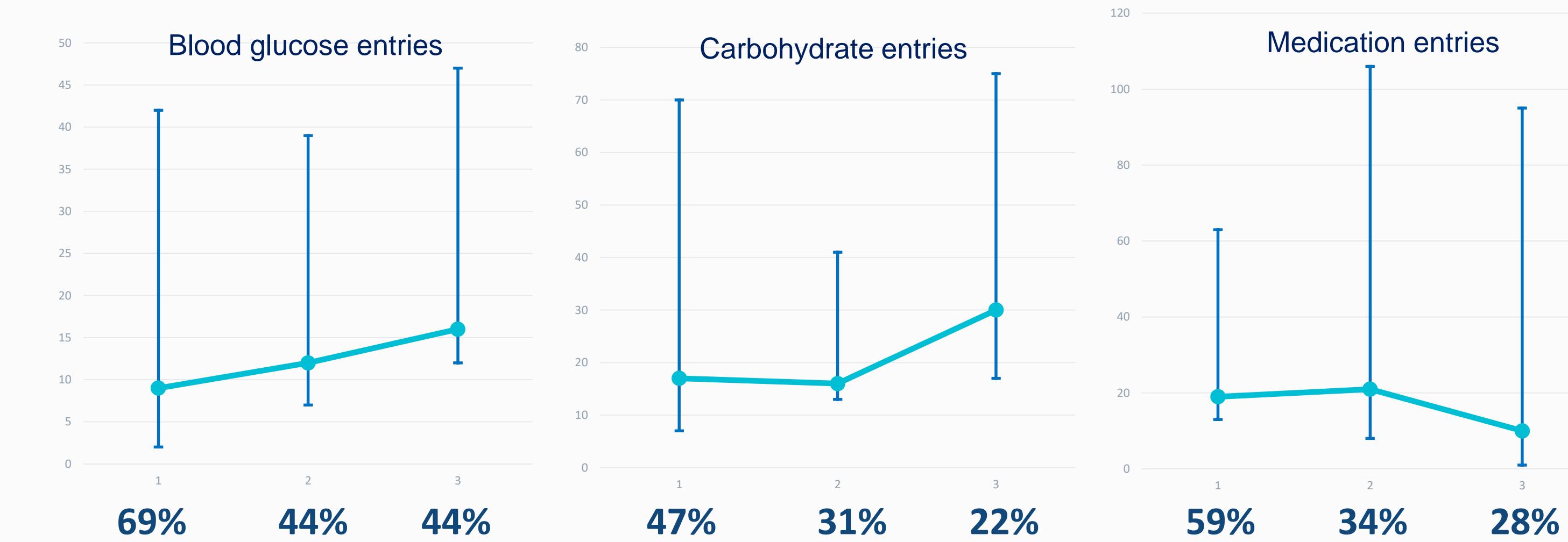
A composite score was calculated for each user based on 8 sub scores ranging from 0 to 3 points and one (#3) yes/no score. The maximum possible score is 22. Patient users were assessed by their primary care physicians.

## Results

### User demographics

Age (median)	55 years	Age (IQR*)	35-72 years	Male	69%	Insulin users	34%	*Interquartile range
--------------	----------	------------	-------------	------	-----	---------------	-----	----------------------

### User entries by category for the first 3 months during the pilot period

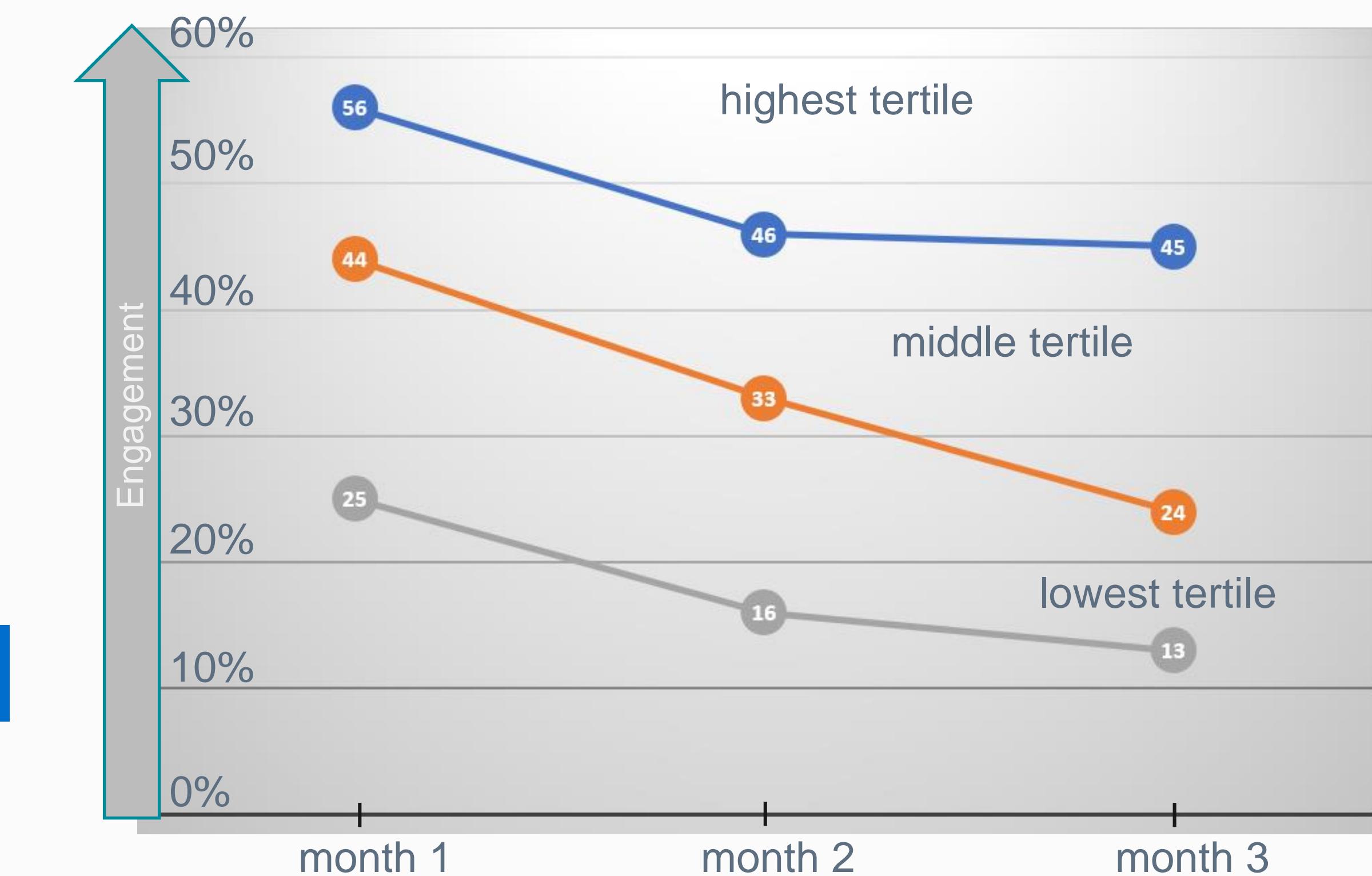


The BlueStar platform records user data on Welldoc servers. The data here shows the number of glucose, carbohydrate, and medication entries by month for 3 months. Each monthly data point represents the median number of entries only for those users making entries in each category. The error bars represent interquartile ranges. The percentage of users making entries in each category each month is shown below each graph.

### Onboarding scores, by tertile

Tertile	Median Score	IQR
highest	16	16-17
middle	14	14-15
lowest	0	0-10

## Engagement and persistence rates were high overall and varied by onboarding score



Engagement was defined as the percentage of days the users accessed BlueStar within each 30 day period (the Daily Active Users (DAU) to Monthly Active Users (MAU) Ratio).

## Conclusions

- A simple assessment by the health care team can predict user engagement and persistence with a digital health tool
- These determinants highlight opportunities for effective engagement with digital therapeutics
- Future studies should expand the onboarding score to include a measure of diabetes self-management knowledge and skill and examine which components of the composite score is most predictive
- Awareness of patient factors may be valuable for optimal implementation of digital health technologies into clinical practice

## References

Quinn C et al. Cluster-Randomized Trial of a Mobile Phone Personalized Behavioral Intervention for Blood Glucose Control Diabetes Care September 2011; vol. 34 no. 9: 1934-1942

