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A Randomized Trial of Mobile Health Support for Heart Failure Patients and Their Informal Caregivers: Impacts on Caregiver-Reported Outcomes

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Abstract

Background—Mobile health services may improve chronic illness care, but interventions rarely support informal caregivers' efforts.

Objectives—To determine whether automated feedback to caregivers of chronic heart failure (HF) patients impacts caregiving burden and assistance with self-management.

Research Design—Randomized comparative effectiveness trial.

Subjects—369 HF patients were recruited from a VA healthcare system. All patients participated with a "CarePartner" or informal caregiver outside their household.

Intervention—Patients randomized to "standard mHealth" received weekly automated self-care support calls for 12 months with notifications about problems sent to clinicians. "mHealth+CP" patients received identical services, plus email summaries and suggestions for self-care assistance automatically sent to their CarePartners.

Measures—At baseline, six- and twelve months, CarePartners completed assessments of caregiving strain, depressive symptoms, and participation in self-care support.

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Trial Registration and IRB: The trial was registered in ClinicalTrials.gov on 11/08/2007 (#NCT00555360) and funding began in July 2008. The study was approved by the Ann Arbor VA Healthcare System's Human Subjects Committee on February 18, 2008.

Results—mHealth+CP CarePartners reported less caregiving strain than controls at both 6- and 12-months (both $p = .03$). That effect as well as improvements in depressive symptoms were seen primarily among CarePartners reporting greater burden at baseline ($p = .03$ for interactions between arm and baseline strain/depression at both endpoints). While most mHealth+CP CarePartners increased the amount of time spent in self-care support, those with the highest time commitment at baseline reported decreases at both follow-ups (all $p < .05$). mHealth+CP CarePartners reported more frequently attending patients' medical visits at six months ($p = .049$) and greater involvement in medication adherence at both endpoints (both $p = .032$).

Conclusions—When CarePartners experienced significant caregiving strain and depression, systematic feedback about their patient-partner decreased those symptoms. Feedback also increased most CarePartners' engagement in self-care.

Keywords

Heart failure; mHealth; care management

Introduction

Like people with most chronic conditions, patients with chronic heart failure (HF) need to maintain self-management behaviors, including adhering to medications, dietary changes, and frequent clinician visits.¹ Many HF patients fall short of self-care goals and experience life-threatening exacerbations.^{2,3} Informal caregivers are essential in bridging the gap between the assistance patients need and what healthcare systems can provide.^{4,5} Patients with active and involved caregivers have better self-care and outcomes,^{6–8} and patients accompanied by a caregiver to physician visits are more likely to discuss challenging topics effectively.⁹ Unfortunately many patients have no spousal caregiver; more than 28% of older adults live alone,¹⁰ and the number of unmarried older adults is increasing.¹¹

Caregiving burden poses a significant threat to in-home caregivers' health; and many report emotional strain, depression, and increased rates of chronic diseases.^{12–14} Caregivers living with the patient often struggle with the demands of their role while coping with their own health problems and other responsibilities.^{15–17} Among married, chronically-ill older adults, more than half of spouses have two or more chronic illnesses.¹⁵ For all of these reasons, strengthening patients' broader caregiving network may benefit both patients and in-home caregivers.^{15,18}

The CarePartner program was developed to address the challenges faced by chronically-ill patients by enabling structured support from informal caregivers ("CarePartners") who reside outside the patient's home. Through this program, patients receive systematic monitoring and tailored self-management education via Interactive Voice Response (IVR) calls. In currently unpublished analyses, we examined patient-reported outcomes from a comparative effectiveness trial in which HF patients treated in Veterans Health Administration (VA) facilities were randomized to "standard mHealth," consisting of weekly IVR monitoring and self-management education calls with feedback to the clinical team; or "mHealth+CP," consisting of identical services plus automated updates to the CarePartner. We found that a greater proportion of mHealth+CP patients reported taking HF

medications exactly as prescribed at both 6-months ($p=.024$) and 12-months ($p=.007$); and, mHealth+CP patients were less likely than standard mHealth patients to report negative emotions during interactions with their CarePartners. Also, mHealth+CP patients were: more likely to report via IVR that they were taking HF medications as prescribed; less likely to report shortness of breath; and less likely to report significant weight gain (all $p<.05$).

Here, we report results from this same trial that represent the perspective of participating CarePartners. We examined intervention-control differences in CarePartner-reported measures of caregiving strain and depressive symptoms, as well as reports of self-management support activities, including time spent helping with self-care, accompanying patients to doctor visits, and assisting with medication adherence.

Methods

Recruitment

HF patients were recruited from VA outpatient clinics between June 2009 and January 2012 and were followed for 12 months. To be eligible, patients had to: have a HF diagnosis and ejection fraction $<40\%$, have attended 1+ VA outpatient visit within the previous year, have a VA primary care provider, and be able to participate in automated telephone calls in English. Patients also needed to nominate an eligible CarePartner, defined as a relative or friend living outside the patient's home. Patients were excluded if they: had diagnostic codes indicating dementia, bipolar disorder, or schizophrenia; lived in a skilled nursing facility; were prescribed oxygen supplementation; were receiving palliative care; or had a life-threatening condition such as lung cancer.

Potentially eligible patients identified from medical records were sent an invitation letter, followed by a telephone screening and recruitment call. Eligible and interested patients were mailed informed consent forms and were assisted in identifying potential CarePartners using the Norbeck Social Support Questionnaire (NSSQ).¹⁹ Using the NSSQ, patients were asked to identify up to 4 individuals with whom they felt comfortable participating in the trial. For each individual, a "closeness" score was determined based on a series of questions focused on various dimensions of support including emotional support (e.g., "How much does this person make you feel liked or loved?") and instrumental support (e.g., "If you needed to borrow \$10...how much could this person usually help?"). Based on those scores and the patient's preferences, the most suitable CarePartner was identified and solicited for participation. To be eligible, CarePartners had to: live outside the patient's home, speak English, have access to a telephone and email account, and report at least monthly contact with the patient. CarePartners provided verbal consent to complete surveys and receive automated email and telephone notifications about their patient-partner. If the potential CarePartner declined participation or was ineligible, additional individuals identified by the patient were contacted.

Randomization

After completing baseline surveys, patient-CarePartner pairs were randomized to a patient-focused mHealth service (standard mHealth) or a service that included feedback to patients'

CarePartners (mHealth+CP). Pairs were randomized within strata defined by whether the patient had an in-home caregiver. Sealed randomization envelopes were created in blocks using an online random number generator.

Standard mHealth Intervention

Patient/CarePartner pairs randomized to standard mHealth were mailed information about HF self-care. CarePartners also received a booklet by the National Institute on Aging for caregivers living at a distance.²⁰ In-home caregivers (if applicable) were mailed HF self-management information designed for family and friends.

Patients received weekly IVR monitoring and self-management support calls for 12 months. Up to nine call attempts per week were made at times the patient indicated were convenient. IVR calls included recorded information and questions that patients answered using their touchtone telephone keypad. Call contents were developed by a panel including primary care physicians; cardiologists; HF nurse care managers; and experts in chronic illness, health behavior change, and mHealth. The calls followed a tree-structured algorithm to ask about patients' overall health, HF symptoms, and self-management behaviors. Based on the information reported, patients received pre-recorded information tailored to their symptoms and self-care practices. When patients reported a medically urgent issue via IVR (i.e., worsening shortness of breath), the system automatically issued a fax notification to their clinician.

mHealth+CP Intervention

The mHealth+CP intervention was based on self-regulation theory, which emphasizes communication of behavior expectations ("standards"), promotion of motivation to meet standards, and monitoring with feedback regarding the gap between behavior and standards.^{21,22} Patients and CarePartners randomized to mHealth+CP received identical intervention elements described above. For mHealth+CP CarePartners, the system automatically generated a structured email report each time the patient completed an IVR call. Reports described in lay language what patients' recently-reported information meant in terms of risk for HF exacerbations and included suggestions for how CarePartners could help support self-management. Each report was structured to describe: (a) the problem the patient reported; (b) why that problem is a risk factor for poor outcomes; and (c) what the CarePartner can do to assist their patient-partner (see Supplemental Digital Content 1). Reports were designed to facilitate instrumental forms of support and to encourage affirmation for patients' self-management efforts.²³ Reports also provided links to additional online resources. CarePartners were asked to call their patient-partner weekly to review the reports and address identified issues. If patients reported a health or self-care problem that also warranted clinician notification, CarePartners received an automated phone call asking them to check their email for more information. CarePartners also received an automated call if patients did not complete an IVR assessment for three consecutive weeks.

CarePartners received printed guidelines about how to communicate effectively about HF-related health and self-care. Specific information addressed how to: communicate in a positive, motivating way, avoid conflict by respecting boundaries, include in-home

caregivers in the care process, and respect patient confidentiality. Patients and CarePartners both received a logbook for tracking information from IVR reports, upcoming contacts, clinical encounters, and medication refills; they also received a laminated calling card that included reminders and tips for the weekly patient-CarePartner calls.

Measurement

Patients' HF-specific quality of life and self-care were measured via quantitative telephone assessments at baseline, six months, and twelve months. Sociodemographic variables collected at baseline included patients' age, race, gender, marital status, employment status, educational attainment, and household income. The current analyses only include baseline patient characteristics relevant to the comparability of groups at the time of randomization.

CarePartners completed online surveys at each time point. CarePartners were asked at baseline to rate how "close" they felt to their patient-partner on a 1–10 scale. CarePartner strain was measured using the Caregiver Strain Index,²⁴ a 10-item scale measuring strain from various potential sources of caregiving burden, e.g., "helping my [relative/friend] has disrupted my routine" and "helping my [relative/friend] has caused emotional tensions." CarePartners' depressive symptoms were measured using the 10-item version of the CES-D. Scores range from 0–10, and scores of 4+ indicate probable major depression.^{25,26}

CarePartners reported on three behaviors related to assisting their patient-partner. To measure the amount of time involved in supporting self-management, we used the following item, originally developed for caregivers in the Health and Retirement Survey:²⁷ "Thinking about all the kinds of help you provide, about how many hours do you spend helping your [relative/friend] in an average week?" We also examined intervention effects on two behaviors related to caregiver support. First, CarePartners were asked "How often do you go with your [relative/friend] to a doctor visit?" and responded using a 5-level ordinal scale ranging from "none of the time" to "all of the time." Second, CarePartners were asked about the amount of help they gave their relative/friend with "taking prescription medications" (see footnotes to Tables 1–2 for exact wording) and responded using a 0–5 ordinal scale ranging from "not at all" to "a great deal."

Statistical Analysis

All analyses were conducted using Stata 13.1.²⁸ Analyses were conducted on an intent-to-treat basis, with missing 6- and 12-month outcome values imputed. Initial analyses compared baseline characteristics of patients and CarePartners who completed follow-up surveys to those with missing outcome data. Subsequent analyses compared baseline characteristics of patients and CarePartners across randomization arms in the sample of CarePartners with available outcome data in the imputed sample. Outcomes at six months and twelve months were examined using multivariable Poisson and ordinal regression models that included as predictors an indicator for arm and the baseline value for the outcome. Because CarePartners were not identified on the basis of their levels of caregiving burden or involvement, our primary hypotheses focused on whether intervention effects varied across the continuum of those baseline distributions, i.e., whether effects were more/less pronounced among caregivers who were particularly burdened, depressed, or involved/

uninvolved in self-care at enrollment. Thus, the models presented in Table 2 included arm-by-baseline value interaction terms. Results of analyses prior to introducing interaction terms are presented in Supplemental Digital Content 2 and reported in the Results when arm main effects in those analyses were statistically significant.

Outcomes related to caregiving burden, depressive symptoms, and time spent caregiving had skewed baseline distributions and limits on the range of possible values, and these analyses used Poisson regression. Analyses of the two ordinal outcomes (frequency of attending outpatient visits and amount of assistance with medication use) used ordinal probit models. Because coefficients representing effect estimates from Poisson regression and probit models are not easily interpretable, we created graphical displays using locally-weighted scatterplot smoothing^{29,30} and used post-test estimation commands to illustrate the magnitude of the intervention-control differences, given specific assumptions about patients' baseline values. We also explored whether CarePartner stress and depressive symptoms at follow-up varied between subgroups of patients with and without a spouse, and we fitted exploratory statistical models for each outcome that included an interaction between randomization arm and spousal availability (i.e., in addition to the predictors described above). Those analyses did not identify significant variation in intervention effects when patients did or did not have a spouse.

Human Subjects Approval

The intervention protocol was approved by the Ann Arbor VA Human Subjects Committee and the University of Michigan Institutional Review Board. All patients provided written informed consent. None of the authors had any financial conflict of interest.

Results

Recruitment and Baseline Characteristics

A total of 4,140 potentially eligible patients were identified from medical records. Of these, 372 patient-CarePartner pairs were randomized, and 369 CarePartners completed baseline surveys. Eighty-three percent of CarePartners completed follow-up surveys at 6 months, and 82% completed surveys at 12 months, with no appreciable differences in completion rates between arms (see CONSORT diagram, Figure 1). There were no differences between patients or CarePartners with and without outcome data with respect to baseline sociodemographic characteristics or reports of the closeness of the patient-CarePartner relationship.

Patient participants in these analyses were on average 67.9 years of age, nearly 100% were men, 77.2% were Caucasian, and 58.9% were married (Table 1). CarePartners were substantially younger on average, the majority (65.1%) were women, and 28.1% had at most a high school education. CarePartners in both arms had similar baseline characteristics, with the exception that mHealth+CP CarePartners were more likely to have at most a high school education (31.7% versus 24.4%; $p=.03$). Baseline values for outcomes were similar across arms. Half of CarePartners lived within 15 minutes of their patient-partner, while 21% lived more than an hour away. With respect to their relationship, 41.1% of CarePartners were the

patient's daughter/daughter-in-law, 19.7% were a son/son-in-law, 12.4% were friends, 9.5% were sisters/sisters-in-law, and the remaining 17.3% included other family and social network members.

A total of 10.7% of CarePartners had a baseline CES-D score of 4+ indicating possible clinical depression. More than a fourth (27.1%) of CarePartners reported spending no time in self-care assistance in an average week, while half spent an hour or less, and 10% spent more than 12 hours. Only 5.7% of CarePartners reported going with their patient-partner to clinician visits "most" or "all of the time," and 54.2% reported that they never attend visits with the patient. Similarly, 71.5% of CarePartners reported providing no assistance with medication adherence, and only 4.7% reported providing a "great deal" of help.

Intervention Effects

In analyses including terms for the main effects of arm and baseline caregiving strain scores (but no arm-by-baseline strain interaction), mHealth+CP patients reported lower levels of caregiving strain at both six- and twelve-months (both $p < .03$, see Supplemental Digital Content 2). When the interaction between arm and baseline strain was taken into account, significant intervention effects on six- and twelve-month caregiving strain scores were identified indicating that caregiving strain was reduced in the mHealth+CP arm, particularly among CarePartners reporting greater strain at baseline (see Figure 2 and Table 2).

With respect to depressive symptoms at six-months, there was a statistically significant main effect of the mHealth+CP intervention, coupled with a negative arm-by-baseline CES-D interaction. Specifically, among CarePartners with greater depressive symptoms at baseline, six-month depressive symptom scores were lower among those in the mHealth+CP arm (see Figure 3). For example, based on the magnitude of intervention effects shown in Table 2, CarePartners with baseline CES-D scores of 6 in the mHealth+CP arm were predicted to have a 6-month CES-D score of 2.31 (95% CI: 1.66, 2.97), versus 3.58 (CI: 2.84, 4.32) for those in the standard mHealth arm. At twelve months, CarePartners who had greater depressive symptoms at baseline were again more likely to have relatively low follow-up scores if randomized to mHealth+CP. For example, based on the effects shown in Table 2, 12-month expected scores among CarePartners with baseline CES-D scores of 6 were 3.79 (CI: 3.01, 4.58) among mHealth+CP CarePartners, compared to 4.88 (4.34, 5.42) among standard mHealth CarePartners.

In analyses of intervention effects on CarePartners' reported time providing self-management support, the model including terms for the main effects of arm and baseline time commitment (but no interaction) suggested an overall negative effect of mHealth+CP at both endpoints (both $p < .021$; see Supplemental Digital Content 2). However as shown in Table 2, this overall decrease was primarily explained by a decrease in caregiving time for CarePartners with high time commitments at enrollment (i.e., the <20% of CarePartners reporting six or more hours of weekly assistance). mHealth+CP CarePartners reporting one hour per week of self-management assistance at baseline (i.e., the median of the baseline distribution) were predicted to contribute 85.6 minutes per week at six months (CI: 83.3, 96.82) versus 64.9 minutes per week among standard mHealth CarePartners (CI: 62.6, 67.3). Similarly, as indicated by effect estimates in Table 2, mHealth+CP CarePartners providing

one hour of weekly assistance at baseline were predicted to contribute 75.6 minutes at 12 months (CI: 67.2, 85.0) versus 63.9 minutes among standard mHealth CarePartners (60.5, 67.3).

Analyses that did not take into account the interaction between arm and baseline values failed to identify effects on CarePartners' involvement in physician visits or medication adherence (see Supplemental Digital Content 2). However, the model including an interaction showed that mHealth+CP CarePartners were more likely to report attendance at their patient-partners' doctor visits than standard mHealth CarePartners, with 50.1% of mHealth+CP CarePartners predicted to attend at least some visits at six months versus 40.0% of standard mHealth CarePartners. Also, at six months, mHealth+CP CarePartners were more likely than standard mHealth CarePartners to report some involvement in patients' medication adherence; for example among CarePartners with an average level of involvement at baseline, 40.3% of mHealth+CP CarePartners were likely to report some involvement at six months compared to 31.4% of standard mHealth CarePartners. At twelve months, both the main intervention effect and the arm-by-baseline value interaction were significant, suggesting that while adherence support increased overall, it decreased somewhat among the small number of CarePartners who initially were spending the most time assisting their patient-partner. Assuming an average level of reported involvement in adherence at baseline, 42.5% of mHealth+CP CarePartners reported some involvement in the patients' adherence at twelve months compared to 32.3% of standard mHealth CarePartners.

Discussion

In this randomized comparative effectiveness trial, we found that when informal caregivers living outside a HF patient's household received weekly updates about the patient's status along with suggestions for how to support self-care, there were several positive outcomes. Overall, caregiving strain was reduced at both 6- and 12-month follow-ups. For that outcome as well as caregivers' depressive symptoms, intervention effects were expressed mainly through improvements in symptoms among CarePartners with the highest baseline levels (i.e., through intervention-by-baseline interaction terms). The findings regarding caregiving strain and depressive symptoms are important because chronic illness caregivers are prone to caregiver burnout and mental health problems.^{13,31,32} While there was a risk that the intervention's additional feedback might have increased CarePartners' burden, there was no evidence for this in the current trial. Consistent with this intervention's intent, it is plausible that CarePartners' emotional benefits can be attributed to their receipt of information about the patient's status and appropriately-timed guidance about helping the patient with specific problems.

While most CarePartners increased the amount of time they spent per week in self-management assistance, those spending the most time at enrollment saw a decrease in time expenditure. These findings suggest that while the feedback reports stimulated more active CarePartner engagement for most people, the intervention's monitoring function may have decreased CarePartners' need to spend extra time identifying patients' health and self-care problems.

At the six-month follow-up, mHealth+CP CarePartners reported more frequently attending physician visits with the patient and an increase in their involvement in medication adherence. The increase in most CarePartners' involvement in patients' medication adherence was maintained at twelve months. It is noteworthy that intervention effects on CarePartner-reported involvement in medication adherence are consistent with the positive intervention effects on medication adherence reported by patients. Still unpublished analyses showed that mHealth+CP patients were more likely to report taking their HF medications as prescribed at both 6- and 12-month follow-ups, and mHealth+CP patients also consistently reported better medication adherence during weekly IVR calls than standard mHealth patients. Effects on CarePartner support for medication adherence may also help explain mHealth+CP patients' decreased likelihood of reporting shortness of breath or weight increases via IVR (unpublished data).

This trial had several limitations. First, the study was conducted among VA patients who may have had more support for HF management than patients in less-resourced healthcare systems. This greater access to disease management support may have reduced CarePartners' overall level of burden. Additionally, while our sample was diverse in terms of CarePartners' age, gender, and level of education, patient-participants were almost exclusively men, and the intervention was targeted to CarePartners outside of the patient's household. As a consequence, the results cannot be directly generalized to the caregivers of women, patients treated in other health system types, or possible benefits for in-home caregivers. Data on time spent in caregiving and in specific activities were self-reported, and therefore subject to recall and social desirability biases. While behavioral interventions that are limited to the provision of printed materials are typically ineffective,^{33,34} it may be that the HF self-care information received by CarePartners at baseline was of some benefit. The present trial was not designed to disentangle any effects of this initial printed information from those of the ongoing IVR-based feedback.

In conclusion, these data suggest that mHealth updates for informal caregivers outside HF patients' households may decrease caregiving burden, particularly among caregivers who reported higher levels of burden when entering the program. The intervention increased CarePartners' involvement in self-care assistance for most participants, while decreasing time spent for the small number of CarePartners who were spending the most time at enrollment. Given these positive findings, researchers and health systems should seriously consider novel strategies for adopting this and similarly structured mHealth strategies that integrate informal caregivers into patients' self-management education and support.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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Figure 1.
CONSORT Diagram for participants in the trial

Figure 2. Comparison of changes in caregiving burden between baseline and six-months (left panel), and baseline and twelve months (right panel)
 Caregiving burden was measured using the Caregiver Strain Index. Standard mHealth=patients randomized to IVR monitoring and self-care support with clinician alerts. mHealth+CP=patients randomized to the same intervention + weekly feedback to patients' CarePartners.

Figure 3. Comparison of changes in depressive symptoms between baseline and six months (left panel), and baseline and twelve months (right panel)

Depressive symptoms were measured using the 10-item version of the CES-D. Standard mHealth=patients randomized to IVR monitoring and self-care support with clinician alerts. mHealth+CP=patients randomized to the same intervention + weekly feedback to patients' CarePartners.

Table 1

Baseline Characteristics of the Sample

	Overall n = 369	Standard mHealth n = 180	mHealth+CP n =189
<u>Patient Characteristics</u>			
Age in years	67.9 ± 10.2	68.0 ± 10.2	67.8 ± 10.2
Male	99.2	98.9	99.5
White race	77.2	77.4	77.1
Married/Partnered	58.9	61.3	56.6
Illness-specific quality of life *	44.2 ± 25.7	44.2 ± 27.1	44.2 ± 24.3
<u>CarePartner Characteristics</u>			
Age in years	47.1 ± 13.2	47.6 ± 14.2	46.6 ± 12.1
Female	65.1	68.3	62.0
Married	68.9	68.3	69.4
High school or less	28.1	24.4	31.7
Closeness with patient [†]	8.0 ± 2.2	8.0 ± 2.2	8.1 ± 2.2
<u>Baseline Values for Outcomes</u>			
Caregiver strain [‡]	3.2 ± 2.9	3.1 ± 2.7	3.3 ± 3.1
Depression [§]	1.0 ± 1.6	1.0 ± 1.7	1.0 ± 1.6
Hours per week helping patient ^{//}	5.4 ± 13.8	5.2 ± 14.5	5.6 ± 13.2
Going to visits [#]	0.7 ± 0.9	0.7 ± 1.0	0.8 ± 0.9
Adherence help ^{##}	0.6 ± 1.3	0.6 ± 1.2	0.6 ± 1.3

Notes: Cell entries are either mean ± SD or column percents.

* Patient-reported Minnesota Living with Heart Failure Questionnaire Scores. Lower scores indicate better functioning.

[†]“On a scale of 1 to 10, how close are you with your patient-partner?”

[‡]Caregiver Strain Index scores. Higher scores indicate greater caregiving burden.

[§]CES-D depression scores. Higher scores indicate greater depressive symptoms.

^{//}“Thinking now about all the kinds of help you provide, about how many hours do you spend helping your [relative/friend] in an average week?”

[#]“How often do you go with your [relative/friend] to a doctor visit (0=‘none of the time’ to 4=‘all of the time.’)?”

^{##}“Please tell me if you provide any kind of help at all with taking prescription medication, such as reminding your [relative/friend] when it is time to take the next dose or measuring out the correct dose (0=‘not at all’ to 5=‘a great deal’).”

Table 2

CarePartner Intervention Effects Measured via 6- and 12-Month Assessments

	6 Month		12 Months	
	mHealth+CP Effect (95% CI)	p-value	mHealth+CP Effect (95% CI)	p-value
Caregiver Strain ^{*†}				
Main Effect	.1107 (.1089, .3304)	.323	.0956 (–.1202, .3115)	.385
Interaction with Baseline	–.0501 (–.0869, –.0134)	.007	–.0587 (–.0970, –.0204)	.003
Depression ^{*//}				
Main Effect	.3604 (.0661, .6548)	.016	.1355 (–.1320, .4031)	.321
Interaction with Baseline	–.1801 (–.2752, –.0852)	<.001	–.0842 (–.1609, –.0075)	.031
Hours helping ^{*‡}	.3301 (.2078, .4525)	<.001	.2080 (.0962, .3197)	<.001
Main Effect				
Interaction with Baseline	–.0529 (–.0588, –.0469)	<.001	–.0396 (–.0458, –.0333)	<.001
Going to visits ^{#§}				
Main Effect	.6509 (.0027, 1.3047)	.049	.4308 (–.1730, 1.0346)	.162
Interaction with Baseline	–.2797 (–.7239, .1645)	.217	–.3089 (–.7282, .1205)	.160
Adherence help ^{#**}				
Main Effect	.5560 (.0488, 1.0631)	.032	.6720 (.1749, 1.1693)	.008
Interaction with Baseline	–.2813 (–.6092, .0465)	.093	–.3862 (–.7157, –.0567)	.022

Notes: Effect estimates with $p < .05$ are bolded. Effect estimates were calculated from regression models controlling for baseline values.

* Analyzed using Poisson regression.

† Caregiver Strain Index. Positive coefficients indicate greater strain.

// 10-point version of CES-D. Positive coefficients indicate greater depressive symptoms.

‡ “Thinking now about all the kinds of help you provide, about how many hours do you spend helping your [relative/friend] in an average week?”

Analyzed using ordinal probit models.

§ “How often do you go with your [relative/friend] to a doctor visit (0=‘none of the time’ to 4=‘all of the time’)?”

** “Please tell me if you provide any kind of help at all with taking prescription medication, such as reminding your [relative/friend] when it is time to take the next dose or measuring out the correct dose (0=‘none’ to 5=‘a great deal’).”