

## Supplementary Online Content

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This supplementary material has been provided by the authors to give readers additional information about their work.

## **eMethods. Specific elements of Design-** **Advising protocol elements**

Each advising session followed a standard counseling protocol, based on the *Active Choices* program, that was similar across the two interventions and consisted of the following elements:<sup>1</sup> introductory social dialogue, querying of any health changes, review of pedometer-assessed steps and minutes walked since the prior advising session, problem-solving aimed at PA barriers, recognition of PA successes, goal-setting for the next period, and scheduling of the next advising session. The advising schedule consisted of weekly sessions for the first two months, followed by twice-per-month sessions for the remaining 10 months.<sup>2,3</sup> Participants were guided in a realistic progression of PA goals towards the national guideline of at least 150 minutes/week of moderate-intensity PA.<sup>4</sup> Advisors in each arm asked participants during each session whether they wanted to maintain or change their walking goals based on their current PA levels. Participants were asked about how many days per week as well as minutes per day they wanted to aim for until the next advising session. When they had achieved a goal, both advising programs provided positive feedback and asked about setting a new goal. For example, when participants in the Virtual advisor arm reached a goal, the advisor responded in the following way: “Great job—you have met your goal of XX number of times during the past two weeks. Would you like to increase the number of days or the number of steps or minutes per day you take?” Peer advisors were trained to respond in a similar way.

Participants in both arms also received simple educational tip sheets, including some recommending replacing sedentary behaviors such as television viewing with PA. Modest incentives (a study bag and calendar to track progress) were provided as part of the interventions.

Cultural tailoring of the Virtual Advisor for the Latino community occurred in a variety of ways, including through the Advisor’s appearance and bilingual communications, information that she provided related to her own “background”, the playing of culturally appropriate music at the beginning of each session, and through brief social chat topics that the Advisor introduced, e.g., favorite local television shows.

Local community centers are attractive for Latino populations for a number of reasons, including the following: Across the U.S., Latinos often live in residential clusters with substantial proportions of other Latino residents.<sup>5</sup> The community centers in these neighborhoods typically offer services that are attractive to the local Latino aging community, including bilingual staff, noontime meal programs with culturally appealing foods, and culturally attractive though often sedentary recreational activities (e.g., crafts, fiestas). In addition, given that a significant proportion of Latino adults lack health insurance,<sup>6</sup> local community centers typically offer basic health services, such as periodic blood pressure and blood glucose checks, through community health workers, who constitute a vital and well-accepted delivery source for these services in the Latino community.<sup>7</sup> Such settings provide excellent opportunities for offering cost-efficient preventive programs to local residents; these programs, including the two compared in the current study, fit well with the centers’ mission to serve the surrounding community. Our partner community centers regularly serve over 100 midlife and older adults per day. Additionally, during the development and conduct of the formative experimental pilot investigation that informed the current trial,<sup>8</sup> the older Latino population strongly supported the delivery of these types of physical activity behavioral interventions in their local community settings.

In light of spatial distancing and other impacts accompanying the COVID-19 outbreak, both types of interventions have, in prior research, been delivered successfully to a range of midlife and older populations through remote delivery channels that do not require travel to a community setting (e.g., phone, home computers).

### **Virtual advisor additional information**

A helpline for participants and center staff was available for assistance in correcting any Virtual Advisor-related problems. A designated Stanford staff member was in regular contact (at least twice a month and more frequently as needed) with the Virtual advisor programming and oversight team at Northeastern University to ensure any problems that occurred were quickly resolved. In addition, participants who did not log into the program after two consecutive sessions during the first two months of the intervention, or over three consecutive weeks thereafter, received a brief telephone contact from the staff member encouraging them to log into the advising program.

A major difference between this type of Virtual advisor system in comparison to automated telephone-based health systems, email and text messaging systems, etc. is that participants could interact directly with the Virtual advisor in the community center at their convenience, given that the system was available throughout the daily hours that the community center was open. Participants simply signed up for times that they desired, and during each session received immediate, real-time customized advice and support. Unlike a number of other automated systems, the

Virtual advisor system includes both verbal and nonverbal communication behaviors (e.g., hand gestures, facial cues), that can enhance message comprehension.<sup>8,9</sup>

### **Human advisor additional information**

Human advisors met the following eligibility criteria:<sup>1</sup> (a) ages 30 years and older; (b) physically active on a regular basis (i.e., engaged in 150 minutes/week or more of moderate intensity physical activity over the past 12 months); (c) free of any medical problems that might make it difficult to serve as a Human advisor in the study (e.g., unstable chronic conditions); (d) willing to participate in the 12-hour training program and volunteer an average of 2-3 hours per week to advise their participants on physical activity; (e) willing to participate in monthly supervision meetings with project intervention staff; (f) able to read and understand English or Spanish sufficiently to provide informed consent and participate in all study procedures; and (g) planning to live in the area for at least a 12-month period. Human advisors received modest monetary remuneration (approximately \$200-\$300 total/advisor) for their participation, which averaged 12.7 months. The total number of Human (peer) advisors participating in the study was 31 (mean age=60, SD=14.1; age range=32-84; 80% women). The average number of participants they advised was 3.9 (SD=1.8), with a range of 1-10.

There has been extensive testing demonstrating the effectiveness of the *Active Choices* physical activity behavioral intervention, including several large-scale translation/dissemination trials confirming its effectiveness when delivered by trained peer and community advisors in real-world conditions. The trials involving trained peers and similar non-professional advisors collectively include over 700 adults from 14 communities. Twelve-month effect sizes (Cohen's *d*) derived from the RCT research directly comparing peer and professional staff-delivered interventions vs. control, in which 15% of participants were Latino, equaled .51 and .50, respectively, and the effect sizes (Cohen's *d*) for the pre-posttest physical activity increases in the translation/dissemination trials averaged .50, with other RCTs on *Active Choices* obtaining similar or greater effect size magnitudes.<sup>2,10</sup> These effect size magnitudes place this intervention on the higher end of effects in relation to the rest of the physical activity intervention field.<sup>11,12</sup> The strong evidence base for the *Active Choices* intervention across different delivery sources (e.g., professional staff, trained non-professional advisors), populations, and delivery channels (e.g., by phone, in-person, via interactive voice response systems) has led to its formal recognition as an approved, evidence-based program by the Administration on Aging—the U.S. Department of Health and Human Services' designated agency for promoting the well-being of older adults through programs aimed at helping them live independently. It similarly has been listed among the National Council on Aging's evidence-supported programs, and by the U.S. Centers for Disease Control and Prevention (CDC) as a CDC "Promising Practice".

The fact that peer advisors were able to be involved in a broader conversational dialogue with their participants (e.g., hearing about news concerning participants' families or work activities) compared to the Virtual Advisor, which was programmed to initiate specific questions and receive specific responses via the simple touch-screen computer interface, allowed the Peer Advisors to spend more time talking with their participants.

### **Accelerometry protocol and analysis description**

The Actigraph® accelerometer (model wGT3X) protocol from a longitudinal study of 860 older adults was applied.<sup>13</sup> Wear-time validity was determined through applying the wear and non-wear time algorithms reported by Choi et al.,<sup>14</sup> and PA intensity cut-point algorithms were based on Copeland et al.<sup>15</sup> Data were considered valid if the participant wore the device for  $\geq 8$  hours/day for  $\geq 4$  consecutive days during each assessment. The  $\geq 8$  hours/day wear time was used to promote greater data inclusiveness, commensurate with national investigations in this area.<sup>16,17</sup> Median minutes/week of baseline accelerometry-derived moderate-to-vigorous activity (MVPA) were 35 and 32 for Virtual and Human Advisor arms, respectively, and mean minutes/week of baseline accelerometry-derived MVPA were 40.7 (SD=25.8) and 43.6 (SD=31.2) for the Virtual and Human Advisor arms, respectively.

Median 12-month changes in accelerometry-derived step counts were assessed using Wilcoxon signed rank tests; the relations between 12-month reported MVPA (which shows the most reliable correlations with accelerometry)<sup>18</sup> and accelerometry-derived MVPA and step counts were assessed using Spearman-rank order correlations;<sup>18</sup> and the sample was split at the median and independent-sample *t*-tests were conducted to explore whether participants falling in the top half of the distribution based on their 12-month reported total walking minutes/week and MVPA values showed higher 12-month accelerometer-derived step counts and MVPA than those in the lower half.

**eResults- Accelerometry corroborative results**

At 12 months, we obtained valid accelerometer data on 144 participants (59.3% for Virtual and 58.2% for Human), who did not differ significantly from the rest of the sample or by intervention arm on baseline demographic or reported PA variables (all  $P$ s  $>.06$ ). Given this, and the lack of between-arm differences for change in reported PA variables, the two arms were combined to increase power. Employing intention-to-treat methods, median baseline to 12-month step count increases (inter-quartile range, 1<sup>st</sup>-3<sup>rd</sup> quartiles) across both arms equaled 434.8/day (-772 to 1412) (i.e.,  $>3000$ /week;  $P$  for increase from zero  $<.001$ ; [Virtual=539.8/day (-327–1600); Human=304.2/day (-987–1245); between-arm Wilcoxon two sample rank test=.08]). Spearman-rank order correlations at 12 months between reported MVPA and accelerometry-derived MVPA and average step counts/day were .24 ( $P<.001$ ), and .25 ( $P<.001$ ), respectively. Significant differences in accelerometry-derived PA for participants  $\geq$  the median vs. below the median for reported total walking weekly minutes at study endpoint also were found. Those participants who were at or above the median at 12 months for reported total walking minutes/week had a mean (SD) for accelerometry-derived total step counts/day of 5756 (2688), compared to a mean of 5084 (1839) for those below the median ( $t$ -test=2.26,  $P=.03$ ). Those participants who were at or above the median at 12 months reported weekly MVPA minutes had a mean (SD) for accelerometry-based weekly MVPA minutes of 52.5 (31.1), compared to a mean of 41.4 (21.5) for the subgroup below the median ( $t$ -test=3.23,  $P=.001$ ).

**eTable 1. Average recorded pedometer steps/day, by intervention month, and proportion of participants reporting them each month, by arm**

Intervention Month	Virtual Advisor (total N=123)		Human Advisor (total N=122)	
	Number/ % reporting	Mean Steps (SD)	Number/ % reporting	Mean Steps (SD)
#1:	111/ 90.2%	5632.1 (2483.5)	86/ 70.5%	5838.3 (3157.3)
#2:	103/ 83.7%	6221.7 (2571.8)	79/ 64.8%	6294.1 (4815.7)
#3:	100/ 81.3%	5859.8 (2517.7)	70/ 57.4%	5782.5 (2457.3)
#4:	88/ 71.5%	6509.9 (2901.5)	67/ 54.9%	6377.3 (4446.2)
#5:	82/ 66.7%	6680.0 (2909.8)	49/ 40.2%	5605.2 (2718.0)
#6:	77/ 62.6%	6305.1 (2864.8)	63/ 51.6%	5815.0 (2390.9)
#7:	71/ 57.7%	6557.7 (2963.3)	62/ 50.8%	6380.4 (4326.3)
#8:	68/ 55.3%	6819.4 (3163.6)	57/ 46.7%	5864.1 (3383.4)
#9:	69/ 56.1%	6332.9 (3319.1)	60/ 49.2%	6282.8 (2791.0)
#10:	64/ 52.0%	6721.1 (3420.0)	55/ 45.1%	5963.1 (3040.0)
#11:	53/ 43.1%	7278.2 (3667.4)	44/ 36.1%	5882.3 (2827.7)
#12:	44/ 35.8%	7211.6 (4272.0)	40/ 32.8%	5550.8 (3477.1)

**Note:** While participants in both arms were encouraged to record their daily pedometer steps on a program calendar, participants in the Virtual Advisor arm could directly download their pedometer data on the Virtual Advisor computer at each session via the computer's USB port.

**eTable 2. Well-being domain changes at 12 months, Between-Arm Differences  
Number of well-being domains improved by 12 months, by arm**

The 10-item Vitality Plus Scale assesses the accumulated health-related benefits of physical activity participation in older adults.<sup>19</sup> Within-arm *t* tests indicated that significant 12-month improvements occurred across all 10 well-being domains (fall asleep quickly, sleep well, feel rested, excellent appetite, not constipated, have no aches or pain, feel full of pep and energy, not stiff in the morning, feel relaxed, feel good) for the Human Advisor arm (*Ps* ≤.04), while only across 3 domains (sleep well, feel rested, and feel full of pep and energy) for the Virtual Advisor arm (*Ps* ≤ .03).

**Well-being items: within-arm 12-month pre-post changes (2-sided paired-comparison *t* tests, using ITT)**

	Virtual Advisor (N=123)			Human Advisor (N=121)		
	Mean change (SE)	<i>t</i> value	<i>P</i> value	Mean change (SE)	<i>t</i> value	<i>P</i> value
Fall asleep quickly:	-0.07 (0.10)	-0.68	.50	0.27 (0.08)	3.15	<b>.002</b>
Sleep well:	0.29 (0.11)	2.66	<b>.009</b>	0.50 (0.09)	5.40	<b>&lt;.001</b>
Feel rested	0.27 (0.11)	2.42	<b>.02</b>	0.46 (0.10)	4.73	<b>&lt;.001</b>
Excellent appetite:	0.03 (0.10)	0.30	.76	0.20 (0.10)	2.03	<b>.04</b>
Not constipated:	0.07 (0.11)	0.70	.49	0.23 (0.11)	2.13	<b>.04</b>
Have no aches or pains:	-0.00 (0.11)	-0.04	.97	0.41 (0.11)	3.75	<b>&lt;.001</b>
Full of pep and energy:	0.23 (0.10)	2.21	<b>.03</b>	0.42 (0.10)	4.08	<b>&lt;.001</b>
No morning stiffness:	0.16 (0.11)	1.40	.16	0.50 (0.12)	4.22	<b>&lt;.001</b>
Feel relaxed:	0.16 (0.10)	1.58	.12	0.48 (0.11)	4.55	<b>&lt;.001</b>
Feel good:	0.13 (0.09)	1.45	.15	0.47 (0.10)	4.95	<b>&lt;.001</b>

**Note:** Item scores use a 5-point Likert scale; a higher score reflects a more positive rating.

**eTable 3- Program Satisfaction Measures at 12 months, between-arm differences**

**1. Working Alliance Inventory (bonding subscale)<sup>20</sup> Results (per protocol)**

	Virtual Advisor		Human Advisor		Difference(95% CI)	t value	P value
	N	Mean(SD)	N	Mean(SD)			
Mean overall inventory score:	94	4.94(1.42)	96	5.84(1.30)	-0.89(-1.28 to -0.50)	-4.53	<.001
I feel uncomfortable with my physical activity advisor (reverse-scored):	94	5.85(1.98)	92	5.59(2.43)	0.26(-0.38 to 0.90)	0.81	.42
My physical activity advisor cares about me even when I do things she/he does not approve of:	91	4.47(2.31)	93	5.08(2.30)	-0.61(-1.28 to 0.06)	-1.81	.07
If I say or do the wrong things, my physical activity advisor will stop working with me (reverse-scored):	92	5.64(2.08)	95	6.29(1.62)	-0.65(-1.19 to -0.12)	-2.39	.02
My physical activity advisor and I understand each other:	94	4.52(2.30)	96	5.69(2.00)	-1.17(-1.78 to -0.55)	-3.73	.03
I believe my physical activity advisor likes me:	93	4.33(2.24)	96	5.88(1.76)	-1.55(-2.13 to -0.97)	-5.31	<.001
I believe my physical activity advisor is genuinely concerned about my welfare:	94	4.81(2.19)	96	5.89(1.72)	-1.08 (-1.64 to -0.51)	-3.78	<.001
My physical activity advisor and I respect each other:	94	5.43(2.08)	96	6.32(1.55)	-0.89(-1.41 to -0.36)	-3.33	.001
I feel that my physical activity advisor is not totally honest about her/his feelings toward me (reverse-scored):	94	5.47(2.15)	94	6.20(1.79)	-0.73(-1.30 to -0.16)	-2.54	.01
I am confident in my physical activity advisor's ability to help me:	94	5.21(2.10)	96	5.94(1.70)	-0.73(-1.27 to -0.18)	-2.61	<.001
I feel that my physical activity advisor appreciates me:	94	4.46(2.28)	96	5.71(1.76)	-1.25(-1.83 to -0.67)	-4.23	<.001
My physical activity advisor and I trust each other:	93	4.34(2.30)	96	5.65(1.90)	-1.31(-1.92 to -0.71)	-4.28	<.001
My relationship with my physical activity advisor is very important to me:	93	4.94(2.11)	95	5.93(1.72)	-0.99(-1.54 to -0.44)	-3.53	<.001

**Note:** Range of item scores using a 7-point Likert scale=1 ('Disagree completely') to 7 ('Agree completely'); a higher score reflects a more positive rating.

## 2. User Satisfaction Survey Results (per protocol)

	Virtual Advisor		Human Advisor		Difference(95% CI)	t value	P value
	N	Mean(SD)	N	Mean(SD)			
I could totally be myself when working with the advisor, reversed	94	4.98(1.28)	96	5.40(1.11)	-0.42(-0.76 to -0.07)	-2.40	.02
Working with the advisor has been frustrating	92	4.76(1.45)	96	5.21(1.38)	-0.45(-0.85 to -0.04)	-2.17	.03
I have felt motivated following the sessions with my advisor, reversed	94	4.79(1.19)	96	5.12(1.18)	-0.33(-0.67 to 0.01)	-1.91	.06
The advisor has given me helpful information, reversed	95	5.00(1.15)	96	5.21(0.98)	-0.21(-0.51 to 0.097)	-1.35	.18
I have felt that the advisor was difficult to understand	94	4.87(1.35)	96	5.53(0.83)	-0.66(-0.98 to -0.34)	-4.05	<.001
The advisor has gotten on my nerves	94	5.00(1.30)	96	5.54(0.86)	-0.54(-0.86 to -0.22)	-3.38	<.001
The advisor has made it clear what was expected of me, reversed	94	4.89(1.28)	96	4.74(1.52)	0.15(-0.25 to 0.56)	0.76	.45
The advisor has made me feel worse when I felt discouraged	95	5.06(1.22)	96	5.34(1.52)	-0.28(-0.64 to 0.08)	-1.53	.13
Working with the advisor has been enjoyable, reversed	95	4.84(1.43)	96	5.32(1.31)	-0.48(-0.87 to -0.09)	-2.42	.02
The advisor has helped me reach personal physical activity goals, reversed	95	4.65(1.46)	96	4.91(1.46)	-0.26(-0.68 to 0.15)	-1.25	.21
Mean of 10 satisfaction with advisor items	95	4.87(0.93)	96	5.23(0.81)	-0.36(-0.61 to -0.11)	-2.84	.005

**Note:** To evaluate program acceptability and usefulness, participants completed the user satisfaction survey at the end of the 12-month intervention period. The survey, adapted from similar user satisfaction surveys in the study age group,<sup>8,21,22</sup> asks participants to rate, on a 6-point Likert type scale, level of agreement to disagreement with each item. Item values range from 1=strongly agree to 6=strongly disagree; positive statements are reversed so that for all items a higher score reflects a more positive rating.

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