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Leveraging Wearables and AI-Driven Health Apps for Weight Loss and Behavior Change in Diabetes Management: A Study on Engagement and Health Outcomes

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***Abstract*— This study evaluated the impact of the Medisafe App, a digital health platform integrated with wearable devices, on health outcomes and user engagement in individuals with type 2 diabetes. Participants tracked weight, physical activity, and engagement metrics over six months. The findings suggest significant improvements in weight loss (7.38%) and physical activity (a 54.2% increase in steps) for participants who used wearable devices and completed the study. While the study design was non-randomized, the results provide valuable insights into how artificial intelligence-driven health tools and wearable technologies can facilitate behavior change in managing chronic diseases like type 2 diabetes.**

Index Terms: AI in healthcare, wearables, digital health interventions, type 2 diabetes, behavior change, mobile health applications, weight loss, personalized healthcare, engagement analytics.

I. INTRODUCTION

The increasing prevalence of chronic conditions such as obesity, type 2 diabetes, and cardiovascular disease presents a significant concern in the United States, primarily driven by dietary and lifestyle choices. Obesity has been identified as a significant risk factor for complications related to diseases like COVID-19 and represents a notable public health issue [3]. Evidence indicates that adopting healthier lifestyles can be critical in preventing and managing these chronic conditions. However, traditional interventions, such as in-person education programs, often face barriers, including limited accessibility and diminished sustained behavior change over time, hampering efforts to achieve long-lasting improvements [4].

Digital health technologies, including mobile applications and wearable devices, present new opportunities to address these challenges by empowering individuals to take a more proactive role in their healthcare. Health applications can enable users to monitor various health metrics, such as activity levels, weight, and blood glucose, while promoting positive behavioral changes through reminders, recommendations, and real-time feedback [5].

Medisafe App, a widely recognized medication management platform, provides a user-friendly solution for managing medications and health. It offers personalized medication reminders, refill alerts, and detailed information on drug interactions. Medisafe integrates seamlessly with wearable devices like Apple Health and Google Fit, allowing users to track critical health metrics such as heart rate, weight, and blood pressure. The app's intelligent AI-powered features provide real-time data and insights, ensuring users stay on track with their medication schedules and health goals. This integration promotes proactive health management and encourages sustained treatment adherence, making Medisafe an essential tool for managing chronic conditions and improving overall health outcomes.

This study utilized the Medisafe App to explore how digital health tools, particularly those integrated with wearable devices, can influence user engagement and health outcomes. It specifically focused on weight loss and increased physical activity in individuals with type 2 diabetes. By evaluating the effectiveness of specific application features such as health tracking and integration with wearables, this study aims to provide insights into how digital health platforms can help users achieve and maintain healthier lifestyles.

Given the growing burden of chronic diseases and the potential of digital health interventions to mitigate this burden, understanding how health applications like the Medisafe App contribute to sustainable behavior change is critical. This study evaluates the app's effectiveness in fostering weight loss, increasing activity levels, and promoting long-term user engagement. It provides a foundation for future research on digital health tools and their role in improving health outcomes.

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II. METHODS

A. Research Design:

The study used a non-randomized design. All participants knew the treatment they were receiving, and their outcomes were measured before and after the intervention to assess its effectiveness. Participants were not paid for participating in this study. They were all asked to download the Medisafe application. They consented to analyses of de-identified data, meaning that any personal information that could identify them (such as names, addresses, or other identifying details) was removed. This ensured the participants' privacy while allowing researchers to analyze the data.

The study was accessible as an app for smartphone devices running on:

- iOS and Android with companion apps for Apple Watch 3 and later versions running watchOS 6.0 or newer.
- Wear OS Watches running Android 7.0 or later with Wear OS 2.7 or above on the Android smartwatch.

B. Participants:

One hundred twenty users with type 2 diabetes participated in the study, which was conducted from 4 November 2023 to 15 April 2024. Their health and engagement data were analyzed six months after the study's initiation.

C. Medisafe Application:

Medisafe is a user-friendly, AI-powered digital health platform that helps individuals manage their medications and overall health more effectively. The app ensures users stay on track with their prescribed treatments by offering reminders and educational resources. Key features include:

- **Medication Management:** Users can track their medication schedule, dosage, and refill dates.
- **Interactive Notifications:** Sends alerts to caregivers if medication is missed, enhancing support.
- **Personalized Health Data:** Provides insights based on health progress and medication adherence.
- **Sync with Wearables:** Integrates with Apple Health and Google Fit, allowing users to monitor vitals like blood pressure and heart rate.

Medisafe's mission is to empower patients by simplifying medication management and improving overall adherence. For the study, participants were requested to use a free version of the Medisafe Application.

D. Measures:

At baseline and months 3 and 6, participants reported health metrics, medications, and demographics. Weight, activity, and engagement data were also collected where available. The study evaluated engagement and platform usage over six months and changes in activity, weight, and engagement levels.

E. Statistical Analysis:

Analysis was performed using SPSS. The study involved a multiple regression analysis to determine the predictive power of engagement with Medisafe app features on weight loss. The primary outcomes were engagement, body weight, and steps. Outcomes were also analyzed within strata based on participant study completion (i.e., completers, n=78; partial completers, n=29; or non-completers, n=13).

Results considered all the samples, regardless of follow-up information or study completion. For participants who did not report their outcomes at six months, the study assumed they did not improve (last observation carried forward), imputing their baseline values as their outcome values. Participants who did not comply with reporting a 6-month outcome were treated as having no change in the outcome variable and thus were not counted as having any weight change.

F. Results:

a. Participant Characteristics baseline

At baseline, the mean weight was 210.54 lbs (SD 49.29 lbs), and the mean age was 56.86 years (SD 10.75). Just over half were female (59%, 71/120), 88% (106/120) were white, and 12% (14/120) were African American.

b. Platform Usage and Engagement:

Over half of the participants (61%) accessed the program from an iOS device and 39% from an Android device. Of the 60 participants tracking their activity through a wearable (Apple or Android Watch), 84% were engaged and had outcomes at six months (defined as actively inputting a piece of data within the last ten days). The last recorded data point was carried forward for the 13 people lost to follow-up at six months.

c. Wearable Engagement:

For users who completed the study, participants using a companion app who completed the study reported weight loss of 7.38% (38.22 lbs, $t58=10.9247$, $p<0.001$).

Table I: Baseline weight compared with weight after six months for three groups of Users

Status	Baseline Weight(lbs), Mean SD	6- Month Weight (lbs), Mean SD	Weight Change(lbs), Mean SD	Weight Change (%), Mean SD	P Value
All Participants(n=120)	210.54 (49.29)	199.41 (45.49)	-11.18 (15.41)	-4.99 (6.31)	<0.001
Completers(n=78)	213.88 (51.17)	197.43 (48.07)	-17.15 (16.03)	-7.38 (6.72)	<0.001

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Status	Baseline Weight(lbs), Mean SD	6- Month Weight (lbs), Mean SD	Weight Change(lbs), Mean SD	Weight Change (%), Mean SD	P Value
Partial Completers(n=29)	213.27 (49.23)	206.11 (42.15)	-7.08 (13.99)	-2.78 (4.39)	0.0009
Non- completers(n=16)	195.77 (40.66)	195.81 (40.83)	0.04 (0.97)	0.02 (0.52)	.8478

For the 78 participants who completed the program using a companion wearable app, the average number of daily steps increased by 54.2% (t78=11.57, P<.0001) by the end of 6 months. The average user steps were significantly higher six months after initiating the study.

Table II: Baseline steps compared with steps after six months for three groups of Users

Status	Baseline Steps(steps/Day), Mean SD	6- Month Steps (steps/day), Mean SD	Steps Change(steps/Day), Mean SD	Steps Change (%), Mean SD	P Value
All Participants(n=120)	3091.62 (619.54)	4467.39 (1680.85)	1375.77 (1567.09)	46.5 (52.82)	<0.001
Completers(n=79)	3049.51 (591.70)	4649.17 (1632.31)	1599.65 (1495.36)	54.2 (47.89)	<0.001
Partial Completers(n=29)	3162.54 (707.64)	4809.24 (1899.57)	1646.69 (1839.18)	55.85 (66.63)	<0.001
Non-completers(n=13)	3135.38 (583.58)	3349.04 (913.34)	+213.66 (600.22)	6.37 (17.5)	.0459

III. DISCUSSION

This study did not utilize a randomized controlled experimental design, so we cannot directly compare the 6-month results to a control or standard-of-care group. However, of the 120 patients with obesity who participated in the study, 84% of those who used a provided wearable device were still actively engaged at the 6-month follow-up. This engagement level supports previous findings on the effectiveness of wearable applications in promoting behavior change.

While the study design does not allow for conclusions about causality, statistically significant correlations were observed between wearable device usage and reductions in body weight. Study participants who remained engaged with the platform reported weight reductions throughout the study period.

The study found more significant weight loss for members who completed or partially completed the program than those who did not. Users who completed the program achieved an average weight loss of 7.38% of their initial body weight at six months. Furthermore, step count data revealed a 3.45% increase from baseline in physical activity levels by the end of the study, further improving engagement and movement.

These results align with prior evidence that digital health platforms combined with companion wearable technology can encourage positive health behaviors [8]. Building upon previous findings regarding the platform's efficacy in helping patients with type 2 diabetes improve glycemic control and achieve sustained weight loss, the outcomes of this study demonstrate that for participants who fully utilize an automated online program delivered via smartphone and wearable devices (teaching a carbohydrate-reduced diet and providing customized, on-demand workouts), significant weight loss and increased physical activity can be facilitated.

IV. CONCLUSION

The study results support our initial hypothesis that patient engagement with the wearable companion application would predict lifestyle behavior change. Participants who completed the program while using the companion wearable app experienced significant weight loss and improvements in physical activity.

Specifically, participants using the companion app who completed the program lost an average of 7.38% of their body weight at the six-month follow-up. These individuals also demonstrated a notable increase in physical activity, averaging 54.2% in daily steps from baseline. Step count data also showed that participants had a 3.45% increase in baseline activity levels, reflecting improved engagement and higher physical activity at the end of the study.

Importantly, participants who completed the program

showed significantly more progress than partial completers or non-completers. Those using the wearable companion app walked over 50% more steps per day at six months compared to their baseline levels, reinforcing the idea that sustained engagement with the application can lead to substantial health improvements.

While the results are promising, it is worth noting that healthcare professionals provided baseline data during referral. Subsequent health outcomes (weight and steps) were self-reported using wearable trackers. Although previous research suggests that self-reported outcomes can closely match actual values, this remains a study limitation [9].

Additionally, the analysis focused primarily on active engagements with the application's features and their correlation with health outcomes. However, passive engagements within the app, which were not explicitly tracked, also contributed to the observed improvements.

This study evaluated whether a companion wearable application contributes to weight loss. Participants tracking their health using a companion wearable app demonstrated significant weight loss at six months and increased activity levels.

The finding supports previous studies demonstrating that wearable apps can improve health outcomes [8]. Further analysis should explore population differences to determine if age, gender, ethnicity, and socioeconomic status impact health app engagements and subsequent health outcomes.

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