"I don't have to explain, people understand": Acceptability and Cultural Relevance of a Mobile Health Lifestyle Intervention for Filipinos with Type 2 Diabetes

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Background: Filipino Americans have the highest risk for obesity-related type 2 diabetes and related complications compared with all major Asian American subgroups. Identifying effective interventions to improve Filipino health outcomes are needed to reduce this health disparity.

Objective: To assess the acceptability and cultural relevance of the PilAm Go4Health program - a culturally adapted mobile health weight-loss lifestyle intervention including virtual social networking for Filipino Americans with type 2 diabetes.

Design, Setting, Participants: Qualitative semi-structured post-program interviews explored perceptions of 45 Filipino Americans with type 2 diabetes in Northern California regarding their perceptions of the acceptability and cultural relevance of PilAm Go-4Health. Participants' mean age was 57.6 years. Sixty-seven interviews were recorded, transcribed, and thematically analyzed by four independent coders.

Results: Over half (n=26, 57.8%) of the respondents found that a culturally tailored intervention program enhanced their engagement. All (n=45) of the respondents felt that mobile health technology promoted their self-efficacy. A majority of the respondents (n=29, 64.4%) expressed that they progressed from despair to self-efficacy as a result of their participation in the intervention. More than one-fourth of the participants (n=13, 28.8%) discussed that the intervention needed further cultural tailoring.

Conclusions: Overall, PilAm Go4Health — a mobile health weight-loss lifestyle intervention — was acceptable and culturally relevant for Filipino Americans with type 2 diabetes. Findings may help inform clinician and researchers on effective intervention

Introduction

Diabetes prevalence is a major health disparity among US racial/ethnic population affecting American Indians/Alaskan Natives (15.9%), non-Hispanic Blacks (13.2%), Hispanics (12.8%), Asian Americans (9.0%), and non-Hispanic Whites (7.6%).[1] Filipino Americans (FA) have the highest prevalence of type 2 diabetes (T2D) and overweight/obesity (16.13%, 78.6%) compared with other major Asian American subgroups (South Asians 15.85%, 60.6%; Koreans 9.85%, 60.4%; Japanese 10.28%, 59.1%; Chinese, 8.15%, 52.3%; Vietnamese 9.85%, 38.6%) and non-Hispanic Whites (7.25%, 53.8%).[2] Consequently, Filipinos are at higher-risk for metabolic syndrome at lower body mass index and younger ages.[3-6] Thus, effective interventions are needed to reduce these health disparities among Filipinos.

Pervasive smartphone ownership has made mobile technology a viable delivery mode for mobile Health (mHealth) interventions, particularly for lifestyle interventions. In addition, those who are most likely to own and rely on smartphones to access the internet are populations in which low health literacy is more prevalent, such as racial/ethnic minorities and low-income households.[7-9] Limited health literacy is also relatively common among type 2 diabetic patients[10-14] thereby contributing to poorer diabetes outcomes.[14-15] However, despite thousands of commercially available health and

fitness apps, few have been applied or tested in intervention settings.[16] More research is needed to examine the acceptability, functionality, cost-effectiveness, and efficacy for improving health outcomes.[17-18] Nonetheless, the existing studies do demonstrate potential for improving health behaviors and outcomes. A systematic review of interventions delivered through mHealth applications found significantly better adherence to antiretroviral therapy,

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smoking cessation, and glycemic management compared with in-person delivered interventions alone.[19] Furthermore, several mHealth intervention studies have focused on improving diabetes management and outcomes,[20,21] but none have specifically addressed FA with diabetes.

Recommendations are for more mHealth interventions to address chronic diseases such as diabetes for high-risk diverse populations. Among the paucity of rigorous mHealth intervention studies, even

fewer have been culturally adapted to specific target or minority populations, despite growing evidence that doing so is effective. A meta-analysis found that culturally tailored diabetes interventions for diverse racial/ethnic populations were more effective than usual care in improving health outcomes.[22] In another systematic review of six electronic and mHealth weight management interventions for US racial/ethnic minorities, only mobile phone and online web-based programs were used, targeted mainly African Americans, and only one study mentioned cultural adaptation.[23]

Integrating mobile technology in weight-loss lifestyle intervention is ideal for FA.[24-25] A recent study found more than 81% of FA were prolific users of digital technology.[26] Thus, a pilot randomized control trial was conducted for PilAm Go4Health, a culturally adapted weight-loss lifestyle intervention including mobile technology (Fitbit accelerometer and associated mHealth app/diary [www.Fitbit.com], and a private Facebook group) for FA with T2D to reduce cardiometabolic disease risks. One aim of the PilAm Go4Health study was to assess the acceptability and cultural relevance of a culturally adapted mHealth weight-loss lifestyle intervention. The objective of our research was to assess participants' perceptions of the intervention study. Findings will help inform researchers and health providers on best practices for designing and implementing a culturally appropriate mHealth lifestyle intervention for FA living with T2D.

METHODS

Research Design

A qualitative exploratory study of semi-structured post-program individual 1:1 interviews was conducted to solicit participants' perceptions regarding the PilAm Go4Health intervention. This qualitative study was part of the PilAm Go4Health pilot RCT weight-loss lifestyle intervention with a wait-list control to reduce risks for metabolic syndrome in FA with T2D. The PilAm Go4Health program (3-month intervention + 3-month maintenance) was based on the Diabetes Prevention Program (DPP),[27] and culturally adapted and modified for mHealth technology.

Intervention participants initially received the PilAm Go4Health 3-month intervention and were asked to: 1) wear a Fitbit accelerometer daily; 2) self-report food/calorie intake and weight using the Fitbit diary app; and 3) participate in the private Facebook group. Research staff posted weekly healthy lifestyle education on the private Facebook site and facilitated ad hoc virtual group discussions. After 3 months, the intervention participants transitioned to a 3-month maintenance to continue healthy behaviors on their own. Wait-list control participants began with only wearing the Fitbit accelerometer daily for 3 months. After 3 months, the control participants received the 3-month intervention. All participants attended six monthly research office visits. Participants were trained on study group requirements and mobile technology use. Further details of the study protocol are published elsewhere.[28] The

University of California San Francisco, Committee for Human Subject Research approval was obtained prior to study implementation. Participants' written informed consent was obtained prior to study participation.

The Stages of Change Model (SCM)[29] and Social Cognitive Theory (SCT)[30] served as the theoretical framework for this study. The SCM identifies individuals in the "contemplation" or "preparation" stages of behavior change. The model incorporates change processes, including personal characteristics (self-efficacy) and environment (culture and social-support) to move one toward the "action" stage. The SCT posits feedback (positive or negative) from social interactions and the environment influences

development of learned behavior. Thus, culturally relevant interventions with social support promote self-efficacy for healthy behavior change and self-efficacy may be a relevant determinant of self-management behaviors among populations with limited health literacy.[9,10,31,32]

Cultural Adaptation Strategies

Cultural adaptations for intervention guidelines[33] and recommendations for culturally adapting intervention for FA[34] were followed to tailor PilAm Go4Health. The cultural adaptations and study design solicited input from Filipino community/organization leaders and members, focus groups, and health providers serving FA. Sociocultural adaptation strategies incorporated

the stakeholders' recommended study design for a wait-list control group to promote study participation, since Filipinos may not participate if they did not receive the intervention. Stakeholders also endorsed this pilot study, delivered in English, with the caveat that a follow-on study would be offered in Tagalog and English. English is the second official Philippine national language taught in most Philippine schools.[35] Thus, similar to South Indian Americans, 80%-90% of FA immigrants are English proficient.[36] To accommodate a family-oriented culture and social support, family members were welcome to attend the monthly research office visits. For linguistic strategies, diabetes education materials adapted for FA were provided.[37]

Table 1. "They Understand," culturally tailored curriculum

Topics/intervention components	Cultural adaptations
Diabetes risk factors	Filipino Americans' risk factors: 1) high fat and sugar diet 2) sedentary lifestyle 3) sugary beverages and soda intake 4) family history of diabetes 5) stress
Social cues	Relapse prevention to negative FA social cues: 1) playing Mahjong table game for extended amount of time 2) frequent fiestas and social events 3) constant food offers by family/friends
Nutrition	Filipino food pamphlet 1) photos of ethnic dishes with nutritional information 2) healthy Filipino food options and recipes with portion sizes and ChooseMyPlate 3) grilled fish to replace fried fish 4) incorporating vegetables in a meal 5) limiting white rice
Physical activity	Preferred Filipino physical activities 1) basketball 2) ballroom dancing 3) Zumba 4) walking
Research team	Bi-cultural FA staff

FA, Filipino Americans.

Peripheral adaptations of culturally identifiable items that Filipinos prefer included a study logo with Philippine flag colors and colorful photos of Filipino families on recruitment flyers (Table 1). To support a community-oriented culture, using Filipino research team members from the community, familiar with the language and culture was an important constituent-involving adaptation strategy. The principal investigator (PI) was also a member of the Filipino community. Details of the PilAm Go4Health study protocol and cultural adaptation strategies are published elsewhere.[28]

Study Participants

Self-identified Filipino men and women with non-insulin dependent T2D were recruited from the San Francisco Bay Area from December 2014 to December 2015 through Filipino community events, shopping centers, faith-based and civic organization meetings, community flyers, medical clinics, and select mailings. Out of 113 potential participants, 45 participants passed the initial screenings and qualified to be enrolled, and randomized in a 1:1 ratio using a computer-generated random allocation sequence and stratified by sex in permuted randomly selected block sizes of 2 and 4 to an intervention group (n=22) or an active wait-list control group (n=23). Among those who did not qualify, 66% did not meet the inclusion/exclusion criteria and a third (33%) chose not to participate primarily due to time commitments.

Inclusion/exclusion criteria were based on the DPP.[27] Inclusion criteria included: 1) Self –identified as Filipino; 2) BMI for Asians > 23 kg/m², 3) Male or female, age > 18 years; 4) physician-diagnosed type 2 diabetes (confirmed by clinical data: fasting blood glucose >126 mg/dL or a positive OGTT); 5) T2D treated with oral medication (non-insulin dependent); 6) no cognitive impairment based on the Mini-Cog test;[38] 7) no physical disabilities precluding walking 20 minutes continuously; 8) English speaking; and 9) own a smartphone (although, a smartphone was provided, if needed). Exclusion criteria included: 1) participation in lifestyle modification program in the last year; 2) glucose metabolism associated disease (eg, Cushing's syndrome, Acromegaly, and Pheochromocytoma under treatment); 3) sub-optimally treated thyroid disease; 4) known eating disorder; 5) known medical conditions (eg, myocardial infarction requiring special exercise program; 6) family member enrolled in study.

Data Collection and Transcription

Both quantitative and qualitative data were collected at baseline, 3-month and 6-month research office visits. At baseline, trained research staff collected anthropometric measures (weight, height, waist circumference) and participants completed a socio-demographic survey. A total of 67 semi-structured individual interviews (22 interviews post-intervention at 3-months and 45 interviews post-study at 6-months) were conducted during scheduled office visits by trained research staff during the scheduled office visit and digitally audio recorded. Interviews lasted 10-40 minutes.

A 10-question interview guide was developed to elicit in-depth responses to the content, components, cultural relevance, barriers to lifestyle behaviors, and recommendations for program improvement (Table 2). To ensure interview fidelity, the PI monitored the initial six participant interviews, and randomly reviewed the remaining digitally recorded interviews every 2-3 weeks. A trained transcriptionist transcribed all interviews verbatim and de-identified all text. The PI and research coordinator reviewed the transcriptions for accuracy.

Data Analysis

Guided by grounded theory, the qualitative data analysis process entailed a three-step process of open coding, axial coding, and then selective coding.[39] Independent coders consisted of four trained research assistants. Research assistants were trained by qualitative experts on open coding which entailed identifying unique categories and concepts associated with assessing the acceptability and cultural relevance of a culturally adapted mHealth weight-loss lifestyle intervention. After going through open coding, the research assistants reviewed the codes and transcripts once more and worked with two qualitative experts on axial coding. Axial coding refers to the process of reviewing the codes to examine for relationships and connections. Finally, the research assistants and the two qualitative experts worked on selective coding that entailed reviewing open codes and axial codes to identify one core category.

Table 2. Interview guide

Item	Question
1	Looking back over the last 3 months, what did you learn the most from the study?
2	What would you change about the study?
3	What did you like the most about the study?
4	What did you like the least about the study?
5	What is the primary reason that motivated you to stick with the lifestyle behaviors you learned (eg, doing physical activities, logging diet and weight in your mobile app)?
6	What was the primary barrier that prevented you from sticking to the lifestyle behaviors you learned?
7	What did you find the most valuable about the study?
8	What advice would you give to other study participants to help increase their: a) Physical activity b) Lose their weight c) Change their diet
9	Since you just returned your study equipment, how do you plan to maintain your physical activity, weight loss and healthy diet? a) Do you plan to purchase a smartphone? b) A pedometer? c) Download a fitness/diet app on your smartphone?
10	Is there anything else you would like to add?

RESULTS

Forty-five participants (62% women) who qualified were enrolled and randomized to the intervention (n=22) or control (n=23) groups. All 45 completed the 6-month study for a 100% retention rate. Details on recruitment, enrollment and randomization are reported elsewhere.[28] Participants' mean age was 57.6 (SD+9.8) years. A majority were immigrants (84%), college graduates (56%), married/cohabitating (67%), and employed full- or part-time (69%). Close to half (47%) were US residents for 10 or more years. Mean baseline body mass index (BMI) category was obese (30.2, SD+ 4.9 kg/m²). Four major themes were identified from participants' responses. First, a culturally tailored intervention and bi-cultural Filipino research staff enhanced engagement. Second, the use of mobile technology and Facebook virtual support helped participants enhance their personal agency and empowerment in managing their diabetes. Third, culturally tailoring the mHealth intervention program assisted in improving participant's self-efficacy in making healthy behavior changes. Finally, further cultural tailoring addressing support mechanisms and improved site accessibility were suggested to improve intervention acceptability. Each theme is described in detail below.

Theme 1: "They Understand" – Culturally Tailored Support Enhanced Engagement

Over half (n=26, 57.8%) of the respondents stated that the culturally tailored support in terms of materials and staff enhanced their engagement. In order to increase effectiveness, PilAm Go4Health was culturally tailored for FA integrating unique cultural features and culturally relevant education materials promoting healthy lifestyle behaviors.[40] Table 1 presents an overview of the cultural adaptations that included culturally oriented education materials promoting healthy lifestyle behaviors facilitated by FA identified research staff and an interactive private Facebook group providing virtual social networking support with other participants and research staff.

Many participants had positive comments on: the health education slideshows that were simple, colorful, visual, and interactive; helpful tools such as: "ChooseMyplate" (www.choosemyplate.gov/MyPlate); regular progress reports; and physical activity photos with FA. The interactive and culturally tailored education helped participants to: 1) better understand concepts such as healthy Filipino weight loss; 2) recall health messages; and 3) disseminate information to family, friends, and community. A 36-year old male said:

"What I've learned through this study is that we have a different

physiology…There's not a one size fit-all weight-loss plan, but that it is has to be conducive specifically to certain people's biology and cultural ways of doing."

Increased engagement, retention, and positive behavior change among participants can be attributed to the utilization of research staff who share cultural traditions and beliefs with the participants.[41] For example, one participant reported that having to eat alone (to support healthy food selections) conflicted with the obligation to participate in family meals (a sign of respect in the Filipino culture).[42] Participants commented that intervention delivery by FA research staff increased not only their comprehension of educational material but also their comfort with sharing cultural challenges regarding diabetes management. Overall, participants noted that research staffs' encouragement, monitoring, technical support, and engagement of family were crucial to achieving their weight-loss goals. A 59-year-old female stated the importance of FA staff that are aware of the various cultural nuances:

"People are aware of the culture. I don't have to explain, people understand what I'm talking about when we talk about certain kinds of food that is so part of our culture… When I go to my primary doctor who doesn't understand the culture, he will say well you're not supposed to eat this."

A 61-year-old female emphasized the impact of research staff support on achieving weight-loss goals:

"It's the support that I got… The visits by [study principal investigator], the monthly visits with [the research coordinator], because I felt that I had someone coming along side with me and truly care about whether I achieved my goals…And how I can become more positive."

Thus, the creation of a familiar and comfortable environment through culturally tailored education and coaching support promoted adherence to healthy behaviors thereby improving diabetes self-management.

Theme 2: "Fitbit Is My Friend" – Mobile Technology Promoted Personal Agency

Personal Agency

Real-time access to summaries of diet choices and physical activity progress on mobile apps optimizes self-regulation to activate change.[43] All participants felt that mHealth technology fostered a new found personal agency for diabetes self-management. The Fitbit app not only served as a self-monitoring tool, but also as an information source for healthy food choices while the private Facebook group provided ongoing virtual social networking support. Commercially available tools like the Fitbit app empowered respondents to make informed healthy choices by becoming cognizant of various foods' nutritional benefits and values (or lack thereof). Participants appreciated the app's visual cues that helped them maintain a physical activity schedule and monitor caloric intake. A 47 year-old male respondent stated:

"The Fitbit thing is valuable… The app actually counting my steps and then viewing what I ate the entire day. Sometimes I take a look at what I ate the entire day and I'm like 'I shouldn't have done that' so it's a reminder as well."

Some even referred to the Fitbit app as an accountability partner, a friend, and a big brother who helped them focus on their diabetes management goals. They mentioned the benefits of the app's tracking function. A 59-year-old female stated:

"The Fitbit, just having that friend there with you everyday was really good for support in addition to the staff just like that song, "I've got a friend." My Fitbit is my friend…It's great support too and the bottom line is just awareness, awareness of what you need to do to have a healthy lifestyle."

All participants felt a deep need to change their lifestyles to avoid diabetes complications afflicting their loved ones. Unlike previous attempts at change, they found the Fitbit app provided instant information and education to facilitate changes with eating habits and physical activity levels.

Virtual Social Support

A unique feature of this intervention was the virtual social networking support via a private Facebook group to promote adherence to healthy behaviors. The Facebook group provided a safe space for members to share personal experiences,

progress, challenges, and helpful solutions, thereby motivating others and encouraging accountability. For instance, group Fitbit challenges offered participants a competitive motivation to reach their step goals. A 48-year-old female stated:

"I think it was good having those challenges…That was kinda fun to do that and just see how others are doing even though you don't know them you want to cheer them on."

Generally, motivation among participants was maintained through virtual and in-person social support from staff, fellow participants, family and friends.

Theme 3: "I Want to Live" – Progression from Despair to Self-efficacy

A majority of participants had observed the health complications of diabetes on their family members. Despite a "desire to live" many discussed past failed attempts at making lifestyle changes. Others felt they were not properly educated on how to make the changes. For the majority of respondents (n=29, 64.4%) this intervention provided a new perspective on their management of diabetes. Relying on the team of bicultural researchers and mobile technology support, the intervention empowered many to make the desired lifestyle changes. A 36-year-old male stated:

"My mom died of cancer and diabetes, it became personal to me…I want to live more…I

have my own two kids now…I want to see their kids graduate high school, and college. It's not by accident that all my aunties and uncles have diabetes as well as my grandfather and grandma… It [the study] became…more purposeful to me… and I think if we could share that message with a lot of Filipinos that really strikes gold."*

One 61-year-old female respondent discussed her despair about her inability to control her weight. There were generations of family members with diabetes and she lacked the confidence to make changes. She found the intervention provided her with the self-efficacy to focus:

"My parents both died because of complications of diabetes…I lost weight but then I gained it all back and I was starting to get afraid because…I was starting to be at my heaviest again. I said 'what will I do?'…I'm deeply grateful for this opportunity, to be part of this study. I would want to see my granddaughter grow up and all my other grandchildren grow up and still be with them. So, this study has helped me again go back and to be on-track."

Similarly, several respondents discussed how the intervention helped them change from a negative state-of-mind about their diabetes management to taking a more proactive stance. Many felt they could not make the necessary changes on their own. A 58-year-old female stated:

"Just believing in myself that I could do this… When I was first diagnosed with diabetes it was like the end of the world, I had no way out. I'm gonna be living on medication for the rest of my life and all those medications are gonna destroy me from the inside out…I had so many things, negativities in my head. It's not true. I can slow it down even technically heal myself by just doing the right things."

The confidence gained translated to those around them. Participants who benefited from the intervention were excited to share what they learned with family and friends. The positive changes they experienced motivated them to encourage family and friends to adopt healthy eating and physical activity behaviors. A 36-year-old male stated:

"It went from being lonely like you're doing it all by yourself… I got twenty to thirty people [to use a Fitbit and participate in weekly challenges]… We changed the whole lifestyle of our family cause everybody's eating healthy, my brother-in-law's working out to do a marathon, my wife is more conscious about what she eats… [and her] physical activity."

Many participants said they changed their mind-set from despair to confidence. This was the first time they had experienced the ability to positively control their diabetes self-management.

Theme 4: "Because Most of the Food Is not There, You Have to Make It up" – Suggestions for Further Cultural Tailoring

The intervention's cultural tailoring helped participants feel more comfortable and understood by providing relevant Filipino educational materials and coaching from Filipino staff. Nonetheless, one-fourth of the participants (n=13, 28.8%) offered suggestions for intervention improvements addressing challenges with study requirement. Suggestions for improvements included: 1) adding ethnic foods to the Fitbit app database and specific diet topics; 2) immediate support with syncing and navigating the Fitbit Zip and app/diary; 3) more facilitated virtual and in-person social support; and 4) a community-based research study office.

Improving Mobile App/Diary, Support for Technology Challenges, and Virtual Social Support

Intervention participants were required to log daily food/caloric intake using the Fitbit app/diary. However, the Fitbit database was limited and did not include Filipino foods. Participants reported this limitation made logging daily food/caloric intake a tedious task. Instead of performing this task while eating, they preferred to interact with family and friends. Although a handbook was provided with common Filipino foods with dietary information, many typical Filipino foods were missing. A 56-year-old female discussed how the Fitbit database with missing Filipino foods made it difficult to log her daily food intake:

"Because most of the food is not there. So you have to make it up. Filipino food is not really there even in the (handbook). That was really my main thing… It takes too much time… It becomes too complicated."

Participants suggested taking pictures of the food instead. A 48-year-old female used a different food diary (MyFitnessPal) that included more Filipino dishes. Another participant suggested incorporating the history of the modern Filipino diet and how this evolution contributes to the Filipino diabetes prevalence.

Besides the difficulties with the Fitbit app/diary, there were technological challenges. Some participants had problems using their smartphone or tablets, and synching their Fitbit to their online accounts. Although research staff were helpful in assisting participants with technological challenges, they were not always immediately available. Therefore, having family members help with the technology challenges was an alternative solution.

Although participants appreciated virtual support through the Facebook group, some wanted additional opportunity to engage with fellow participants. A 38-year-old also suggested facilitating more meaningful discussions among the Facebook participants:

"If the group itself can't generate comments or dialogue, is there a way that somebody can facilitate the discussions...And more frequent user-led discussions?"

Challenges with Study Location and Inclement Weather

There were challenges regarding the research office location and weather. Respondents cited difficulties commuting and distance of the research office and blood draw lab. Although they noted it was worth the commute to complete the study, they would have referred more potential participants if the study site were closer to Filipino communities.

The cold weather deterred older participants from engaging in physical activities. A 77-year-old male found it difficult to perform activities outside when it was too cold. Similarly, a 71-year-old female walked indoors (eg, the mall) to complete her daily step goals because of the unpredictable weather.

In summary, participants made suggestions to improve the intervention by culturally tailoring the Fitbit food database, making daily food entry more convenient, promoting additional virtual and in-person engagement to enhance social support, and improving accessibility by conducting the study closer to Filipino communities.

DISCUSSION

Findings suggest that a culturally adapted mHealth weight-loss lifestyle intervention was acceptable and culturally relevant for FA living with T2D. Participants appreciated a culturally tailored program and were more comfortable sharing experiences with FA research staff who, they felt, understood the culture. The Facebook group provided a commu-

nity forum to discuss experiences, provide support, and share tips with their peers. They also valued the culturally tailored educational materials posted on the Facebook site. To enhance Facebook participation and engagement, they recommended staff facilitate more discussions. Additionally, the community-based participatory approach of this study, which enabled cultural tailoring of the intervention, is aligned with the Institute of Medicine's recommendation that programs that promote health literacy should be developed

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with utilizers themselves, and must be sensitive to cultural preferences.[44]

Akin to past studies that employed mHealth applications and found increased physical activity, self-efficacy, and food awareness among participants,[45,46] the intervention's mobile technology motivated participants' self-monitoring of physical activity steps, weight and food intake, which in turn inspired self-efficacy for adhering to healthy behaviors. Despite participants' acceptance for the mobile technology, many

struggled using the Fitbit app/diary to log daily food intake due to its time-consuming tedious nature and a database that lacked Filipino ethnic foods. This may have influenced their diabetes self-management.

Culturally, eating together shows respect and a sense of *pakikisama (companionship)* for family and friends.[42,47] Family pressures to eat fat and sugar-heavy ethnic foods are cultural challenges to managing T2D for FA. Frequent family gatherings centered on ethnic foods affected participants' ability to choose healthy foods. Nevertheless, the study galvanized participants to share what they learned with family, peers and community about limiting fat and sugar, and the importance of physical activity for health. In return, many gained family and peer support to complete the study, and challenged the stigma and self-imposed silence associated with FA living with diabetes.

Similar to the findings of past studies, the PilAm Go4Health weight-loss intervention including mobile technology was acceptable to participants, particularly the older adults. Mercer et al (2016)[48] found wearable activity trackers were useful in encouraging older participants to be more physically active. Older participants in this study also favored using the Fitbit accelerometer to track their physical activity, motivating them to achieve their daily step goals.

The PilAm Go4Health intervention's health education promoted nutritional awareness and physical activity. A recent study using mHealth apps to foster healthy eating and physical activity was ef-

fective, and encouraged engagement and consciousness among the participants.[43] Respondents in this study also stated they became more aware of choosing healthy foods, as well as substituting healthier ingredients when cooking meals.

A culturally adapted intervention helped participants feel more comfortable and responsive to culturally relevant educational materials and weight-loss tips. Other culturally tailored diabetes self-management interventions, such as in the Mexican and Bangladeshi American communities, utilized community health workers with shared cultural and lived experiences as study participants along with culturally and linguistically tailored materials. These interventions increased diabetes awareness, physical exercise and self-efficacy, and decreased HbA1c levels among study participants living with T2D.[49-50] By providing culturally relevant information and coaching to the FA participants, respondents felt more motivated and better equipped to achieve their goals and live a healthy lifestyle.

Participants suggested a need for sustained and adaptive support. They offered suggestions for several Fitbit app/diary improvements, including: a more comprehensive database incorporating Filipino foods and other methods for logging foods such as uploading a photo of each meal. Respondents also suggested if intervention sites were in closer proximity to where FA live and congregate, more community members would likely participate in the intervention.

To the best of our knowledge, this study is the first to assess per-

ceptions of FA with T2D participating in a RCT culturally adapted mHealth weight-loss lifestyle intervention. The Filipino community provided input in the intervention design and cultural adaption. To improve cultural relevancy, a community health worker model with FA research staff was used. For social support, virtual and in-person social networking with family support was incorporated to promote adherence to healthy behaviors. However, there were several limitations to this study. First, the study coordinator implemented the intervention and also conducted the participant interviews, which may have created a social desirability bias eliciting favorable responses from participants.[51] This study was conducted in English, limiting some participants (with English as their second language) to accurately express opinions. The study location may have biased the sample to those who had access to transportation. Finally, the small sample size of Filipinos from Northern California communities limits the generalizability to other Filipinos or the general population.

Conclusion

Overall, participants found the PilAm Go4Health acceptable and culturally relevant. Our findings could be used to guide health providers and researchers working with diverse populations in developing mHealth weight-loss lifestyle interventions to enhance recruitment, engagement and retention, particularly for at-risk, hard-to-reach populations.

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