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Gentle Physical Activity Intervention Led by Caregivers in a Medicaid Home Care Program: Do Outcomes Differ Between Family and Nonfamily Caregiving Dyads?

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Abstract

Background and Objectives: Caregiving dyads are fertile contexts for health promotion such as physical activity. However, previous physical activity interventions in caregiving dyads paid limited attention to care recipients' outcomes and rarely involved paid caregivers. Home care aides (HCAs) provide nonmedical care for older family members or nonfamily clients in publicly funded home care programs in the United States. This study examined whether family and nonfamily HCA–client dyads differed in the outcomes of a 4-month gentle physical activity pilot program led by HCAs in a Medicaid home care program.

Design and Methods: A single-group prepost design was used to assess changes in clients' function (self-reported and performance-based) and process outcomes (exercise-related social support provided by HCAs) in 18 family and 32 nonfamily HCA–client dyads. Repeated measures analysis controlled for clients' demographic and health characteristics. Clients' and HCAs' motivation to continue the program beyond the intervention period was examined using quantitative and qualitative data.

Results: Client outcomes and exercise-related social support provided by HCAs improved, especially in nonfamily dyads. Both family and nonfamily dyads had high levels of motivation to continue the program, supporting the program's sustainability for both clients and HCAs.

Discussion and Implications: Empowering HCAs to engage in health promoting activities with their clients is a promising strategy to improve the lives of caregiving dyads.

Translational Significance: Home care aides constitute one of the fastest growing occupations in the United States. Building health promotion into long-term care and empowering family and nonfamily caregivers with health promotion skills is a promising strategy for aging societies.

Keywords: Caregiving—Formal, Function/mobility, Home- and community-based care and services, Long-term care, Workforce issues.

Caregiving dyads are fertile contexts for health promotion such as physical activity.¹ Caregivers may participate in interventions together with their care recipients^{2,3} or monitor care recipients' activity.⁴ However, previous phys-

ical activity interventions in caregiving contexts mainly focused on caregivers' psychosocial outcomes, with limited attention to care recipients' health and functional outcomes. A recent systematic review of the efficacy of physical ac-

tivity interventions for caregivers identified only two studies involving dyadic pilot interventions with promising findings about care recipients' outcomes.⁵⁻⁷ Furthermore, physical activity interventions in caregiving contexts rarely involve formal, or paid caregivers,⁸ one of the most rapidly growing occupations in the United States.⁹

Home care aides (HCAs), also called personal care assistants or home makers, are formal caregivers who provide nonmedical assistance to older adults who need help with daily activities.¹⁰ HCAs may care for their own family members. An increasing number of states allow family members or relatives to be paid to care for older adults, partly to promote consumer direction and increase the supply of caregivers in publicly funded home care programs in the United States.¹⁰⁻¹³ Some states, like California, encourage clients to hire their own HCAs who become "independent providers." Other states, like Illinois, allow eligible older adults' relatives to be their HCAs as long as they are hired by home care agencies that are contracted with the state to provide home care.

As regular caregivers, HCAs are well positioned to promote physical activity among frail older adults in their home setting. However, physical activity interventions may work differently for family and nonfamily HCA-client dyads. The current home care practice does not consider physical activity promotion as part of HCAs' job description or clients' care plans that HCAs must follow. HCAs are not expected to initiate physical activity with their clients on their job. Thus a home care-based physical activity intervention program could redefine the role of HCAs as health promotion agents and empower HCAs in their relationship with their clients. This enhanced role of HCAs may be more pronounced in nonfamily HCA-client dyads where their interactions are limited to home care work contexts. Family dyads, on the other hand, are not constrained by home care rules outside the paid home care hours. Physical activity intervention activities may work as an extension of ongoing family activities defined by the family norms or expectations.¹⁴ Thus, a home care-based physical activity intervention may lead to larger changes in HCAs' roles and client outcomes in nonfamily dyads than in family dyads. We are not aware of any empirical studies that examined differences in family and nonfamily caregiving dyads' outcomes of a home care-based health promotion intervention.

This study examined whether and how family and nonfamily caregiving dyads differed in client and HCA outcomes of a gentle physical activity intervention. We analyzed quantitative and qualitative data from a 4-month pilot program, Healthy Moves for Aging Well, delivered by HCAs for their clients in the context of a real-world home care program funded by Medicaid, the largest funder of U.S. long-term care.⁸

Research Design and Methods

A single-group pretest design was used to assess client and HCA outcomes as part of a pilot feasibility study of an

in-home physical activity program delivered by HCAs to their home care clients. The program was adapted from Healthy Moves for Aging Well, originally developed by Partners in Care Foundation and designed to be delivered by case managers and trained lay coaches.¹⁵ Building on behavioral change theories¹⁶ and evidence-based physical activity,¹⁷ Healthy Moves consists of a motivational enhancement component and three chair-bound movements. Guided by social cognitive theory,¹⁸ our 4-month intervention was hypothesized to affect clients' outcomes partly through exercise-related social support provided by HCAs for their clients. We conducted the intervention in the context of Illinois Department on Aging Community Care Program (CCP) In-Home Services.¹⁹ Details of the intervention, the research design and procedures as well as the overall results of improved clients' function and health are available elsewhere.^{8,20}

Sample

HCA-client pairs were recruited from a large home care agency contracted with the Illinois Department on Aging to provide in-home services. Clients were eligible for the study if they were receiving CCP in-home services (i.e., aged 60+ years, having assets less than \$17,500), able to speak English adequately, had a cognitive status sufficient to follow directions, were able to sit in a chair independently for 15+ minutes, and were willing to have their primary care physician notified of their study participation. Of the 107 potentially eligible home care clients identified by the home care agency through HCA contacts and supervisor referrals, 64 clients were screened into receiving baseline assessments. Their HCAs were screened for their eligibility (English speaking, willing and able to implement the intervention routine for 4 months, having an eligible and interested client, and intending to stay with the home care agency for 12 months). Of the 54 HCA-client pairs who satisfied both HCA and client eligibility criteria and started the intervention, 4 pairs dropped out of the study due to client cognitive impairment ($N = 1$) and deaths ($N = 3$). Included in this study were 50 dyads with client baseline and Month 4 assessment data, involving 50 clients and 42 HCAs (8 HCAs had 2 participating clients). Of the 42 HCAs, 37 participated in Month 4 training and survey (5 HCAs could not be reached for Month 4 interviews).

Procedures

HCAs received a half-day training on the use of a brief motivational enhancement tool appropriate for clients' readiness for behavioral change and the three chair-bound movements through role plays. During the first home care visit after the training, HCAs delivered the program to their client in his/her home, using the training materials. HCAs were asked to remind their clients of their personally

meaningful goal set on the first day and of doing Healthy Moves regularly as part of regular home care visits during the following 4 months.

At baseline before the intervention and at Month 4 after the intervention, clients' health and functional status was assessed in the clients' homes by trained interviewers. HCAs filled out a self-administered questionnaire distributed at the baseline HCA training session and a follow-up training session.

Measures

Client outcomes

Our primary outcome was clients' function (self-reported and performance-based). Self-reported measures included (1) a scale for 6 items of daily activities specifically targeted by Healthy Moves (HM6; eg, walking from room to room, pouring a drink from a carton), (2) 8 items from basic activities of daily living (BADL; eg, bathing, dressing)²¹⁻²³ and (3) 4 items from instrumental activities of daily living (IADL; eg, shopping, preparing meals).²⁴ Performance-based function was measured using Short Physical Performance Battery (SPPB).²⁵ Higher scores of HM6 (range 0–12), BADL (range 0–16), and IADL (range 0–8) represented greater functional disability (worse function), while higher SPPB scores (range 0–12) represented better physical function. Items and scoring method of these outcomes are described in a previous publication.⁸

Process outcomes

Exercise-related social support provided by HCAs for their clients was assessed using reports from clients and HCAs. Client-reported HCA support was assessed by a 3-item scale adapted from the Social Support for Diet and Exercise Behaviors scale (range 3–9).²⁶ HCAs' self-reported support for clients was assessed by a 3-item scale of exercise-related activities with their client during the past 4 months (discussed the client's physical activity or exercise, helped the client do exercise, and reminded the client of doing exercise; never, hardly ever, sometimes, often; range 3–12).

Motivation to continue Healthy Moves

Clients rated their motivation to do Healthy Moves for the next 4 months on a scale of 0 (*not at all motivated*) to 10 (*totally motivated*) and responded to an open-ended question ("what makes you feel that way?") in a face-to-face interview at Month 4. Similarly, HCAs rated their motivation to continue Healthy Moves with their client participant for the next 4 months and responded to the same open-ended question in a self-administered questionnaire at the follow-up in-service training. Responses to the open-ended question provided qualitative information on what makes clients and HCAs motivated or demotivated to continue their activity.

Analytic Strategy

Mixed models repeated measures analysis examined whether changes in client outcomes and process outcomes between the baseline and Month 4 were statistically significant for family and nonfamily dyads and whether family and nonfamily HCA–client dyads were different in those changes. All client and process outcomes were regressed on clients' age, gender, number of chronic conditions, baseline exercise minutes (strengthening, range of motion, and aerobic exercise; total minutes/week), duration of HCA–client relationship, HCA–client relationship type (family/nonfamily), time (baseline/Month 4), and time–relationship type interaction. Stata 13 was used for statistical analysis.²⁷ To understand the program sustainability, clients' and HCAs' levels of motivation to continue the intervention program was analyzed using descriptive statistics, complemented by qualitative data. More specifically, thematic analysis²⁸ was used to analyze clients' and HCAs' responses to open-ended questions. One author (L.Y.) read the data (the clients' and HCAs' brief comments on their motivation for continuing Healthy Moves) and developed a preliminary codebook, including codes and definitions. The other author (N.M.) reviewed the data and the codebook. The two authors refined and finalized the codebook together and then coded the data independently. Any disagreements between the two coders were discussed until consensus was achieved. The two authors jointly extracted common themes from the coded data.

Results

Participant Baseline Characteristics

Table 1 presents client and HCA baseline sociodemographic and health-related characteristics for the total sample ($N = 50$), family dyads ($N = 18$), and nonfamily dyads ($N = 32$), respectively. The 18 family dyads involved 17 HCAs (11 daughters, 1 son, 2 granddaughters, and other relatives), including 1 HCA who cared for 2 family clients. The 32 nonfamily dyads involved 26 HCAs including 6 HCAs who cared for 2 nonfamily clients. Family dyads and nonfamily dyads were similar in that clients and HCAs were typically African American women with high school or equivalent education. Compared to family dyads, clients in nonfamily dyads were more likely to live alone and were cared for by their HCAs for a longer period of time. HCAs in nonfamily dyads were less likely to be married, more likely to be dually eligible for Medicare and Medicaid, and had more years working as HCAs.

Client Outcomes

Mixed model repeated measures analysis indicates that client outcomes generally improved (Table 2, Figure 1). In family dyads, clients reported less limitations with IADL on average after the intervention, as shown in the statistically significant coefficient for time ($\beta = -1.06$, $p = .020$).

Table 1. Baseline Characteristics of Home Care Clients and Home Care Aides

Variables	All Percent or Mean (Range)	Family Dyads Percent or Mean (Range)	Nonfamily Dyads Percent or Mean (Range)	<i>p</i>
Clients	N = 50	N = 18	N = 32	
Age, years	76.9 (63–101)	74.9 (63–90)	78.0 (63–101)	n.s.
Female	78.0	83.3	75.0	n.s.
African American	96.0	94.4	96.9	n.s.
Education				
Less than high school	32.0	33.3	31.3	n.s.
High school or pass GED	40.0	44.4	37.5	n.s.
Some college/trade school	22.0	22.2	21.9	n.s.
College or above	6.0	0	9.4	n.s.
Not married currently	92.0	94.4	90.6	n.s.
Live alone	58.0	33.3	71.9	0.008
Frequent contact with family/friends	68.0	77.8	62.5	n.s.
Number of chronic conditions	5.5 (2–10)	5.6 (2–10)	5.4 (2–8)	n.s.
Health insurance				
Medicare only	40.0	44.4	37.5	n.s.
Medicaid only	4.0	0	6.3	n.s.
Medicare and Medicaid	50.0	44.4	53.1	n.s.
Duration of HCA-client relationship (months)	22.7 (1–108)	14.0 (2–58)	27.6 (1–108)	0.06
Exercise minutes/week	109.14 (0–820)	91.9 (0–390)	118.8 (0–820)	n.s.
Home care aides	N = 42	N = 17*	N = 26*	
Age, years	48.8 (22–73)	48.5 (28–63)	49.0 (22–73)	n.s.
Female	95.2	88.2	100	0.070
African American	92.9	94.1	92.3	n.s.
Education				
Less than high school	9.5	0	15.4	0.090
High school or pass GED	31.0	35.3	30.8	n.s.
Some college or trade school	54.8	58.8	50	n.s.
College or above	4.8	5.9	3.9	n.s.
Not married currently	83.3	70.6	92.3	0.060
Live alone	19.1	23.5	15.4	n.s.
Number of chronic conditions	1.8 (0–6)	1.9 (0–6)	1.8 (0–4)	n.s.
Health insurance				
Medicare only	9.5	5.9	11.5	n.s.
Medicaid only	28.6	35.3	26.9	n.s.
Medicare and Medicaid	19.1	5.9	26.9	0.080
HCA tenure (months)	77.3 (1–344)	33.4 (1–111)	106.9 (5–344)	0.002

Note: GED = General Educational Development; HCA = home care aides; n.s. = not significant. *p* Values were based on test of means or proportions between family and nonfamily dyads.

*One HCA cared for 1 family and 1 nonfamily clients. This HCA is represented in both family and non-family dyads in [Table 1](#).

Table 2. Clients' and Home Care Aides' Outcomes Before and After the Intervention in Family and Nonfamily Dyads: Mixed Models Repeated Measures Analysis (N = 50)

Variables	Family		Nonfamily		Family vs. Nonfamily	
	Baseline Mean	β^*	Baseline Mean	β^+	β^+	<i>p</i>
Client outcomes (function)						
HM6	5.44	-0.78	5.03	-0.91	0.13	n.s.
Basic activities of daily living	4.72	-0.05	3.72	-0.31	0.26	n.s.
Instrumental activities of daily living	6.06	-1.06	5.75	-0.94	-0.12	n.s.
Short Physical Performance Battery	5.00	-0.17	4.47	0.91	-1.07	.028
Process outcomes						
Exercise related social support—client report	5.89	1.28	4.53	2.38	-1.1	.06
Exercise related social support—HCA report [§]	9.93	-0.13	7.79	2.96	-3.09	.001

Notes: HM6 = a scale of 6 items of daily activity limitations targeted by the intervention. HCA = home care aides. β s and *ps* were derived from mixed models repeated measures analysis. All outcomes were regressed on clients' age, gender, number of chronic conditions, baseline exercise minutes, duration of HCA–client relationship, HCA–client relationship type, time, and time–relationship interaction. The coefficients of changes were tested for family and nonfamily dyads following model estimation.

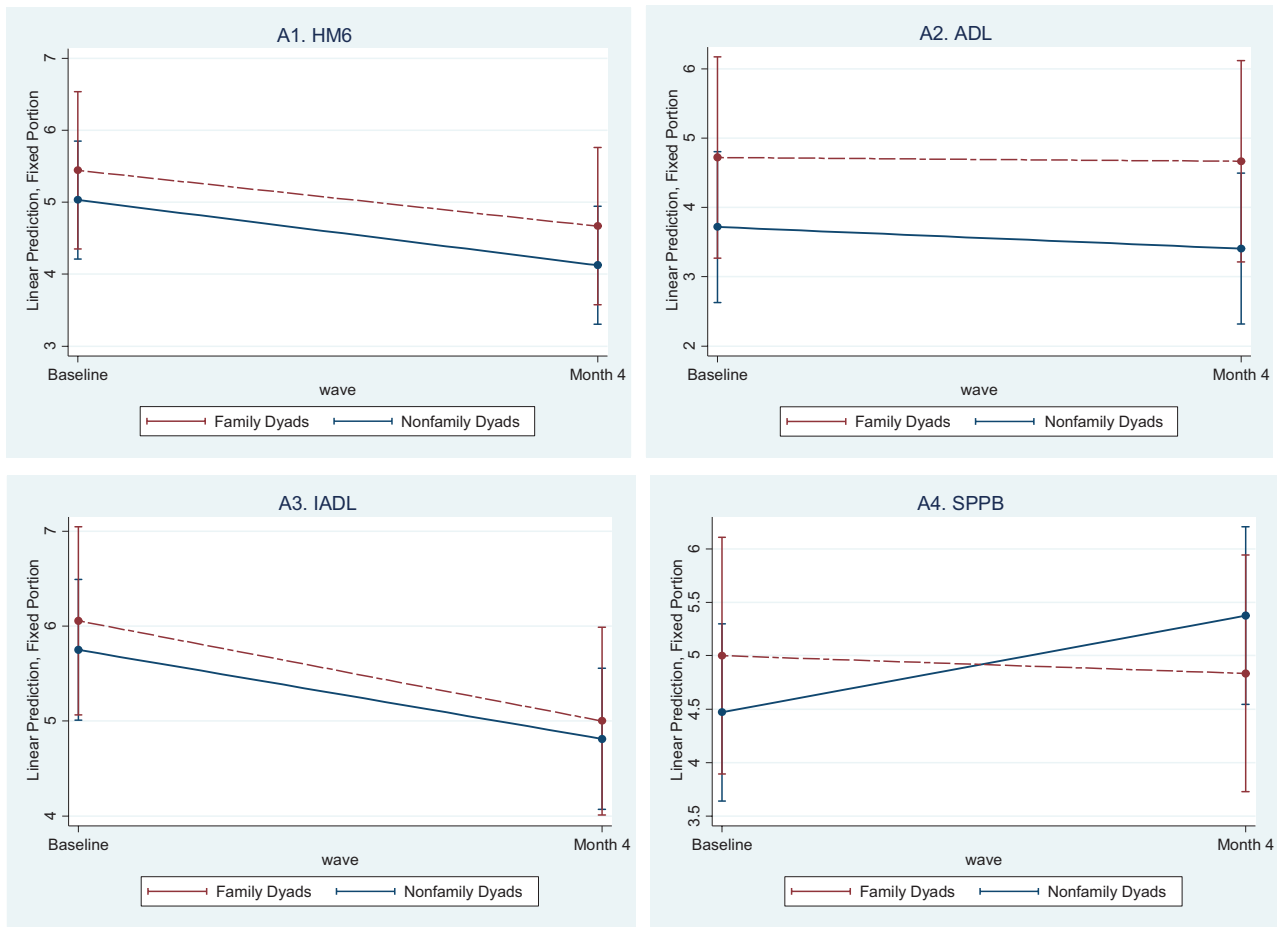
*The average change in client outcomes among family HCA dyads.

†The average change in client outcomes among non-family HCA dyads.

‡The average difference between family and non-family HCA dyads in the change in client and process outcomes.

§Analyses were conducted among dyads whose HCA-reported exercise-related social support were completed at both baseline and Month 4 (N = 39).

Panel A. Client Outcomes



Panel B. Process Outcomes: Exercise-Related Social Support

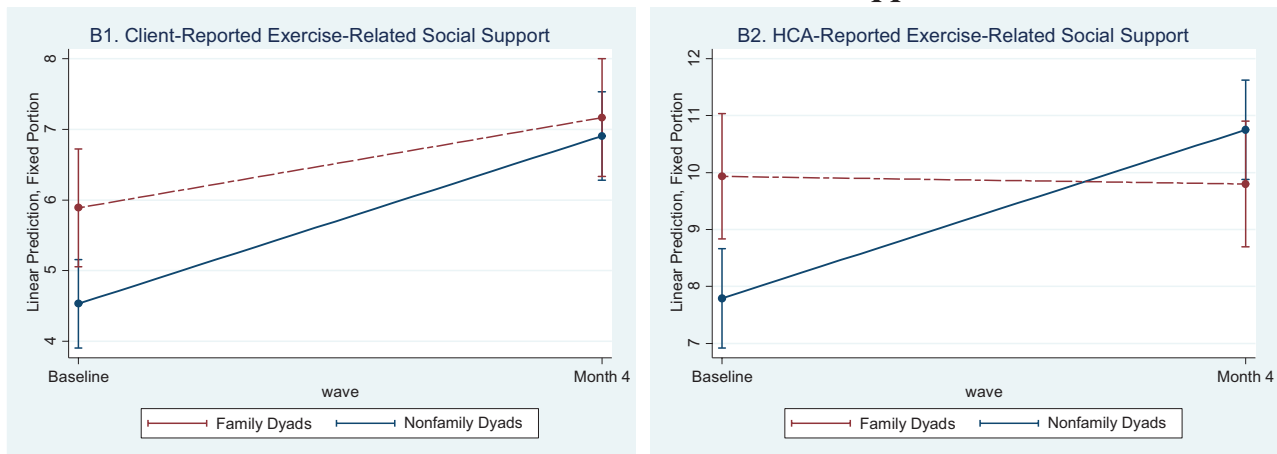


Figure 1. Client outcomes and process outcomes before and after the intervention by family and non-family HCA–client dyads: changes in predictive margin. **(A)** Client outcomes. **(B)** Process outcomes: exercise-related social support. *Notes:* The graphs represent the baseline values and β s reported in Table 2 and the results of the mixed models repeated measures analysis. All outcomes were regressed on clients’ age, gender, number of chronic conditions, baseline exercise minutes, duration of HCA–client relationship, HCA–client relationship type, time, and time–relationship interaction. The coefficients of changes were obtained for family and nonfamily dyads following model estimation. BADL = basic activities of daily living; HCA = home care aides; HM6 = daily activity limitation targeted by Healthy Moves; IADL = instrumental activities of daily living; SPPB = short physical performance battery.

In nonfamily dyads, clients reported less limitations with daily activities targeted by Healthy Moves ($\beta = -0.91$, $p = .026$) and IADLs ($\beta = -0.94$, $p = .007$), and performed better in SPPB ($\beta = 0.91$, $p = .002$) after the intervention. Clients in family dyads showed a significantly lower rate of changes in SPPB compared with those in nonfamily dyads ($\beta = -1.07$, $p = .028$). There was no statistically significant change in clients' BADL in family or nonfamily dyads.

Process Outcomes

Exercise-related social support from HCAs, as reported by clients, increased significantly after the intervention in both family dyads ($\beta = 1.28$, $p = .007$) and nonfamily dyads ($\beta = 2.38$, $p = .000$), with a smaller improvement in family dyads as indicated by the coefficient of the interaction term ($\beta = -1.1$, $p = .06$) (Table 2, Figure 1). Exercise-related social support activities, as reported by HCAs, increased significantly in nonfamily dyads ($\beta = 2.96$, $p = .000$), but not in family dyads. Family caregivers had much higher frequencies of engaging in health promoting activities for their clients at baseline with no statistically significant increase over time (Figure 1). There was a statistically significant difference in changes in HCA-reported exercise-related social support activities for family and nonfamily dyads, as indicated by the coefficient of the interaction term between time and relationship (family/nonfamily) ($\beta = -3.09$, $p = .001$).

Motivation to Continue Healthy Moves

Clients and HCAs reported high levels of motivation to continue Healthy Moves after the intervention period both in family dyads (7 and 8.5 on average, respectively) and nonfamily dyads (7.9 and 8.1) on a scale of 0 (*not at all motivated*) to 10 (*totally motivated*), with the mode of 10 (Table 3). The proportion of respondents with the maximum level of motivation was higher among HCAs (66.7% in family dyads and 62.5% in nonfamily dyads) than among clients (44.4% in family dyads and 48.4% in nonfamily dyads). Of the 18 family dyads, all clients and 14 HCAs provided short responses to the open-ended question about what made them motivated (or unmotivated) to continue Healthy Moves. Of the 32 nonfamily dyads, 31 clients and 21 HCAs provided responses (Table 3).

Thematic analysis identified themes related to motivators and barriers for clients to continue Healthy Moves. The most frequent theme was the program's benefits for clients reported by 61% of family clients and 74% of nonfamily clients. Physical benefits of the program were most common: "My joints feel better and I'm able to sleep better at night" (family client); "[One of the movements] helped my circulation to my feet" (nonfamily client). Clients also reported the program's psychological benefits: "[The program] provides a sense of accomplishment, purpose and motivation" (family client); "I am proud of myself" (nonfamily

client). Clients experienced other benefits: "Healthy Moves gives me something to do" (family client); "Healthy Moves helps keep me busy. Otherwise I get bored and want to snack which is not good" (nonfamily client). Some clients reported the program's general benefits: "It [the program] helped me. Every time I do it, it makes me feel better" (family client); "The way I feel once I've done them [movements] motivates me to continue to do them. I just feel better in general, more relaxed" (nonfamily client).

The second most frequent theme related to motivating factors was the norm that exercise is good reported by 50% of family clients and 39% of nonfamily clients. For example, clients indicated that exercise is good and needed: "I know it's good for me" (family client); "I need it (exercise)" (nonfamily client). Some clients expressed their desire to restore or maintain function: "I'm not ready to fall apart. I want to stay together as long as I can" (family client); "I don't want to get where I cannot move" (nonfamily client). Clients were also motivated to continue Healthy Moves, because the program was not difficult, as mentioned by 6% of family and nonfamily clients.

Barriers for clients to continue the program included a lack of motivation, as reported by 11% of family clients and 13% of nonfamily clients: "I'm not always excited to exercise" (family client); "[I am] tired and don't feel like it. I am too lazy" (nonfamily client). Some clients preferred other activities, as mentioned by 17% of family clients and 6% of nonfamily clients: "[I am] more interested in a community center that [I] just joined. They offer exercise programs and arts and crafts, everything but swimming" (family client). "[I] currently prefer home therapy exercises more" (nonfamily client). Physical conditions constituted barriers to continue the program for 10% of nonfamily clients: "[It] depends on my legs and their swelling."

HCAs, just as clients, mentioned the program's benefits for clients most frequently. This theme was endorsed by 50% of family HCAs and 52% of nonfamily HCAs. Specific benefits mentioned included the program's physical benefits for clients: "[Healthy Moves] helps [the client] with walking and arthritis" (family HCA); "I saw the way Healthy Moves changed [client's] physical ability" (nonfamily HCA). Psychological benefits for their clients, such as sense of accomplishment, were also mentioned: "[I am motivated because of] how my client feels accomplished and has achieved her goals of taking a shower alone and holding her grandnephew" (family HCA); "She loves my help and loves going with me [to] places, so this [program] helped [the client] prove she can still do things and keep up" (nonfamily HCA). Normative expectations of exercise were reported by 29% of family HCAs and 5% of nonfamily HCAs, as shown in the following statements: "As long as [the program] keeps the client from sitting around..." (family HCA); "It is important that the clients stay healthy and active" (nonfamily HCA).

Different from clients, HCAs identified the program's benefits for themselves, often together with

Table 3. Motivation to Continue the Intervention Program among Home Care Clients and Home Care Aides: Motivation Score, Motivators, and Barriers

Themes and Characteristics	Reported by			
	Family Dyads (N = 18)		Nonfamily Dyads (N = 32)	
	Client	HCA	Client	HCA
Motivation score (0–10 scale)				
Mean (standard deviation)	7 (3.5)	8.5 (2.3)	7.9 (2.6)	8.1 (3.1)
Mode (%)	10 (44.4)	10 (66.7)	10 (48.4)	10 (62.5)
Motivators	N (%)	N (%)	N (%)	N (%)
Client benefits from the program	11 (61)	7 (50)	23 (74)	11 (52)
Exercise is good for clients/older adults	9 (50)	4 (29)	12 (39)	1 (5)
The program is not difficult	1 (6)	0	2 (6)	1 (5)
HCA benefits from the program	0	3 (21)	0	7 (33)
Barriers				
Client lacks motivation to exercise	2 (11)	3 (21)	4 (13)	2 (10)
Client prefers other physical activities	3 (17)	0	2 (6)	0
Client's physical conditions are barriers	0	0	3 (10)	0
HCA lacks motivation to continue the program	0	1 (7)	0	1 (5)
Sample size (response rate %)*				
Quantitative motivation score	18 (100)	15 (83) [†]	31 (97) [‡]	24 (75) [§]
Qualitative data (motivators and barriers)	18 (100)	14 (78) [†]	31 (97) [‡]	21 (66) [§]

Notes: Data came from face-to-face interviews with home care clients and self-administered surveys of home care aides (HCAs) conducted after the 4-month intervention. HCAs were asked to assess the level of motivation to continue the program with each of the participating clients. Follow-up open-ended questions provided an opportunity for each respondent to provide reasons for his or her motivation score. Brief comments provided by each respondent were coded. Each participant is represented in up to two themes.

*The response rate was computed by dividing the number of responses by the number of family or nonfamily dyads included in this study.

[†]Of the 18 family dyads, 3 HCAs did not provide their motivational scores, because they did not attend the follow-up survey (N = 1) or skipped the specific item (N = 2).

[‡]Of the 32 nonfamily dyads, one client skipped the motivation-related items.

[§]Of the 32 nonfamily dyads, quantitative motivation scores were missing for 8 HCAs, because they did not participate in the follow-up survey (N = 4, including 1 HCA who cared for 2 clients) or because they skipped the motivation-related items (N = 3). Qualitative data were missing for additional 3 HCAs because they skipped the open-ended question.

its benefits for clients. This theme was endorsed by 21% of family dyads and 33% of nonfamily dyads, as shown in the following statements: “It makes my client feel good about herself. I also feel good for my client” (family HCA); “I exercise with my client daily which helps her with her walking and arthritis” (family HCA); “It [the program] helps the client and myself” (nonfamily HCA) or “More energy for both me and client” (nonfamily HCA).

With regard to barriers for continuing the program, HCAs reported lack of motivation among clients most frequently, just as clients did. This barrier was reported by 21% of family HCAs and 10% of nonfamily HCAs: “[my client] doesn’t want to be in any more programs” (family HCA); “Depending on what [the client] has going on makes it motivating but on the other hand probably not” (nonfamily HCA). HCAs’ own limited motivation was expressed by 7% of family HCAs and 5% of nonfamily HCAs: “I would be more motivated but she actually does well on her own” (family HCA); “Depends on my mood and how I am feeling” (nonfamily HCA).

Discussion and Implications

The gentle physical activity program empowered HCAs with easy-to-learn tools so that HCAs can deliver the program to their clients to maintain or improve client functional outcomes. Client outcomes and process outcomes (exercise-related social support) improved after the intervention. Improvement was significantly greater in nonfamily dyads than in family dyads. Most clients and HCAs were motivated to continue Healthy Moves beyond the 4-month intervention in both family and nonfamily dyads, a promising sign of the intervention’s sustainability. Perceived benefits of the intervention program for clients’ were dominant reasons for clients and HCAs to continue the program.

Results indicate that nonfamily HCA–client dyads benefited more from the intervention. The steeper increases in exercise-related social support among nonfamily HCAs was consistent with our expectations. Delivering a physical activity program is not currently part of HCAs’ job description. HCAs are expected to perform only the tasks written on care plans. It is natural that nonfamily HCAs did not engage in health promoting activities as much as family HCAs before

the intervention. As expected, quantitative analysis indicated that exercise-related social support provided by HCAs was significantly higher in family dyads at baseline and suggested that the intervention triggered many nonfamily HCAs to start health promoting activities such as encouraging and assisting their clients to do physical activity. Family HCAs, on the other hand, had already been engaged in exercise-related support activities for their clients outside their HCA jobs as family members, especially given the growing knowledge about the benefits of physical activity.²⁹ We speculate that the intervention brought about more salient changes in the health promoting role for clients among nonfamily HCAs than among family HCAs. The results from quantitative data analysis were supported by qualitative data from HCAs' responses to an open-ended question. Specifically, the proportion of HCAs who endorsed the program's benefits for HCAs themselves as a motivating factor to continue the program was higher in nonfamily HCAs than in family HCAs. The steeper improvement in outcomes in nonfamily dyads is not surprising, given the greater improvement in exercise-related social support provided by HCAs than in family dyads. Qualitative data provided complementary results. The proportion of clients who endorsed the program's benefits for clients themselves as a motivating factor for continuing the program was higher in nonfamily dyads than in family dyads. On the other hand, the proportions of clients and HCAs who endorsed normative expectations of physical activity benefiting clients as a motivating factor were higher in family dyads than in nonfamily dyads.

As far as we know, this is the first empirical study that examined differences in family and nonfamily caregiving dyads' outcomes of a home care-based health promotion intervention.

The data came from a pilot study of an easy-to-learn physical activity intervention that has built-in motivational enhancement. The program has the potential to enhance HCAs' competency to promote physical activity that can be done daily in the comfort of home, regardless of outside weather, both in family and nonfamily caregiving dyads. The study was conducted in a real-world Medicaid home care setting.

This study has limitations. This study used data from a pilot study whose original aim was to examine the feasibility of the intervention and measurement. The one-group pretest design limited our ability to make causal inferences. The study was not adequately powered. The lack of statistical significance in some of the client outcomes and process outcomes may be due to the small sample size, especially in family dyads. The sample consisted primarily of English-speaking African American HCA-client volunteers in Medicaid in-home services. Thus the results cannot be generalized to a population of HCA-client dyads outside the context of this pilot study. For example, previous literature documented that African American caregivers rated their caregiving experience more positively³⁰ and felt lower levels of caregiving burden than white caregivers.³¹ Further research is needed to examine whether and how home care-based physical activity interventions may work differently

in different racial or ethnic caregiving contexts. The qualitative data consisted of short responses with limited contextual information that did not allow in-depth analysis. The proportion of HCAs who had missing qualitative data was higher in nonfamily dyads than in family dyads. Thus, results that compare family and nonfamily HCAs based on qualitative data should be interpreted with caution. Despite these limitations, this study provided a promising result for promoting HCAs' expanded roles in health promotion in a real-world home care setting, warranting a randomized controlled trial to examine the effectiveness of the intervention program for older adults and caregivers in family and nonfamily caregiving dyads.

HCAs constitute one of the fastest growing occupations in the United States. Governmental and home care agencies will continue to face challenges of recruiting, training, managing, and retaining care workers. Building health promotion into long-term care and empowering family and nonfamily caregivers with health promotion skills are promising strategies for enhancing the health and well-being of caregivers and care recipients in aging societies where developing the direct care workforce is a priority.³²

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Conflict of Interest

None reported.

References

1. Teri L, Gibbons LE, McCurry SM, et al. Exercise plus behavioral management in patients with Alzheimer disease: a randomized controlled trial. *JAMA*. 2003;290:2015-2022. doi:10.1001/jama.290.15.2015

2. Kim JI, Lee S, Kim JH. Effects of a web-based stroke education program on recurrence prevention behaviors among stroke patients: a pilot study. *Health Educ Res.* 2013;28:488–501. doi:10.1093/her/cyt044
3. Holthoff VA, Marschner K, Scharf M, et al. Effects of physical activity training in patients with Alzheimer's dementia: results of a pilot RCT study. *PLoS One*, 2015;10:e0121478. doi:10.1371/journal.pone.0121478
4. Pretzer-Aboff I, Galik E, Resnick B. Feasibility and impact of a function focused care intervention for Parkinson's disease in the community. *Nurs Res.* 2011;60:276–283. doi:10.1097/NNR.0b013e318221bb0f
5. Lambert SD, Duncan LR, Kapellas S, et al. A descriptive systematic review of physical activity interventions for caregivers: effects on caregivers' and care recipients' psychosocial outcomes, physical activity levels, and physical health. *Ann Behav Med.* 2016;50:907–919. doi:10.1007/s12160-016-9819-3
6. Canonici AP, Andrade LP, Gobbi S, Santos-Galduroz RF, Gobbi LT, Stella F. Functional dependence and caregiver burden in Alzheimer's disease: a controlled trial on the benefits of motor intervention. *Psychogeriatrics.* 2012;12:186–192. doi:10.1111/j.1479-8301.2012.00407.x
7. Marsden D, Quinn R, Pond N, et al. A multidisciplinary group programme in rural settings for community-dwelling chronic stroke survivors and their carers: a pilot randomized controlled trial. *Clin Rehabil.* 2010;24:328–341. doi:10.1177/0269215509344268
8. Muramatsu N, Yin L, Berbaum ML, et al. Promoting seniors' health with home care aides: a pilot. *Gerontologist.* 2018;58:779–788. doi:10.1093/geront/gnx101
9. Bureau of Labor Statistics. Occupational outlook handbook, home health aides and personal care aides. 2018. <https://www.bls.gov/ooh/healthcare/home-health-aides-and-personal-care-aides.htm>. Accessed May 10, 2019.
10. Osterman P. *Who Will Care For Us? Long-Term Care and the Long-Term Workforce*. New York, NY: Russell Sage Foundation; 2017.
11. Muramatsu N, Yin L, Lin T-T. Building health promotion into the job of home care aides: transformation of the workplace health environment. *Int J Environ Res Public Health.* 2017;14(4):384. doi:10.3390/ijerph14040384
12. Newcomer RJ, Kang T, Doty P. Allowing spouses to be paid personal care providers: spouse availability and effects on Medicaid-funded service use and expenditures. *Gerontologist.* 2012;52:517–530. doi:10.1093/geront/gnr102
13. Cooper RE. Caring Families... Families Giving Care Using Medicaid to Pay Relatives Providing Support to Family Members with Disabilities. 2010. <https://dda.health.maryland.gov/pages/Developments/2015/Attachment%205%20Caring%20Families.pdf>. Accessed May 10, 2019.
14. Pillemer K, Gilligan M. Translating basic research on the aging family to caregiving intervention: the case of within-family differences. *Innov Aging.* 2018;2. doi:10.1093/geroni/igx035
15. National Council on Aging. Healthy Moves for Aging Well: evidence-based in-home physical activity program for frail older adults. <https://www.ncoa.org/resources/program-summary-healthy-moves-for-aging-well/>. Accessed April 3, 2017.
16. Prochaska JO, DiClemente CC. Stages and processes of self-change of smoking: toward an integrative model of change. *J Consult Clin Psychol.* 1983;51:390–395.
17. Rikli RE, Jones CJ. Development and validation of criterion-referenced clinically relevant fitness standards for maintaining physical independence in later years. *Gerontologist.* 2013;53:255–267. doi:10.1093/geront/gns071
18. Bandura A. *Social Foundations of Thought and Action: A Social Cognitive Theory*. Englewood Cliffs, NJ: Prentice-Hall; 1986.
19. Illinois Department on Aging. Community Care Program. <https://www2.illinois.gov/aging/CommunityServices/ccp/Pages/default.aspx>. Accessed August 16, 2019.
20. Muramatsu N, Madrigal J, Berbaum ML, et al. Co-learning with home care aides and their clients: collaboratively increasing individual and organizational capacities. *Gerontol Geriatr Educ.* 2015;36:261–277. doi:10.1080/02701960.2015.1015121
21. Gill TM, Baker DI, Gottschalk M, Peduzzi PN, Allore H, Byers A. A program to prevent functional decline in physically frail, elderly persons who live at home. *N Engl J Med.* 2002;347:1068–1074. doi:10.1056/NEJMoa020423
22. Gill TM, Robison JT, Tinetti ME. Difficulty and dependence: two components of the disability continuum among community-living older persons. *Ann Intern Med.* 1998;128:96–101. doi:10.7326/0003-4819-128-2-199801150-00004
23. Katz S, Ford AB, Moskowitz RW, Jackson BA, Jaffe MW. Studies of illness in the aged. The index of ADL: a standardized measure of biological and psychosocial function. *JAMA.* 1963;185:914–919. doi:10.1001/jama.1963.03060120024016
24. Lawton MP, Brody EM. Assessment of older people: self-maintaining and instrumental activities of daily living. *Gerontologist.* 1969;9(3):179–186. doi:10.1093/geront/9.3_Part_1.179
25. Guralnik JM, Simonsick EM, Ferrucci L, et al. A short physical performance battery assessing lower extremity function: association with self-reported disability and prediction of mortality and nursing home admission. *J Gerontol.* 1994;49:M85–M94.
26. Sallis JF, Grossman RM, Pinski RB, Patterson TL, Nader PR. The development of scales to measure social support for diet and exercise behaviors. *Prev Med.* 1987; 16:825–836.
27. StataCorp. *Stata Statistical Software: Release 13*. College Station, TX: StataCorp LP; 2013.
28. Braun V, Clarke V. Using thematic analysis in psychology. *Qual Res Psychol.* 2006;3(2):77–101. doi:10.1191/1478088706qp063oa
29. Bauman A, Merom D, Bull FC, Buchner DM, Fiararone Singh MA. Updating the evidence for physical activity: summative reviews of the epidemiological evidence, prevalence, and interventions to promote “active aging”. *Gerontologist.* 2016;56(Suppl. 2):S268–280. doi:10.1093/geront/gnw031
30. Cho J, Ory MG, Stevens AB. Socioecological factors and positive aspects of caregiving: findings from the REACH II intervention. *Aging Mental Health.* 2016;20:1190–1201. doi:10.1080/13607863.2015.1068739
31. Pinquart M, Sörensen S. Ethnic differences in stressors, resources, and psychological outcomes of family caregiving: a meta-analysis. *Gerontologist.* 2005;45:90–106. doi:10.1093/geront/45.1.90
32. Institute of Medicine (US) Committee on the Future Health Care Workforce for Older Americans. *Retooling for an Aging America: Building the Health Care Workforce*. Washington, DC: National Academies Press; 2008.