AI-Enabled Lifestyle Interventions for Diabetes Prevention and Obesity Management

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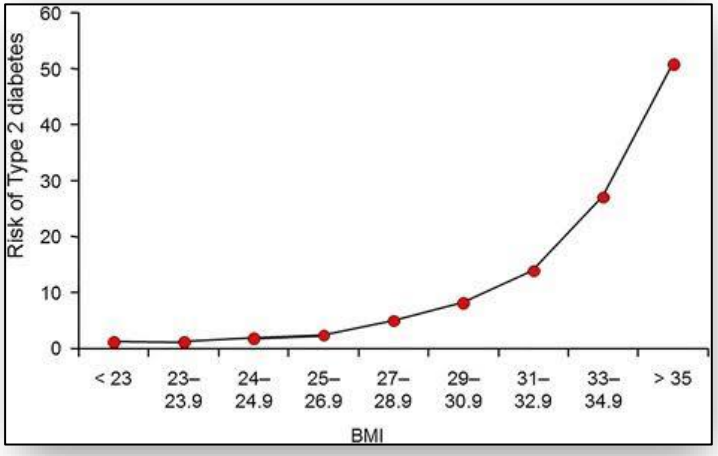
Disclosures

None.

The link between diabetes and obesity

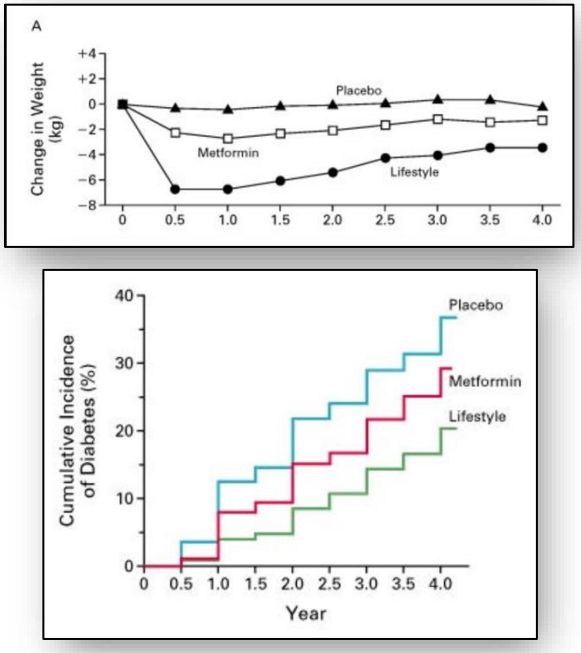
- Obesity promotes insulin resistance, chronic inflammation, and progressive β-cell dysfunction
- A 5-unit increase in BMI is associated with a 72% higher risk of type 2 diabetes; approximately 90% of adults with type 2 diabetes have overweight or obesity
- These pathways are modifiable, as weight loss and physical activity have been shown to improve insulin sensitivity and reduce diabetes risk
- **Therefore, diabetes prevention is a central component of obesity care**



Sources: Jayedi et al. BMJ. 2022; Yu et al. Int J Obes 2022; GBD 2021 Diabetes Collaborators, Lancet 2023; Klein et al. Cell Metabolism 2022; Kalyani et al. JAMA 2025

Lifestyle intervention is important in diabetes prevention

- In the landmark DPP trial, intensive lifestyle intervention reduced diabetes incidence by 58% vs placebo
- Weight loss and physical activity were mediators of diabetes risk reduction
- Modern incretin-based therapies now achieve substantially greater weight loss (~15–20%), yet lifestyle intervention remains important for long-term behavior change, physical function, and weight maintenance
- Lifestyle intervention can be used alongside pharmacologic treatment and remains the guideline-recommended standard for diabetes prevention



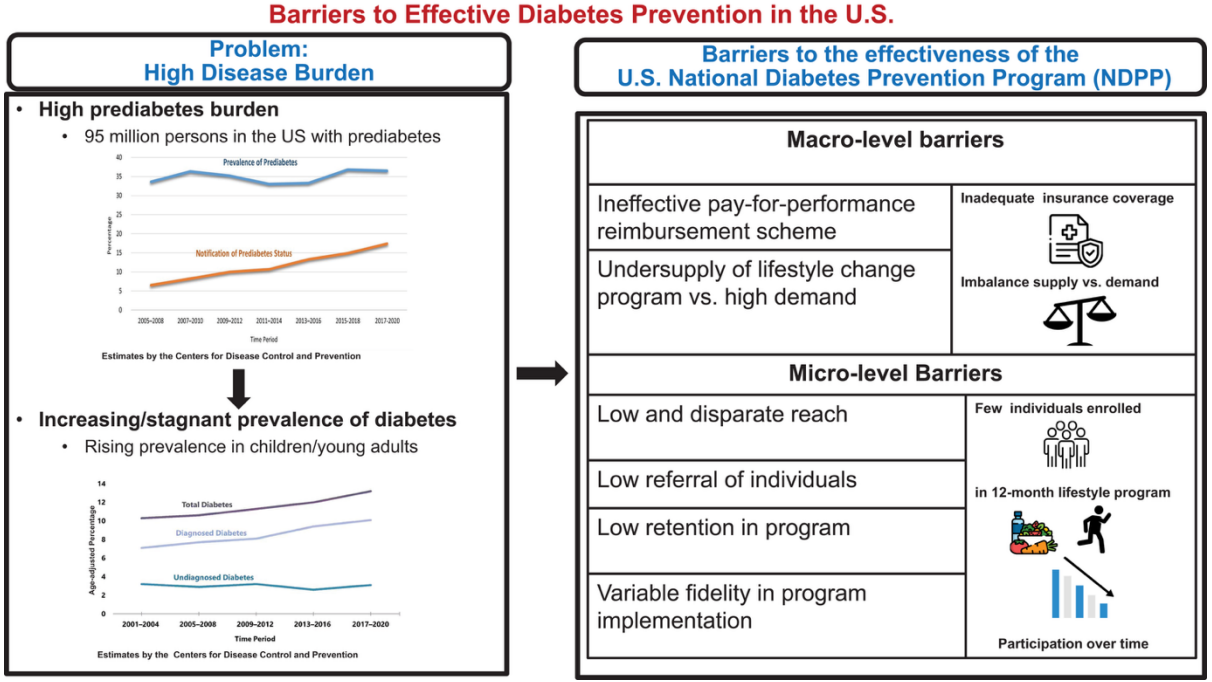
Source: Knowler et al. NEJM 2002

MVPA: Moderate-to-Vigorous Physical Activity. Sources: Knowler et al. NEJM 2002; Hamman et al. Diabetes Care. 2006; Kushner et al. JAMA 2026; Lundgren et al. NEJM 2021

The National Diabetes Prevention Program: effective, but underreached

- A 22-session, yearlong program structure creates substantial participation barriers
- Only 35% of participants referred ultimately engage in the DPP
- There is 1 CDC-recognized DPP for every 63,000 adults with prediabetes in the US
- **Diabetes prevention now requires delivery models that preserve effectiveness while expanding access**

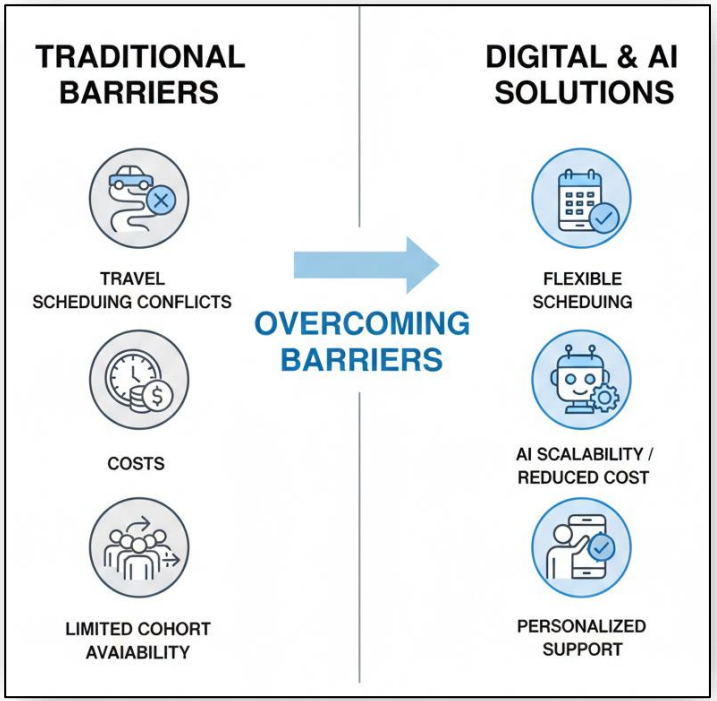
Source: Mathioudakis. JAMA. 2025



Source: Echouffo-Tcheugui. Diabetes Care. 2025

Can AI help scale lifestyle interventions?

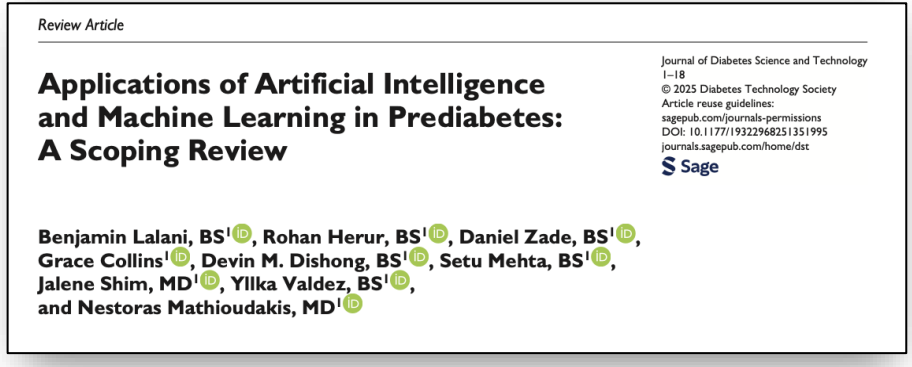
- Digital diabetes prevention programs emerged to improve scalability and access through asynchronous, app-based delivery
- Artificial intelligence introduced the potential to further personalize and automate behavioral support through behavioral tracking, goal setting, feedback loops, wearable and smartphone data integration



Sources: Lalani et al. JDST 2025

How is AI being used in diabetes prevention?

- Our scoping review identified **20 AI-based lifestyle intervention studies** leveraging diverse platforms and data streams
- **However, prior evidence was limited**:
  - Most studies were small or nonrandomized
  - Few evaluated fully automated AI delivery
  - None compared a fully AI-led DPP against a human-led DPP



Review Article

Applications of Artificial Intelligence and Machine Learning in Prediabetes: A Scoping Review

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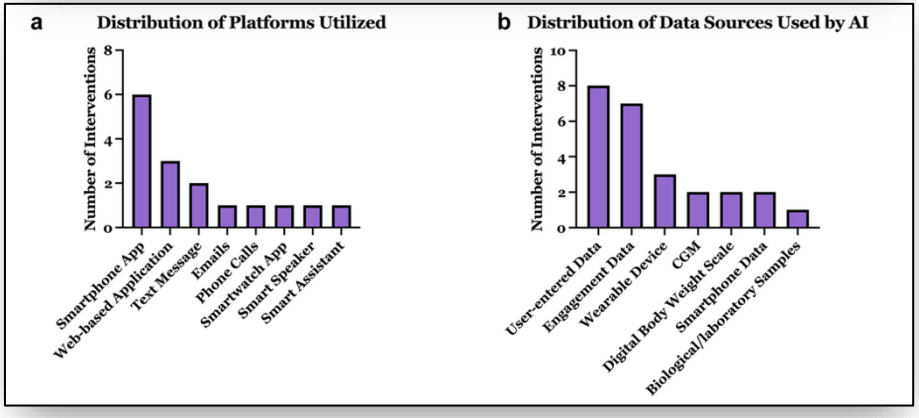


Sources: Lalani et al. JDST 2025

JAMA

Mathioudakis N, Lalani B, Abusamaan MS, et al; for the AI-DPP Study Group.

An AI-Powered Lifestyle Intervention vs Human Coaching in the Diabetes Prevention Program

A Randomized Clinical Trial

Published online October 27, 2025

Diabetes Technology Meeting 2025

Available at jama.com

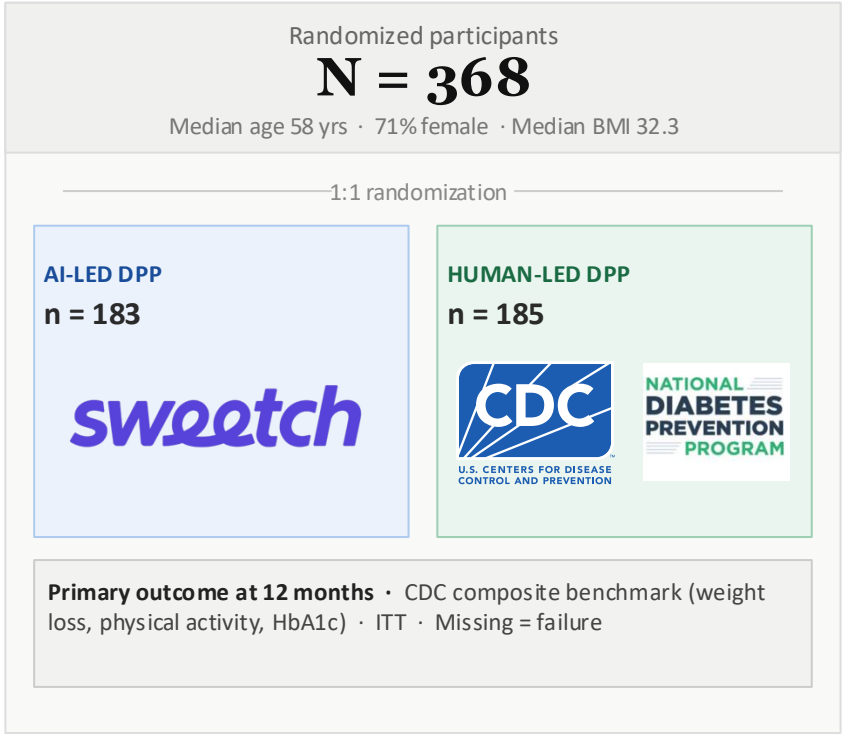
Scan to read the article

The question:

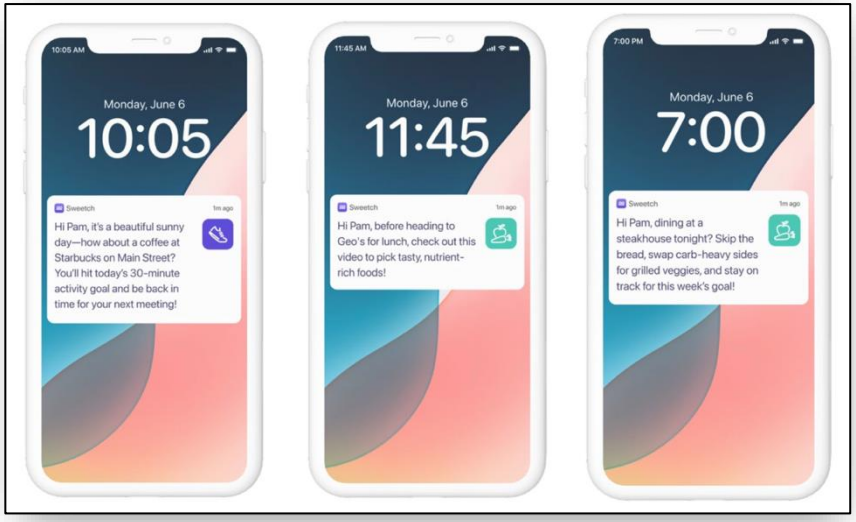
How does referral to a lifestyle intervention exclusively driven by AI compare with referral to a human coach–led DPP lifestyle intervention?

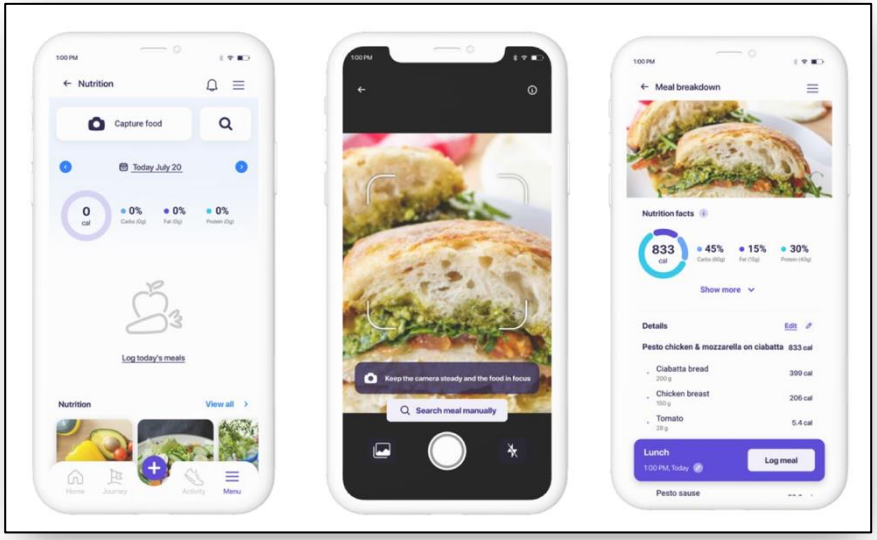
Study design

- **Phase 3, pragmatic, non-inferiority RCT** — study team did not deliver or manage either intervention; reflects real-world clinical referral
- **Population:** Adults ≥18, laboratory-confirmed prediabetes (HbA1c 5.7–6.4%), overweight/obesity; 72% had obesity (BMI ≥30)
- **Two US clinical sites** — Johns Hopkins Hospital (Baltimore MD) and Reading Hospital Tower Health (PA); stratified block randomization by site and HbA1c
- **12-month intervention,** Oct 2021 – Dec 2024
- **Objective actigraphy** — wrist-worn accelerometry through ActiGraph monitors
- **Composite primary outcome** mirrors CDC DPRP: ≥5% weight loss, or ≥4% weight loss + ≥150 min/wk MVPA, or ≥0.2pp HbA1c reduction — maintaining HbA1c <6.5%
- **NI margin:** −15 percentage points (more conservative than FDA-recommended 50% effect preservation)



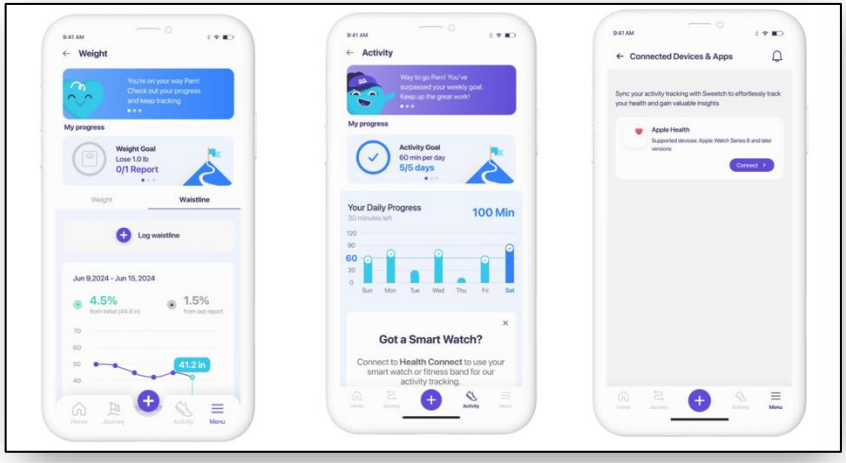
The AI-led DPP utilized a reinforcement learning algorithm to personalize behavior change support

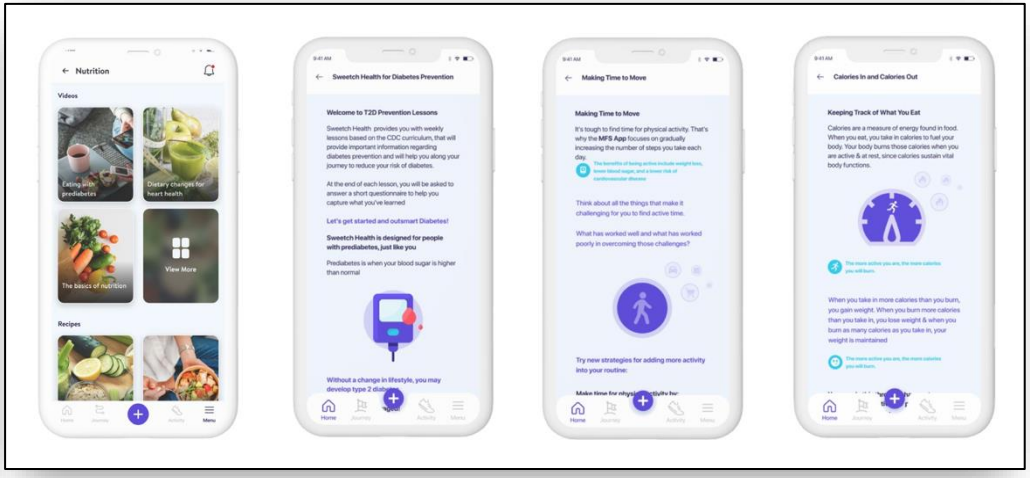




Sources: Sweetch Health Ltd.

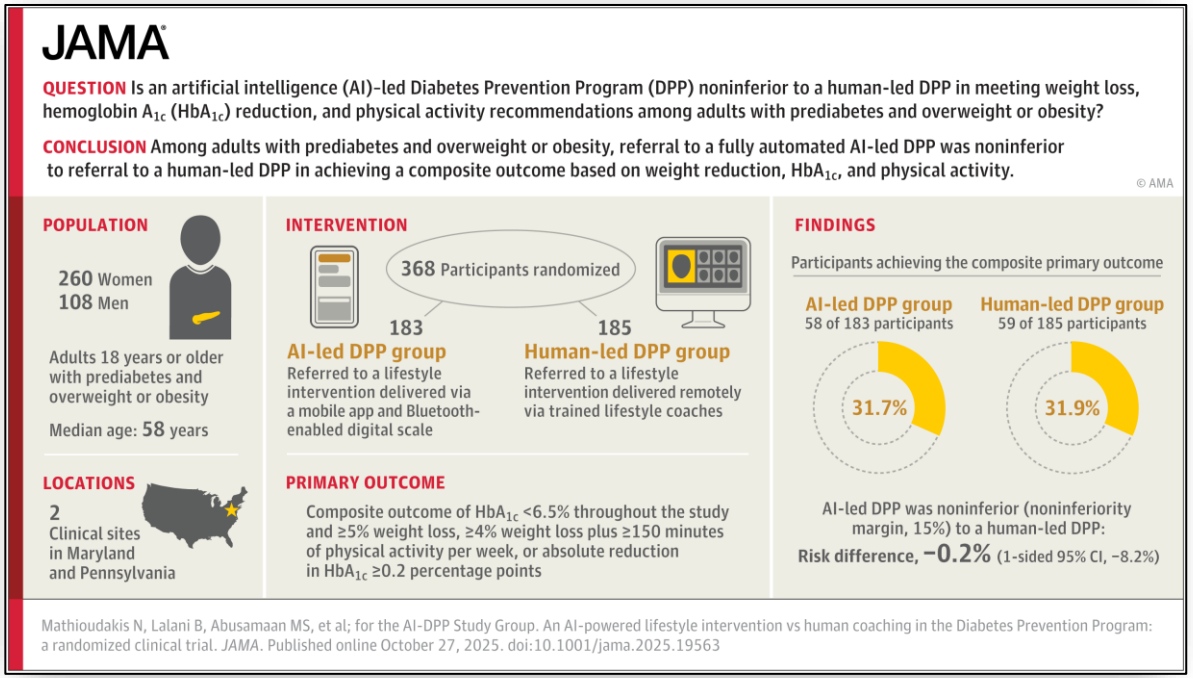
Weight/activity tracking and educational content were additional features of the intervention





Sources: Sweetch Health Ltd.

In those with prediabetes and overweight/obesity, the AI-led and human-led DPPs had similar performance



- A higher percentage of referred participants initiated the AI-led DPP compared with the human-led DPP (93.4% vs 82.7%; P = .001)
- A higher percentage of AI-led DPP participants met engagement criteria for program completion (63.9% vs 50.3%; P = .008)

Source: Mathioudakis. JAMA. 2025

Primary Findings

Outcome	No. of participants/total No. (%)		Risk difference (1-sided 95% CI), percentage points
	AI-led DPP	Human-led DPP	
Primary analysis[a]			
Primary outcome at 12 mo	58/183 (31.7)	59/185 (31.9)	-0.2 (-8.2)
Elements of composite primary analysis[b]			
≥5% Weight loss	31/183 (16.9)	37/185 (20.0)	-3.1 (-9.7)
≥4% Weight loss and 150 min of physical activity/wk	23/183 (12.6)	23/185 (12.4)	0.1 (-5.5)
Reduction in HbA_{1c} ≥0.2 percentage points[c]	35/130 (26.9)	35/130 (26.9)	0 (-9.1)

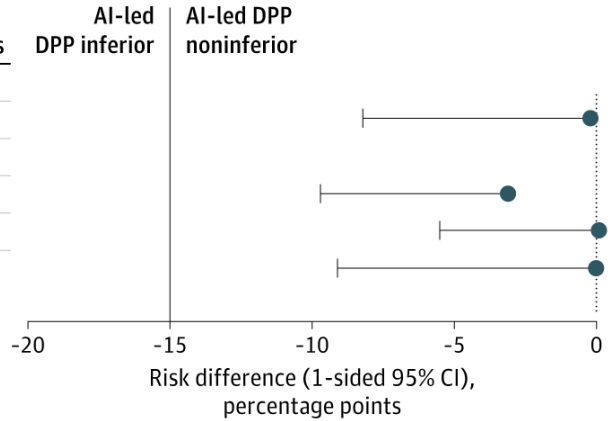


Figure Legend:

[a]The plot presents risk differences (percentage points) with 1-sided 95% CIs for the primary and elements of the composite primary analysis at 12 months. The reference line at −15 percentage points represents the noninferiority margin. The AI-led DPP intervention is considered noninferior to human-led DPP if the 1-sided 95% CI does not cross this threshold. Negative risk difference values indicate a lower outcome achievement frequency in the AI-led DPP group compared with the human-led DPP group.

[b]95% CIs for elements of the composite primary analysis outcomes are presented for descriptive purposes only. No multiplicity adjustment was applied because these analyses are exploratory and not intended for formal hypothesis testing.

[c]Analysis of the hemoglobin A_{1c} (HbA_{1c}) reduction of 0.2 percentage points outcome applies only for participants with HbA_{1C} in the prediabetes range at the study baseline visit (AI-led DPP: n = 130; human-led DPP: n = 130).

Source: Mathioudakis. JAMA. 2025

Despite the evidence, CDC policy says:

"Organizations may not use AI or ML to replace live lifestyle coaching."

— CDC DPRP Standards and Operating Procedures

Without DPRP recognition, fully automated programs are not able to be part of the CDC's National DPP and receive Medicare reimbursement

Summary and Implications

- Given these results, a fully automated AI-led DPP may be a viable alternative to the standard DPP in adults with prediabetes and overweight/obesity, especially in cases where the standard DPP cannot be accessed
- AI-based asynchronous delivery may help address major implementation barriers (access, scheduling, transportation, limited program capacity) that lead to the DPP's low utilization rates
- Findings support revisiting CDC's official DPP recognition requirements to support the development and implementation of AI-led DPPs
- Ongoing analyses are evaluating participant satisfaction and preferences, cost-effectiveness, and how digital engagement relates to outcomes