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Incorporating Patients' Social Determinants of Health into Hypertension and Depression Care: A pilot randomized controlled trial

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Abstract

The objective of this study was to carry out a randomized controlled pilot trial to test the effectiveness of an integrated intervention for hypertension and depression incorporating patients' social determinants of health (enhanced intervention) versus an integrated intervention alone (basic intervention). In all, 54 patients were randomized. An electronic monitor was used to measure blood pressure, and the nine-item Patient Health Questionnaire (PHQ-9) assessed depressive symptoms. Patients in the enhanced intervention had a significantly improved PHQ-9 mean change from baseline in comparison with patients in the basic intervention group at 12 weeks ($p=0.024$). Patients in the enhanced intervention had a significantly improved systolic and diastolic blood pressure mean change from baseline in comparison with patients in the basic intervention group at 12 weeks ($p=0.003$ and $p=0.019$, respectively). Our pilot trial results indicate integrated care management that addresses the social determinants of health for patients with hypertension and depression may be effective.

Keywords

primary health care; hypertension; unmet needs; intervention; depression

INTRODUCTION

By 2025 the number of people with hypertension will increase by 60% (Kearney et al., 2005) yet the proportion of adults whose hypertension is controlled remains low (Chobanian, Bakris, Black, Cushman, & Green, 2003; Hajjar & Kotchen, 2003; Thom et al., 2006). Longitudinal studies indicate that hypertension is associated with clinical depression and that clinical depression is an independent risk factor for hypertension (Davidson, Jonas, Dixon, & Markovitz, 2000; Markovitz, Matthews, Kannel, Cobb, & D'Agostino, 1993;

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Meyer, Armenian, Eaton, & Ford, 2004). Integrated care for depression and hypertension has been shown to improve depressive symptoms and blood pressure control (Bogner & de Vries, 2008; Bogner, de Vries, Kaye, & Morales, 2013). Patients also recognize the value of integrating their care and want more of it (Novelli, Halvorson, & Santa, 2012). However, many patients with hypertension and depressive symptoms have priorities that extend beyond their biomedical care. Attention to individual priorities for the social determinants of health may be essential to improve outcomes (Stacey et al., 2011).

Social determinants of health are important gradients of health (Graham, 2007). As early as 1943 Abraham Maslow noted that a person is only motivated to focus on higher levels of need after basic physiological and safety needs are met (Maslow, 1943). Subsequent theorists have updated the theory to incorporate the acceptance of change and the importance re-prioritizing needs with lifetime learning (Kiel, 1999). Patients' perspectives related to their needs are important to consider because they can affect their clinical outcomes (Khatib et al., 2014). Such needs include a wide variety of factors, including housing, transportation, emotional, and financial needs which are important for understanding the difficulties a patient may have managing their hypertension. The arenas of research, practice and policy-making are facing increasing pressure to address broader determinants of health, through the development and dissemination of interventions that adequately meet both patients' biomedical needs and social determinants of health. The Chronic Care Model (CCM) encourages a holistic approach in promoting the use of community resources to meet patients' needs. However, community linkages are the least developed component in the CCM perhaps because they have been under-resourced (Pearson et al., 2005). Furthermore, the CCM does not discuss the importance of assessing and collecting information on social determinants that contribute to chronic conditions.

Some interventions focused specifically on improving outcomes among persons with hypertension have sought to extend beyond the traditional biomedical model and address social determinants of health such as social support (e.g. (Criswell, Weber, Xu, & Carter, 2010; Morisky, DeMuth, Field-Fass, Green, & Levine, 1985)). No known studies examining depression treatment in hypertension have incorporated the social determinants of health. While interventions focusing solely on conventional biomedical needs may improve short-term outcomes, long-term goals are centered on improving long-term effects of hypertension for the patient. A broader framework incorporating a social lens, allows for sustainably addressing the underlying contextual needs of patients that will support long-term improvements in health and well-being. Our study is the first study to address both biomedical needs and social determinants of health in hypertension and depression care with a focus on blood pressure control in primary care settings.

The purpose of this study was to carry out a randomized controlled pilot trial to test the effectiveness of an integrated intervention for hypertension and depression incorporating patients' social determinants of health (enhanced intervention) versus an integrated intervention alone (basic intervention). Our intervention builds upon our prior work with a problem-solving based intervention (Bogner, Morales, de Vries, & Cappola, 2012). It was hypothesized that in a sample of primary care patients prescribed pharmacotherapy for hypertension, patients who were randomized to receive the enhanced intervention compared

with the basic intervention would demonstrate the following after a 12 week period: (1) lower blood pressure; and (2) fewer depressive symptoms. In addition, we postulated that the most common social determinants of health that patients with hypertension would want to address would be transportation, financial, or emotional needs.

METHODS

Recruitment Procedures

Patients were identified through an electronic medical record from October 2013 to March 2015 with an active diagnosis of hypertension and a current prescription for an antihypertensive within the past year. Patients from three primary care practices in Philadelphia, Pennsylvania with an upcoming appointment were approached for additional screening. Inclusion criteria were: 1) aged 18 and older; 2) a diagnosis of hypertension; and 3) a current prescription for an antihypertensive. Patients were included with a range of depressive symptoms in order to reflect the concept of the relapsing, remitting nature of depression in primary care (Angst, 1988). The exclusion criteria were: 1) inability to give informed consent; 2) significant cognitive impairment at baseline (Mini-Mental State Examination (MMSE) <21) (Crum, Anthony, Bassett, & Folstein, 1993); and 3) residence in a care facility that provides medications on schedule. The protocol for this study was approved by the University of Pennsylvania Institutional Review Board.

Study Design

This study was conducted in two phases: a run-in phase and a randomized controlled trial phase. The intervention was not performed during this phase. Data was also collected on demographics, blood pressure, and depressive symptoms during this phase. Patients entered phase 2 of the study in which they were randomized to either the basic or enhanced intervention after completion of the initial 2-week run-in phase. Which patients were enrolled in the basic or enhanced intervention was revealed to physicians in order to allow for collaboration with the study team.

Basic and Enhanced Interventions

In the basic intervention the interventionist collaborated with physicians to offer education, guideline-based treatment recommendations, and to monitor clinical status. Key components of the basic intervention were: (1) provision of an individualized program to improve adherence to anti-hypertensives; and (2) integration of depression treatment with hypertension management. The interventionist worked individually with patients to address the factors involved in adherence through a 4-step problem solving process. The first step involved identifying and defining the problem resulting in nonadherence. This step was completed when a patient understood why it was essential that they take their medications and recognized the circumstances under which they missed doses of their medications. The second step involved brainstorming about solutions. Patients identified barriers to adherence and brainstormed to think of solutions to overcome these barriers. In the third step patients selected a solution to implement and strategized about implementation. After identifying the solution, the patient worked to develop an action plan for carrying it out. Step 4 involved assessing whether the action was employed and desired effect achieved.

The enhanced intervention involved all aspects of the basic intervention plus patient prioritized planning (PPP). PPP recognizes patients' social and cultural context by addressing health-related priorities which are identified by the patient. The goal of this intervention was to identify priorities likely to influence treatment adherence. The intervention sought to address both biomedical needs (physical symptoms, diet and exercise) and social determinants of health (financial, social and emotional) patients with hypertension and depressive symptoms wished to discuss in the context of their health. Patients completed a card sort through Websort software which asked them to look at a list of twenty-two options for discussion. Patients picked each option by "clicking" on it and "dragging" the option to one of five boxes labeled with a level of importance and readiness for help (these are problems I really want help with, these problems are really important to me, these are problems that are important to me that I am not ready to talk about, these are problems I really don't want to talk about, or these problems are not important to me). After the card sort, the interventionist engaged in the 4-step problem solving process described above. Interventionists had information about available local resources which was distributed to participants. The goal was to create a personalized management plan which empowered patients to prioritize their own needs as a step towards active participation in care. The interventionist asked permission to discuss the patient's priorities with the clinical team after the patient and interventionist completed their discussion around goal-setting.

Both the basic and enhanced interventions involved three 30 minute in person sessions (baseline, 6 weeks and 12 weeks) and two 15-minute telephone monitoring contacts over a 12 week period. Three research coordinators (one Master's level and two bachelor's level) were trained as interventionists and administered intervention activities. The interventionists received training on pharmacotherapy for depression and hypertension management during weekly clinical sessions with the principal investigator prior to trial initiation.

Measurement Strategy

The Mini-Mental State Examination (MMSE) screened potential study patients for cognitive impairment. The MMSE is a short standardized mental status examination employed for clinical and research purposes (Folstein, Folstein, & McHugh, 1975). Patients were asked whether they resided in a care facility that provided medications on schedule. At baseline, 6, and 12 weeks patients in both the basic and enhanced intervention underwent assessments conducted in person. Research assistants carried out all assessments blinded to patient's randomization status. Standard questions at baseline assessed sociodemographic characteristics. Functional status was assessed using the Medical Outcomes Study Short Form (SF-36) (Stewart, Hays, & Ware, 1988).

At baseline and 12 weeks, blood pressure was obtained in accordance with American Heart Association Guidelines (American Heart Association, 2016) using the BPTu. The BPTu is an automated device that avoids observer bias and unlike the traditional mercury technique, is an oscillometric monitor which takes 6 consecutive blood pressure readings and is designed for clinical settings. The BPTu device drops the first reading and averages the remaining five. Depressive symptoms were measured employing the nine-item Patient Health Questionnaire (PHQ-9) at baseline, 6, and 12 weeks. Our study employed the PHQ-9

because it is a validated and effective tool in screening for depression in the primary care setting (Kroenke, Spitzer, & Williams, 2001).

Analytic strategy

The analytic plan was conducted in three phases. In the first phase we calculated descriptive statistics for patients in the basic and enhanced interventions. In order to compare baseline characteristics of patients in the basic and enhanced intervention the t-test and Fisher's exact tests were employed (for continuous or categorical variables as appropriate). In the second phase, the analysis proceeded at the patient level, as randomized. Within individual repeated measures linear models in which mean response (e.g. blood pressure and depressive symptoms) depends on the covariates of interest (treatment assignment and time since randomization) and an unstructured variance-covariance matrix was employed to account for the extra correlation. The parameter of interest was the time by treatment interaction, which represents the relative difference in change over time among the patients assigned to the enhanced intervention group compared to the basic intervention group. The expected value of the outcome in each treatment group at 12 weeks was compared to the value at baseline, the time of randomization. The differences of these treatment specific contrasts were the desired effect. The third phase consisted of examining the needs that patients in the enhanced intervention identified as either wanting help with or that were important to them.

RESULTS

Figure 1 depicts the flow of patients through the trial. Of 188 patients initially identified and screened from the electronic medical records, 75 were eligible and were approached and 55 were enrolled (73.3% participation rate). Consent was followed by a 2-week run in phase in which demographics, blood pressure, and depressive symptoms were assessed and during which 1 patient withdrew from participation. In all, 54 patients were randomized to the basic or enhanced intervention after the two-week run in period. One patient in the enhanced intervention was lost to follow-up but the remaining 53 patients completed the final study visit.

Sample characteristics

Baseline characteristics of the 54 patients randomized to the basic or enhanced interventions are provided in Table 1. Characteristics of patients in the basic and enhanced interventions did not differ significantly (Table 1). Patients who participated and patients who refused participation were similar in age, gender, and ethnicity.

Needs Identified as Important or Needing Help With

Needs identified by patients in the enhanced intervention as important to them or that they needed help with are summarized in Table 2. All the participants selected one or more needs that they identified as important or needed help with. Patients selected a variety of needs but the most common were their inability to lose weight, needing ideas about exercise, not having enough money to cover expenses, problems with physical illness, problems with pain, problems with memory or solving problems, and feeling depressed or anxious.

Clinical Outcomes

Clinical outcomes at 12 weeks are shown in Table 3. Patients in the enhanced intervention had a significantly improved systolic blood pressure mean change from baseline in comparison with patients in the basic intervention group at 12 weeks (enhanced intervention -11.96 vs. basic intervention 6.08 ; $p=0.003$). Patients in the enhanced intervention had a significantly improved diastolic blood pressure mean change from baseline in comparison with patients in the basic intervention group at 12 weeks (enhanced intervention -4.79 vs. basic intervention 4.12 ; $p=0.019$). Patients in the enhanced intervention also had significantly improved PHQ-9 mean change from baseline in comparison with patients in the basic intervention group at 12 weeks (enhanced intervention -2.75 vs. basic intervention 0.40 ; $p=0.024$).

The authors have no conflicts of interests and certify responsibility for the manuscript.

DISCUSSION

In this study the goal was to pilot test the comparative effectiveness of an integrated intervention for hypertension and depression incorporating patients' social determinants of health (enhanced intervention) versus a basic interventional approach. The principal finding of our study was that primary care patients randomized to the enhanced intervention compared to control patients randomized to receive the basic intervention demonstrated better blood pressure control and fewer depressive symptoms at the final study visit. Furthermore, we also found that the most common needs identified by patients were their inability to lose weight, needing ideas about exercise, not having enough money to cover expenses, problems with physical illness, problems with pain, problems with memory or solving problems, and feeling depressed or anxious. The results support the effectiveness of integrated care management that addresses social determinants of health for primary care patients with hypertension and depression.

Before addressing the implications of our study, the results must be first considered in the context of some potential limitations. First, the three primary care sites that patients received care from might not be representative of all primary care practices, especially when considering different geographical regions. However, these practices were diverse and varied in size and are probably similar to other practices in the region. Second, our preliminary investigation was limited to fifty-three participants but participants were randomized to the enhanced intervention or basic interventional approach. Third, our intervention would require additional resources in primary care settings. However, we have designed a simple intervention and future implementation will explore whether ancillary health personnel could be trained to carry out the intervention. Lastly we have not explored the cost-effectiveness of our intervention. Future investigations will need to evaluate the effect of the intervention program on quality of well being, health resource utilization, cost and cost-effectiveness.

Despite the limitations of this study, findings from this study deserve attention because previous intervention trials integrating care for hypertension and depression in primary care have not addressed patients' social determinants of health. Prior work has identified the

importance of social determinants of health such as socioeconomic status, material needs, and social support among patients with hypertension (Harper, Lynch, & Smith, 2011). However, other interventions including pharmacist-physician collaborations, mobile reminders and tracking, counseling and management strategies have not addressed social determinants of health in patients with hypertension and depressive symptoms (Alcantara et al., 2014; Gums et al., 2015; Kronish & Ye, 2013; Piette, Striplin, Marinec, Chen, & Aikens, 2015). A broader framework incorporating social determinants of health may provide a sustainable approach supporting long-term improvements in health and well-being.

In this pilot trial with fifty-three patients we found a statistically significant improvement in hypertension control and depressive symptoms. Our results are a signal that this intervention, tailored towards patient prioritized social determinants of health may be both feasible and effective. In the era of the patient centered medical home and accountable care organizations, there is increasing pressure for primary care to become the venue for addressing all of patients' perceived needs related to their health. This study sought to improve community linkages between medical, social and community services including links to senior centers, advocacy organizations, mental health services, legal services, employment services, and financial counseling.

Another purpose of our paper was to focus on the types of needs identified by patients as needing help with or important to them. Prior research has explored unmet needs of primary care patients with hypertension focused on access, patient perceptions, limited knowledge and support systems (Khatib et al., 2014). However, our findings are able to add to current literature other needs that exist for patients. Patients in our study struggled with their inability to lose weight, needing ideas about exercise, not having enough money to cover expenses, problems with physical illness, problems with pain, problems with memory or solving problems, and feeling depressed or anxious. These results are not wholly consistent with our hypothesis. We had hypothesized that patients would struggle most with transportation, financial, or emotional needs. Transportation, financial, and emotional needs were all identified by some patients but were not the most common need. It is important to understand that patients identify other needs including struggles with weight loss, exercise regimens, and problems with physical illness, pain, and memory in order for clinicians to better counsel and manage their patients.

There is urgency in finding evidence-based solutions to reduce the burden of hypertension and coexisting depressive symptoms. In our study we found a statistically significant decrease in blood pressure and depression symptoms at 12 weeks among patients randomized to our enhanced intervention including patient prioritized planning to address social determinants of health. Patients identified a broad range of social determinants of health. Future investigations could explore enhancing and sustaining the effect of the intervention through the training of ancillary health personnel, such as Licensed Practical Nurses, who are already working in primary care practices to carry out the intervention. These findings should propel the development and dissemination of models of care that incorporate patients' social determinants of health into hypertension and depression care.

References

- Alcantara C, Edmondson D, Moise N, Oyola D, Hiti D, Kronish IM. Anxiety sensitivity and medication nonadherence in patients with uncontrolled hypertension. *J Psychosom Res.* 2014; 77(4):283–286. DOI: 10.1016/j.jpsychores.2014.07.009 [PubMed: 25280825]
- American Heart Association. Blood pressure testing and assessment. 2016. Retrieved from www.americanheart.org
- Angst, J. Clinical course of affective disorders. In: Helgason, T., Daly, R., editors. *Depression Illness: Prediction of course and outcome.* Berlin, Germany: Springer-verlag; 1988. p. 1-47.
- Bogner HR, de Vries HF. Integration of depression and hypertension treatment: a pilot, randomized controlled trial. *Ann Fam Med.* 2008; 6(4):295–301. [PubMed: 18626028]
- Bogner HR, de Vries HF, Kaye EM, Morales KH. Pilot trial of a licensed practical nurse intervention for hypertension and depression. *Fam Med.* 2013; 45(5):323–329. [PubMed: 23681683]
- Bogner HR, Morales KH, de Vries HF, Cappola AR. Integrated management of type 2 diabetes mellitus and depression treatment to improve medication adherence: a randomized controlled trial. *Ann Fam Med.* 2012; 10(1):15–22. 10/1/15 [pii]. DOI: 10.1370/afm.1344 [PubMed: 22230826]
- Chobanian A, Bakris G, Black H, Cushman W, Green L. The seventh report of the joint national committee on prevention, detection, evaluation, and treatment of high blood pressure: the JNC 7 report. *Jama.* 2003; 289:2560–2572. [PubMed: 12748199]
- Criswell TJ, Weber CA, Xu Y, Carter BL. Effect of self-efficacy and social support on adherence to antihypertensive drugs. *Pharmacotherapy.* 2010; 30(5):432–441. DOI: 10.1592/phco.30.5.432 [PubMed: 20411995]
- Crum RM, Anthony JC, Bassett SS, Folstein MF. Population-based norms for the Mini-Mental State Examination by age and educational level. *Jama.* 1993; 269:2386–2391. [PubMed: 8479064]
- Davidson K, Jonas BS, Dixon KE, Markovitz JH. Do depression symptoms predict early hypertension incidence in young adults in the CARDIA study? *Coronary Artery Risk Development in Young Adults.* *Arch Intern Med.* 2000; 160(10):1495–1500. [PubMed: 10826464]
- Folstein MF, Folstein SE, McHugh PR. “Mini-Mental State”: A practical method for grading the cognitive state of patients for the clinician. *J Psychiatr Res.* 1975; 12(3):189–198. [PubMed: 1202204]
- Graham, H. *Unequal lives: health and socioeconomic inequalities.* Maidenhead: Open University Press; 2007.
- Gums TH, Uribe L, Vander Weg MW, James P, Coffey C, Carter BL. Pharmacist intervention for blood pressure control: medication intensification and adherence. *J Am Soc Hypertens.* 2015; 9(7):569–578. DOI: 10.1016/j.jash.2015.05.005 [PubMed: 26077795]
- Hajjar I, Kotchen TA. Trends in prevalence, awareness, treatment, and control of hypertension in the United States, 1988–2000. *Jama.* 2003; 290(2):199–206. [PubMed: 12851274]
- Harper S, Lynch J, Smith GD. Social determinants and the decline of cardiovascular diseases: understanding the links. *Annu Rev Public Health.* 2011; 32:39–69. DOI: 10.1146/annurev-publhealth-031210-101234 [PubMed: 21219168]
- Kearney PM, Whelton M, Reynolds K, Muntner P, Whelton PK, He J. Global burden of hypertension: analysis of worldwide data. *Lancet.* 2005; 365(9455):217–223. [PubMed: 15652604]
- Khatib R, Schwalm JD, Yusuf S, Haynes RB, McKee M, Khan M, Nieuwlaat R. Patient and healthcare provider barriers to hypertension awareness, treatment and follow up: a systematic review and meta-analysis of qualitative and quantitative studies. *PLoS One.* 2014; 9(1):e84238.doi: 10.1371/journal.pone.0084238 [PubMed: 24454721]
- Kiel JM. Reshaping Maslow's hierarchy of needs to reflect today's educational and managerial philosophies. *J of Instructional Psychology.* 1999; 26(3):167–168.
- Kroenke K, Spitzer RL, Williams JB. The PHQ-9: validity of a brief depression severity measure. *J Gen Intern Med.* 2001; 16(9):606–613. [PubMed: 11556941]
- Kronish IM, Ye S. Adherence to cardiovascular medications: lessons learned and future directions. *Prog Cardiovasc Dis.* 2013; 55(6):590–600. DOI: 10.1016/j.pcad.2013.02.001 [PubMed: 23621969]

- Markovitz JH, Matthews KA, Kannel WB, Cobb JL, D'Agostino RB. Psychological predictors of hypertension in the Framingham Study: is there tension in hypertension? *Jama*. 1993; 270:2439–2443. [PubMed: 8230620]
- Maslow AH. A theory of human motivation. *Psychol Rev*. 1943; 50:370–396.
- Meyer MC, Armenian HK, Eaton WW, Ford DE. Incident hypertension associated with depression in the Baltimore Epidemiologic Catchment area follow-up study. *Journal of Affective Disorders*. 2004; 83:127–133. [PubMed: 15555705]
- Morisky DE, DeMuth NM, Field-Fass M, Green LW, Levine DM. Evaluation of family health education to build social support for long-term control of high blood pressure. *Health Educ Q*. 1985; 12(1):35–50. [PubMed: 3980239]
- Novelli WD, Halvorson GC, Santa J. Recognizing an Opinion: Findings From the IOM Evidence Communication Innovation Collaborative. *Jama*. 2012; :1–2. [pii]. DOI: 10.1001/jama.2012.133691363268
- Pearson ML, Wu S, Schaefer J, Bonomi AE, Shortell SM, Mendel PJ, ... Keeler EB. Assessing the implementation of the chronic care model in quality improvement collaboratives. *Health Serv Res*. 2005; 40(4):978–996. [PubMed: 16033488]
- Piette JD, Striplin D, Marinec N, Chen J, Aikens JE. A randomized trial of mobile health support for heart failure patients and their informal caregivers: impacts on caregiver-reported outcomes. *Med Care*. 2015; 53(8):692–699. DOI: 10.1097/MLR.0000000000000378 [PubMed: 26125415]
- Stacey D, Bennett CL, Barry MJ, Col NF, Eden KB, Holmes-Rovner M, ... Thomson R. Decision aids for people facing health treatment or screening decisions. *Cochrane Database Syst Rev*. 2011; (10):CD001431.doi: 10.1002/14651858.CD001431.pub3 [PubMed: 21975733]
- Stewart AL, Hays RD, Ware JE. The MOS Short-form General Health Survey: Reliability and validity in a patient population. *Medical Care*. 1988; 26:724–735. [PubMed: 3393032]
- Thom T, Haase N, Rosamond W, Howard VJ, Rumsfeld J, Manolio T, ... Wolf P. Heart disease and stroke statistics--2006 update: a report from the American Heart Association Statistics Committee and Stroke Statistics Subcommittee. *Circulation*. 2006; 113(6):e85–151. [PubMed: 16407573]

Figure 1.
Study flow diagram.

Table 1

Baseline characteristics (n=54). P-values represent comparisons according to Fisher's Exact test and t-tests for categorical or continuous data, respectively.

	Basic (n=25)	Enhanced Intervention (n=29)	P value
Sociodemographic characteristics			
Age, mean in years (s.d.)	60.6 (9.2)	63.8 (6.6)	.16
African American, n (%)	13 (52.0%)	19 (65.5%)	
White, n (%)	9 (36.0%)	7 (24.1%)	
Hispanic, n (%)	3 (12.0%)	0 (0.0%)	.13
Asian, n (%)	0 (0.0%)	1 (3.4%)	
Other, n (%)	0 (0.0%)	2 (6.9%)	
Gender, women n (%)	17 (68.0%)	23 (79.3%)	.37
Less than HS education, n (%)	1 (4.0%)	1 (3.4%)	.99
Depression			
PHQ-9, mean (s.d.)	6.3 (7.0)	6.9 (5.4)	.65
Medications			
Number of medications, mean (s.d.)	9.2 (4.3)	9.8 (4.0)	.54
Functional status (SF-36)			
Physical function score, mean (s.d.)	55.1 (30.8)	59.0 (32.3)	.65
Social function score, mean (s.d.)	66.0 (38.9)	72.8 (34.1)	.50
Role physical score, mean (s.d.)	47.0 (39.1)	56.9 (43.3)	.39
Role emotional score, mean (s.d.)	76.0 (34.1)	77.0 (36.8)	.92
Bodily pain score, mean (s.d.)	31.2 (23.9)	44.9 (29.5)	.07
Cognitive status			
MMSE, mean (s.d.)	27.4 (2.7)	27.2 (2.8)	.67
Blood pressure			
Systolic BP, mean (s.d.)	130.8 (19.3)	137.8 (17.7)	.17
Diastolic BP, mean (s.d.)	74.2 (12.4)	76.3 (10.5)	.51

Abbreviations: s.d., standard deviation; HS, high school; SF-36; Medical Outcomes Study Short Form; MMSE, Mini-Mental State Examination; PHQ-9, nine-item Patient Health Questionnaire; BP, blood pressure; Hb, hemoglobin.

Table 2

Needs selected by participants in the enhanced intervention as important or needing help with (n=29).

Selected needs	Persons, %
Unable to lose weight	21 (72.4%)
Ideas about exercise	19 (65.5%)
Not having enough money to cover my expenses	18 (62.1%)
Problems with physical illness	18 (62.1%)
Problems with pain	17 (58.6%)
Problems with memory or solving problems	12 (41.4%)
Feeling depressed or anxious	10 (34.4%)
I worry about safety	9 (31.0%)
Concerns about my children	8 (27.6%)
Problems with reading a newspaper or computer screen	7 (24.1%)
Trouble getting transportation	5 (17.2%)
I feel alone	5 (17.2%)
Guidance on medication usage	5 (17.2%)
Problems with relationships with my family/others	5 (17.2%)
No one to help me	5 (17.2%)
Difficulty with dressing or bathing	5 (17.2%)
I need a new place to live	5 (17.2%)
Difficulty getting medications	4 (13.8%)
Not having enough time to take care of myself	4 (13.8%)
Problems with law/legal concerns	2 (6.9%)
Problems with alcohol, street drugs, or taking more medication than prescribed	0 (0.0%)
Thoughts of death or suicide	0 (0.0%)

Table 3

Clinical outcomes of blood pressure, and depression symptoms in basic and in the enhanced intervention at 12 weeks.

	Unadjusted Estimate		Estimated Between-Group Difference (95% CI)	P value
	Basic (n=25)	Enhanced Intervention (n=28)		
Depression				
PHQ-9, mean change from baseline (s.d.)	0.40 (0.98)	−2.75 (0.93)	3.15 (0.44 to 5.86)	.024
Blood pressure				
Systolic blood pressure, mean change from baseline (s.d.)	6.08 (4.94)	−11.96 (3.35)	18.0 (6.28 to 29.81)	.003
Diastolic blood pressure, mean change from baseline (s.d.)	4.12 (3.39)	−4.79 (1.69)	8.91 (1.05 to 16.26)	.019

Abbreviations: CI, confidence interval; PHQ-9, nine-item Patient Health Questionnaire; s.d., standard deviation; Hb, hemoglobin. Estimates, 95% confidence intervals, and p-values from the statistical models.

[‡]Mean group difference (95% CI) from a repeated measures linear regression model.