Qualitative Study: User Experiences with *Platano*, a Dietary Self-Monitoring App for Underserved Patients with Type 2 Diabetes

Filippa Juul[1], Amenda Almonte[2], Lena Mamykina[2], Jhack Sepulveda[2], Elizabeth Heitkemper[2,3], Elliot Mitchell[2], Marissa Burgermaster[4,5]

[1]Department of Epidemiology, College of Global Public Health, New York University, [2]Department of Biomedical Informatics, Columbia University, [3]School of Nursing, University of Texas at Austin, [4]Department of Nutritional Sciences, College of Natural Sciences, University of Texas at Austin, [5]Department of Population Health, Dell Medical School, University of Texas at Austin

Background

- 30 million Americans have type 2 diabetes[1]
- Americans from low socioeconomic and racial/ethnic minority groups have higher diabetes prevalence and fewer management resources[1]
- Diet and blood glucose monitoring are linked to better diabetes management[2]
- Sustained engagement with self-monitoring is challenging, especially among underserved populations[3,4]
- This may exacerbate health disparities via "intervention-generated inequalities"[5,6]
- In focus groups, we found that mHealth tools for diabetes self-monitoring tailored Self-Determination Theory's extrinsic—intrinsic motivation continuum may improve engagement and dietary management of type 2 diabetes

Objective:
Understand the *Platano* user experience for patients with type 2 diabetes from a New York City neighborhood with high levels of health disparities.
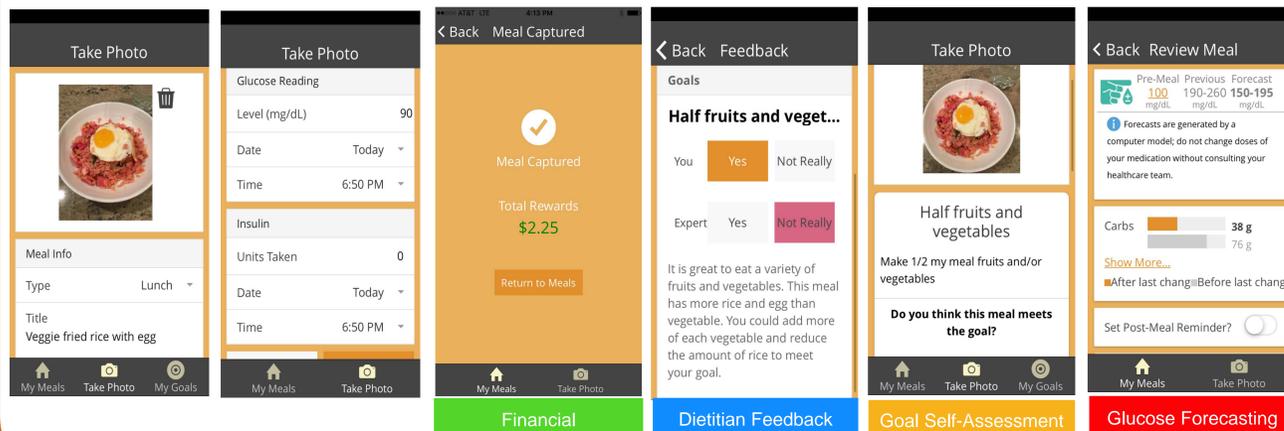
Platano

A self-determination theory-based mHealth diet and blood glucose self-monitoring app developed with user-centered design.

Self-determination theory applied to findings from focus groups with participants from population of interest

	extrinsic motivation			Intrinsic motivation
regulatory styles	external	introjected	identified	integrated
regulatory processes	compliance, reward/punishment	pride, self-esteem, guilt avoidance	personal importance	congruence with self/values
self-monitoring behaviors	data collection	sharing data with others	self-monitoring	self-management
behavior change strategies	money, points, material reward	feedback from social network or clinician	goal setting and tracking	insight about actions and health consequences

Platano users…

1. Log meal
2. Log blood glucose
3. Receive feedback tailored based on extrinsic—intrinsic motivation continuum

Methods

The ongoing **Personal Informatics Technology for Engagement in Community Health (PI-TECH)** study includes a pilot sequential multiple assignment randomized trial (SMART) of the *Platano* dietary self-monitoring app for type 2 diabetes.

- *Study design:* Thematic analysis of *Platano* user experience
- *Setting:* Washington Heights/Inwood, New York City
- *Sample:* N=9, age range=28-61, 88% female, 89% non-white, 88% household income<$20,000.
- *Data collection:* Face-to-face, in-depth interviews after using *Platano* for 6 weeks during SMART
- Interviews recorded and transcribed verbatim
- *Analysis:* Data coded for emergent themes related to participants' user experience using Thematic Analysis
- *Software:* NVivo 12

Results

Platano User Experience Themes and Supporting Quotes

Context/External Circumstances

Food insecurity
"To meet the goals at least two different types of fruit, but sometimes when you cook the meal -- suppose you don't have any more money. So, sometimes you bought your groceries for the month and you don't have any more money to buy any fruit, so that's it for the day." (P1, F)

Cultural norms
"Am I going to give up chittlins once a year I only make them on Christmas it's a traditional black food made on New Years Eve and I've done it every year 55 years. I've watched my mother for 50 years do that. […] And so -- it's a full picture and a part of that picture is food. Food in the black house is the main stay it's just the part of the culture." (P5, F)

Flexible Tool

Awareness of diet and influencers
"So, I am finding the suggestions the app itself it helps me understand that I am -- I am being more conscious of what I am eating or what I -- I shouldn't eat." (P3, M)

Accountability
"It makes me, want to be more obedient and stick to what I've put down, like if I said, I'm going to have chicken, string beans and rice, brown rice, because I can't have white rice…" (P2, F)

Platano as a tool for self discovery
"I eat like all right say I just ate okay say if I want some Doritos or something potato chips or Pringles is my favorite. see that the sugar will go down it won't it won't go as high as a cake or a cookie or a piece of pie" (P9, F)

Empowerment

Dietary behavior change from Platano
"So, I'm looking at my pictures I'm saying you know I could do better, so then I had greens. I had a vegetable plate, I had greens then I had cabbage. I said hey, I had two greens and I didn't have rice. I had a sweet potato." (P1, F)

Patient empowerment from Platano
"Well, you know what it is, it's nobody -- I know I have to take more into my own hands. So, in other words, I have a doctor's appointment lined up for Friday which I just found out about. And when I see her, I'm going to tell her. I want to go to an endocrinologist who does the diabetics because home was taken over when I did my weight loss surgery, but that woman, she works with -- she works here too. (P7, F)

Individual characteristics

Motivation (Internal, outcome expectation)
"Well, for me what helped me was like even prior to joining the program it was just me wanting to really change my diabetes, because I didn't want to be injecting myself with medicine. I was at the point where I was taking insulin, not even in Metformin, so as far as for me that's what motivated me, not having because I personally don't take insulin even throughout the whole program, I haven't taken any insulin. (P6, F)

Nutrition literacy
"Fiber, I don't know if the coffee have fiber. But I don't think the – the fiber is in the rice, right?" (P4, F)

In-the-moment barriers

Feeling irresponsible
"It's rare. I have to be starving to eat out. The other day I had some Chinese food because I was reckless. And then I took my reading and it was pretty high." (P3, M)

Snacking
"But I do know that what I was told was pain will bring it and stress will bring it up -- but really, having -- and I notice when I get like that, I'm picking and I don't even realize how much I am picking and then when it comes down to sitting and eating the meal, I can't do it." (P7, F)

Conclusion

- This thematic analysis suggests that a diabetes-self management app specifically designed for a disadvantaged population is well received and viewed as a supporting tool among underserved urban adults with type 2 diabetes.
- Participants valued *Platano* as a tool for self-discovery and accountability. To participants, using Platano resulted in dietary changes, weight loss, and potential for improved patient-provider communication.
- External circumstances, individual characteristics, and in-the-moment barriers influenced app usage and diet goal adherence. For example, limited heath- and nutrition literacy sometimes led to misinterpretation of lifestyle recommendations and suboptimal food choices.
- Our findings reinforce the need for more comprehensive solutions to reduce barriers in engaging in dietary behavior change to improve diabetes outcomes.

References
[1]CDC, National Diabetes Statistics Report. 2017.
[2]Welschen et al. Self-monitoring of blood glucose in patients with type 2 diabetes who are not using insulin: a systematic review. *Diabetes care* 2005 Jun;28(6):1510-7.
[3]Ancker, J.S., B. Hafeez, and R. Kaushal, *Socioeconomic disparities in adoption of personal health records over time.* Am J Manag Care, 2016. 22(8): p. 539-40.
[4]The Lancet. *Does mobile health matter?* Lancet, 2017. 390(10109): p. 2216.
[5]Regnier, F. and L. Chauvel, *Digital Inequalities in the Use of Self-Tracking Diet and Fitness Apps: Interview Study on the Influence of Social, Economic, and Cultural Factors.* JMIR Mhealth Uhealth, 2018. 6(4): p. e101.
[6]Veinot, T.C., H. Mitchell, and J.S. Ancker, *Good intentions are not enough: how informatics interventions can worsen inequality.* J Am Med Inform Assoc, 2018. 25(8): p. 1080-1088