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Older Adults and Diabetes Prevention Programs in the Veterans Health Administration

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OBJECTIVE

To investigate whether older veterans enrolled in two diabetes prevention programs (DPPs) in the Veterans Health Administration will have similar weight loss as younger veterans.

RESEARCH DESIGN AND METHODS

Post hoc analysis of data from two prospective, pragmatic, nonrandomized studies of behavioral weight management interventions that were delivered in-person (Department of Veterans Affairs [VA]-DPP) or online (Online-DPP), comparing participation and weight loss between participants aged ≥ 65 years ($N = 120$) vs. < 65 years ($N = 258$).

RESULTS

Over 70% of participants in both age groups completed eight or more sessions within 6 months; a higher proportion completed eight or more sessions in the Online-DPP intervention than in the VA-DPP intervention ($P < 0.05$). The overall weight changes at 6 and 12 months were similar across the two age groups: ~ 5 kg or 5% weight loss compared with baseline ($P > 0.05$).

CONCLUSIONS

DPPs delivered in person or online can be similarly effective in older and younger veterans. Online programs may be an important means to improve the reach of DPPs for older adults.

Older veterans are disproportionately affected by diabetes, with prevalence as high as 34% in 2011 (1), compared with 25% of the general population ≥ 65 years of age (2). Thirty-six percent of older veterans have obesity, a major risk factor for diabetes (1). Clearly, effective intervention to prevent diabetes in older adults, especially older veterans, is urgently needed. The Diabetes Prevention Program (DPP) trial demonstrated that modest weight loss through lifestyle interventions can reduce diabetes incidence in high-risk individuals (2). However, few programs translating the DPP into real clinical settings included older veterans or online programs. Veterans receiving care in the Department of Veterans Affairs (VA) Veterans Health Administration (VHA) are likely to have lower overall health status and socioeconomic status than nonveterans (3). In addition, many older adults with prediabetes already have comorbidities and functional impairment that may limit their ability to complete lifestyle-based DPP programs (4). Thus, we conducted a post hoc analysis of two DPP trials in the VHA, in person (VA-DPP) and online (Online-DPP), and investigated whether veterans ≥ 65 years of age had similar participation and weight loss as younger veterans.

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RESEARCH DESIGN AND METHODS

VA-DPP and Online-DPP were two prospective, pragmatic, nonrandomized comparative effectiveness trials of translating DPP into the VHA, conducted in 2012–2015 and 2012–2016, respectively (5,6). They had similar participant eligibility criteria and outcome measures. Eligible participants for both studies were obese (BMI ≥ 30 kg/m²) or overweight (BMI ≥ 25 kg/m²) with at least one obesity-related condition (e.g., hypertension, hyperlipidemia) and had prediabetes (VA laboratory-confirmed HbA_{1c} 5.7–6.4%; fasting plasma glucose 100–125 mg/dL within the last 6 months). Participants with diabetes were excluded. Participants in the VA-DPP were ineligible for the Online-DPP. Recruitment for both Online-DPP and VA-DPP was done at four primary care clinics, located in Minnesota, California, Maryland, and Wisconsin.

VA-DPP used the Group Lifestyle Balance curriculum, with 22 in-person group-based intensive lifestyle change sessions over 12 months (16 core sessions in the first 6 months followed by six monthly maintenance sessions). Online-DPP was a 12-month intensive intervention with weekly online modules delivered sequentially as they were completed, through a web-based platform developed by Omada Health (7).

The VA-DPP weight data were obtained from the VHA Corporate Data Warehouse, a national data repository comprising data from local VHA electronic health records or from a follow-up visit. For the Online-DPP, objective weight data were obtained from participants using a cellular-enabled uploading scale. For participants who failed to upload, clinical weights were extracted from the VHA Corporate Data Warehouse.

To ensure comparable samples across the two studies, only participants who completed at least one module/session and had at least one follow-up weight were included in the analysis: 198 of the 273 subjects enrolled in the VA-DPP and 180 of the 268 subjects enrolled in the Online-DPP. A multilevel mixed-effects regression model was used to predict 6- and 12-month changes in baseline weight by age category and tested for differences between the VA-DPP and Online-DPP. The model adjusted for

baseline weight, sex, race, and program days since enrollment. Additional pairwise comparisons were made between participants enrolled in each study by age groups. All analyses were conducted using Stata 14.1.

RESULTS

At baseline (Table 1), compared with adults <65 years of age ($N = 258$), adults ≥ 65 years of age ($N = 120$) included fewer females, had lower BMI, and had a lower percentage of African Americans ($P < 0.001$); more older adults had hypertension and coronary artery disease, fewer had mental health conditions (each $P < 0.05$). The two age groups had the same HbA_{1c} percentage at 6.0% ($P = 0.77$). Similar proportions of older and younger adults completed four or more and eight or more sessions within each study during the first 6 months ($P > 0.05$). Higher proportions of both older and younger adults completed eight or more sessions in the Online-DPP compared with the VA-DPP ($P < 0.05$).

Both age groups lost a clinically and statistically significant amount of weight (~ 5 kg or 5% weight from baseline at 6 and 12 months; $P > 0.05$) and had similar weight loss trajectories over the 12 months ($P > 0.05$). Both age groups in the Online-DPP program regained weight at 12 months compared with 6 months: <65 years old, +0.88 kg (95% CI 0.60–1.16; $P < 0.01$); and ≥ 65 years old, +0.41 kg (95% CI 0.08–0.73; $P = 0.01$). In a multilevel mixed-effects model predicting weight changes, no significant interactions were found among age, study, and time ($P > 0.05$); sex was not a significant factor in predicting weight loss ($P = 0.98$).

CONCLUSIONS

In this post hoc analysis of two DPP translation studies in the VHA, veterans ≥ 65 years of age achieved similar participation and weight loss as younger adults, whether DPP was delivered in person or online. In a previous community-based DPP study involving in-person sessions (8), older adults were more likely to complete intervention sessions and achieve weight loss goals than younger adults. Our study population included veterans receiving care in the VHA, who generally have lower socioeconomic status and have higher comorbidity burden, particularly mental health comorbidities, compared with the general U.S. adult

population (3). These factors likely contributed to the lower participation and less weight loss found in our study compared with other studies. Nevertheless, participation in the VA-DPP was higher than that in MOVE! (the VHA weight-loss program), and nearly all of the Centers for Disease Control and Prevention Diabetes Prevention Recognition Program standards for recognition were met (9). Overall participation in the Online-DPP (84.4% completed nine or more modules in the first 6 months) was slightly lower than the 92% reported in a Medicare population (10).

Our results suggest that the two VHA DPPs are likely to be effective in older adults who have a high burden of comorbidities. Participants in a previous study (8) were likely healthier, as only 34.8% of them had comorbid hypertension, whereas twice as many participants in our study had hypertension, including 75% of those ≥ 65 years of age. Future studies are needed to assess the uptake of DPP among individuals with cognitive or mobility impairment because nearly 20% of adults ≥ 53 years of age with prediabetes already have mild cognitive impairment, and 32% have mobility limitations such as difficulty walking several blocks and/or climbing a flight of stairs (4).

We also found that Online-DPP is effective in older adults. Although a number of DPPs have shown success in weight loss, three-quarters of the DPPs delivered in person had low reach (<33% of eligible individuals participated) (11). Distance is known to be an important barrier in seeking health care in rural veterans and other populations (12,13), increasing the likelihood of failing to complete the program. Online programs will likely become an increasingly important means to reach more older adults because >90% of adults >50 years old own a computer, and >40% of them, including those ≥ 70 years of age used their computers to obtain health and fitness information (14).

Despite the potential for inherent bias involved in post hoc analyses, our hypotheses and analyses were specified prior to examination of the data by age groups. Our study is limited because of the small sample size, predominately male, and does not include populations outside of the VHA, but the sample population was geographically and racially

Table 1—Participant baseline characteristics and participation and weight loss outcomes in VA-DPP and Online-DPP, comparing those <65 and ≥65 years of age

	Age <65 years (N = 258)			Age ≥65 years (N = 120)			P values, overall comparison between age <65 vs. ≥65
	Overall	VA-DPP (N = 139)	Online-DPP (N = 119)	Overall	VA-DPP (N = 59)	Online-DPP (N = 61)	
Baseline characteristics							
Age, mean (SD)	54.7 (7.2)	55.1 (7.0)	54.4 (7.5)	70.1 (5.5)	68.7 (4.8)	71.4 (5.9)	<0.001
Female, n (%)	82 (31.8)	24 (17.3)	58 (48.7)	8 (6.7)	2 (3)	6 (10)	<0.001
Weight, kg; mean (SD)	106.2 (21.1)	111.8 (20.3)	99.2 (19.9)	103.4 (18.9)	106.6 (19.1)	100.2 (18.2)	0.23
BMI, kg/m ² ; mean (SD)	35.1 (5.6)	36.2 (5.5)	33.8 (5.4)	32.9 (5.6)	33.6 (5.1)	32.3 (6.0)	<0.001
Race, n (%)							<0.001
Black	92 (35.7)	64 (46.0)	28 (23.5)	21 (17.5)	16 (27)	5 (8)	
White	147 (57.0)	63 (45.3)	84 (70.6)	96 (80.0)	40 (68)	56 (92)	
Other	11 (4.3)	4 (2.9)	7 (5.9)	1 (0.8)	1 (2)	0 (0)	
Missing	8 (3.1)	8 (5.8)	0 (0.0)	2 (1.7)	2 (3)	0 (0)	
Comorbidities, n (%)							
HTN	160 (62.0)	90 (64.7)	70 (58.8)	90 (75.0)	44 (75)	46 (75)	0.013
CAD	20 (7.8)	12 (8.6)	8 (6.7)	26 (21.7)	14 (24)	12 (20)	<0.001
Mental health	140 (54.3)	81 (58.3)	59 (49.6)	43 (35.8)	24 (41)	19 (31)	<0.001
HbA _{1c} %; mean (SD)	6.0 (0.2)	6.0 (0.2)	6.0 (0.2)	6.0 (0.2)	6.0 (0.2)	6.0 (0.2)	0.77
Participation outcomes, n (%)							
Completed 4+ sessions	219 (84.9)	109 (78.4)	110 (92.4)*	103 (85.8)	48 (81)	55 (90)	0.81
Completed 8+ sessions	181 (70.2)	79 (56.8)	102 (85.7)*	91 (75.8)	37 (63)	54 (89)*	0.25
Predicted mean change in weight, kg (95% CI)							
6-month weight loss	-5.79 (-6.65, -4.92)	-5.05 (-6.09, -4.01)	-5.85 (-6.76, -4.95)	-5.91 (-7.02, -4.81)	-5.30 (-6.62, -3.98)	-5.96 (-7.10, -4.81)	0.81
12-month weight loss	-5.00 (-5.89, -4.10)	-5.22 (-6.46, -3.98)	-4.98 (-5.92, -4.03)	-5.55 (-6.68, -4.41)	-5.43 (-7.03, -3.82)	-5.55 (-6.73, -4.37)	0.32
Predicted mean change in weight, % (95% CI)							
6-month weight loss	-5.76 (-6.58, -4.93)	-4.98 (-5.96, -3.99)	-5.83 (-6.70, -4.96)	-5.97 (-7.01, -4.93)	-4.78 (-6.02, -3.54)	-6.05 (-7.12, -4.97)	0.66
12-month weight loss	-5.02 (-5.88, -4.17)	-5.17 (-6.35, -3.99)	-5.01 (-5.91, -4.11)	-5.60 (-6.67, -4.53)	-4.95 (-6.47, -3.43)	-5.63 (-6.74, -4.52)	0.26

P values are results from ANOVA for continuous variables and Pearson χ^2 test for categorical and binary variables comparing participants <65 years of age to those ≥65 years of age. Pearson χ^2 test for pairwise comparisons and proportion test were performed to compare VA-DPP to Online-DPP participants within each age group (*P < 0.05) and to compare participants <65 years of age to those ≥65 years of age within each study (all P > 0.05). CAD, coronary artery disease; HTN, hypertension.

diverse, including many with mental health comorbidities. Because nearly 50% of the veterans are ≥ 65 years of age, or ~ 9.4 million (15), results from the current analysis are especially important for the VHA effort to prevent diabetes. In fact, our participants successfully lost 5% of baseline weight, on average, achieving the primary goal set for the National DPP trial. Thus, our findings suggest that, along with younger adults, DPP delivered in person or online may also be equally effective in older adults.

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