

Published in final edited form as:

*Schizophr Res.* 2010 May ; 118(1-3): 264–270. doi:10.1016/j.schres.2010.01.026.

## The Health and Recovery Peer (HARP) Program: A Peer-Led Intervention to Improve Medical Self-Management for Persons with Serious Mental Illness

Benjamin G. Druss, MD, MPH<sup>a</sup>, Liping Zhao, MSPH<sup>a</sup>, Silke A. von Esenwein, PhD<sup>a</sup>, Joseph R. Bona, MD, MBA<sup>b</sup>, Larry Fricks<sup>c</sup>, Sherry Jenkins-Tucker<sup>d</sup>, Evelina Sterling, MPH, CHES<sup>e</sup>, Ralph DiClemente, PhD<sup>a</sup>, and Kate Lorig, RN, DrPH<sup>f</sup>

<sup>a</sup>Rollins School of Public Health, Emory University, 1518 Clifton Road NE, Atlanta, GA 30316 Dr Druss: bdruss@emory.edu, Mrs. Zhao: lzhao2@emory.edu, Dr. von Esenwein: svonese@emory.edu, Dr. DiClemente: rdiclem@sph.emory.edu.

<sup>b</sup>Dekalb Community Service Board P.O. Box 1648 Decatur, GA 30031 josephb@dekcsb.org

<sup>c</sup>Appalachian Consulting Group, 3173 Highway 129 North; Cleveland, GA 30528, larryfricks@alltel.net.

<sup>d</sup>GA Mental Health Consumer Network Inc., 246 Sycamore St # 260, Decatur, GA 30030-3434, sjtucker@gmhcnc.org.

<sup>e</sup>Independent Consultant, 1590 Ashforde Drive, Marietta, GA 30068, evelinaws@yahoo.com

<sup>f</sup>Stanford Pt. Education Research Center, 1000 Welch Rd, Suite 204, Palo Alto CA 94304, Lorig@Stanford.edu.

### Abstract

**Objectives**—Persons with serious mental illnesses (SMI) have elevated rates of comorbid medical conditions, but may also face challenges in effectively managing those conditions.

**Methods**—The study team developed and pilot-tested the Health and Recovery Program (HARP), an adaptation of the Chronic Disease Self-Management Program (CDSMP) for mental health consumers. A manualized, six-session intervention, delivered by mental health peer leaders, helps participants become more effective managers of their chronic illnesses. A pilot trial randomized 80 consumers with one or more chronic medical illness to either the HARP program or usual care.

© 2010 Elsevier B.V. All rights reserved.

Please address correspondence to: Benjamin G. Druss MD, MPH, Department of Health Policy and Management, Rollins School of Public Health, Emory University, 1518 Clifton Rd, NE Room 606, Atlanta GA 30322, 404-712-9602 (office phone), 404-727-9198 (fax), bdruss@emory.edu.

#### 2. Contributors

Dr. Druss is the Principal Investigator on this study, designed the study, wrote the protocol, and wrote the manuscript. Mrs. Zhao undertook the statistical analysis. Dr. von Esenwein, Dr. Bona, Mr. Fricks, Mrs. Jenkins-Tucker, Mrs. Sterling, Dr. DiClemente, and Dr. Lorig contributed to and have approved the final manuscript.

**Publisher's Disclaimer:** This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final citable form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

#### 3. Conflict of Interest

Dr. Lorig receives royalties from Bull Publisher for being an author of *Living a Healthy Life with Chronic Conditions*. This book was written for the self-management course and is used in this study. All other authors declare that they have no conflict of interest.

**Results**—At six month follow-up, participants in the HARP program had a significantly greater improvement in patient activation than those in usual care (7.7% relative improvement vs. 5.7% decline,  $p=0.03$  for group\*time interaction), and in rates of having one or more primary care visit (68.4% vs. 51.9% with one or more visit,  $p=0.046$  for group\*time interaction). Intervention advantages were observed for physical health related quality of life (HRQOL), physical activity, medication adherence, and, and though not statistically significant, had similar effect sizes as those seen for the CDSMP in general medical populations. Improvements in HRQOL were largest among medically and socially vulnerable subpopulations.

**Conclusions**—This peer-led, medical self-management program was feasible and showed promise for improving a range of health outcomes among mental health consumers with chronic medical comorbidities. The HARP intervention may provide a vehicle for the mental health peer workforce to actively engage in efforts to reduce morbidity and mortality among mental health consumers.

### Keywords

serious mental illness; chronic disease; wellness; recovery; self management

## 1. Introduction

Persons with serious mental illness (SMI) are at elevated risk for a host of chronic medical conditions, (Jeste DV 1996; Goldman 2000; Dickey et al. 2002; Jones DR 2004; Sokal J 2004; Carney et al. 2006; Carney and Jones 2006; Leucht et al. 2007; Meyer and Nasrallah 2009). At the same time, they also face a series of barriers to effectively managing those illnesses. Physical inactivity (Brown et al. 1999; Daumit et al. 2005), poor diet, (McCreadie R 1998) problems with adherence to somatic medications (Kreyenbuhl et al. 2008), and limited health literacy (Dickerson et al. 2005; Dickerson et al. 2009) may both increase the incidence of illness and raise challenges to managing those conditions after they have developed.

Within the general medical literature, there is a growing recognition of the value of interventions that improve patient self-management of chronic medical conditions (Monninkhof et al. 2003; Chodosh et al. 2005; Effing et al. 2007). These programs work to improve an individual's ability to manage his or her illness and health behaviors and act as an effective patient. (Hibbard et al. 2004).

Peer specialists make up one of the most rapidly growing segments of the mental health workforce in the US. These peers are trained to work in a variety of different settings to promote mental health recovery and wellbeing (Davidson et al. 1999; Cook 2005; Davidson et al. 2006). Amidst growing concern in the mental health consumer community about elevated morbidity and premature mortality (Parks and Svedsen 2006), mental health consumer leaders are increasingly calling for efforts to incorporate physical health and wellness into existing consumer recovery programs (Fricks 2009). However there are currently no evidence-based interventions available to do so.

This study adapted an established medical disease self-management program to be delivered by, and to, mental health consumers. This manuscript describes the development of the program and results of a pilot study designed to assess its feasibility and potential to improve self-management and health outcomes.

## 2. Methods

### 2.1 Overview of the Chronic Disease Self Management Program (CDSMP)

The intervention builds on the Chronic Disease Self Management Program (CDSMP) developed by Lorig et al at the Stanford Patient Education Center (Lorig 1999; Lorig 2006). CDSMP programs are led by two peer educators with chronic medical conditions; any given group typically includes participants with a range of chronic conditions such as diabetes and arthritis. A series of six group sessions addresses self-management tasks that have been found to be common across chronic health conditions (Clark et al. 1991) (Hibbard et al. 2007; Mosen et al. 2007). The elements of the intervention include regular action planning and feedback, modeling of behaviors and problem-solving by participants, reinterpretation of symptoms, and training in specific disease management techniques. In multiple studies, the CDSMP has shown to improve disease self management, health services use, and clinical outcomes (Lorig et al. 1999) (Lorig et al. 2001) (Lorig et al. 2008; Lorig et al. 2009).

### 2.2 Adapting the Chronic Disease Self Management Program for Mental Health Consumers

The study adapted the CDSMP to mental health consumers using the iterative “ADAPT-ITT” approach for adaptation of evidence-based interventions developed by Wingood and DiClemente (Wingood and DiClemente 2008). An expert panel comprised of mental health consumer leaders, a health educator, and the developer of the CDSMP was convened to consider the specific issues faced by persons with serious mental illness in managing their medical needs, and how these factors should be taken into consideration in modifying the intervention.

Peer leaders led a pre-pilot trial of the unmodified CDSMP with 8 subjects, followed by a series of two focus groups led by the health educator with those participants. The expert panel reviewed the results and then made recommendations about revisions to the manual. The health educator made the appropriate changes, which were reviewed and approved by the expert panel.

While the core structure of the program was retained, several modifications were made to adapt it to the needs and characteristics of mental health consumers. Because of potential gaps in health literacy and cognitive limitations (Dickerson et al. 2005; Dickerson et al. 2009), the manual was simplified to a sixth-grade reading level and a self-management record was added to track disease-specific self-management, medications, upcoming appointments, dietary intake, and physical activity. To improve motivation and engagement in care, each participant was paired with a partner from the group, with the two working together toward accomplishing action plans and goals.

Materials were added emphasizing the connection between mind and body, and a section was added about the importance of coordinating information about medications between primary care providers and psychiatrists. The section on medical advanced directives was expanded to also include mental health advanced directives, which specify preferences if a client is unable to make decisions due to psychiatric symptoms.

Finally, the diet and exercise sections were modified to address the high rates of poverty and social disadvantage in this population. The diet section provided strategies for purchasing healthy food on a budget (including using food stamps) and strategies were provided to allow participants to safely exercise in their own homes.

## 2.3 Randomized Trial

Subsequently, a small randomized trial was conducted at a Community Mental Health Center (CMHC) to establish feasibility, effectiveness, and to inform further studies of the program in this population. All study participants gave written, informed consent, and the study was approved by the University's Institutional Review Board.

**2.3.1 Study Setting**—The study was conducted at an urban CMHC. The target population of the facilities is individuals age 18 and older from the area that experience serious and persistent mental illness with or without comorbid addictive disorders.

**2.3.2 Sample Recruitment**—The sample was recruited through waiting rooms and flyers posted in outpatient clinics at the two facilities. This dual approach has been found to be optimal for recruiting vulnerable populations for health behavior interventions (Harris et al. 2003). To be eligible, subjects had to be on the active patient roster at the CMHC, have a severe mental illness, (National Advisory Mental Health Council 1993) have one or more chronic medical condition, and have the capacity to provide informed consent. Inclusion criteria were kept broad to optimize generalizability.

**2.3.3 Measures**—Patient activation reflects an individual's perceived ability to manage his or her illness and health behaviors, and act as an effective patient (Hibbard et al. 2004). This construct was measured using the 13-item Patient Activation Measure (PAM) (Hibbard et al. 2004). Patient activation is calculated on a 0-100 score, with 100 as the highest possible degree of activation.

Disease self-management was assessed using questions about physical activity, health services use, and medication adherence. Questions about physical activity and source of a primary care provider were drawn from the Behavioral Risk Factor Surveillance System (BRFSS) (Stein et al. 1993; Arday et al. 1997; Brownson et al. 1999; Nelson et al. 2001). Medication adherence was assessed using a validated self-report measure of problems in adherence to medication (Morisky et al. 1986).

Health Related Quality of Life (HRQOL) was measured by the SF-36, constructed for use in the Medical Outcomes Study (McHorney et al. 1993; McHorney et al. 1994). A Physical Component Summary (PCS) and Mental Component Summary (MCS) scores were constructed from the survey, scored between 0 (poor health) to 100 (perfect health) (Ware et al. 1995).

In general populations, two groups of factors have been found to place populations at risk of poor self-management and health outcomes: social vulnerability factors including lack of an adequate support network and low SES, and medical vulnerability factors, such as problems in obtaining and maintaining appropriate medical services. (Aday 1994; Gelberg et al. 2000). Thus, exploratory analyses were conducted to see whether the program had differential effects on physical health status among patients who either were medically vulnerable (uninsured or no primary care provider) or socially vulnerable (living alone or unemployed).

**2.3.4 Randomization**—Using a computerized algorithm, patients were randomized to the intervention or usual care group by the project manager. After randomization, interviews were administered at baseline and again at 6 months post-baseline. Interviewers were blinded to subjects' randomization status.

**2.3.5 Intervention**—Two certified mental health peer specialists participated in a community-based, 5-day CDSMP master training course to become master trainers in the

CDSMP program. Subsequently, they received 3 additional days of training from the team's principal investigator and health educator in the Health and Recovery Peer (HARP) program, the adapted version of the CDSMP. The health educator observed the initial sessions and provided detailed feedback to the peer leaders to assess and optimize fidelity to the intervention.

Each subject in the intervention group attended up to 6 group sessions led by mental health peer specialists. Sessions covered following topics related to chronic disease self-management: 1. Overview of self-management 2. Exercise and physical activity 3. Pain and fatigue management 4. Healthy eating on a limited budget 5. Medication management 6. Finding and working with a regular doctor.

During the sessions, peer educators modeled appropriate behaviors and responses, and participation from each group member helped model behavior and improve motivation for other members. Attendees are taught to develop short-term "action plans" for choosing domains of health behavior change. (Lorig et al. 1994) This process involves identifying a problem that is of particular concern, listing ideas for solving the problem, and then developing a plan outlining specific, short-term goals for improvement.

**2.3.6 Usual Care**—Subjects assigned to usual care continued to receive all medical, mental health, and peer-based services that they were otherwise receiving prior to entry into the study.

#### 2.4. Statistical Analysis

All analyses were conducted as intent-to-treat. Bivariate analyses examined differences between the intervention and usual care groups on demographic and clinical variables at baseline, to assess adequacy of randomization, as well as at the follow-up period. The primary analytic technique for assessing statistically significant changes in outcome variables was random regression. This method makes it possible to compare the difference in change between groups over time, and to conduct intent-to-treat analyses that include subjects with missing data at one or more follow-up periods. Analyses were conducted using the SAS MIXED procedure for continuous variables and PROC GENMOD for binary and ordinal variables. For each outcome measure, the model assessed the outcome as a function of 1) randomization group 2) time since randomization and 3) group\*time interaction. The group\*time interaction, which reflects the relative difference in change in the parameters over time, was the primary measure of statistical significance.

As a pilot study, the intervention was primarily designed to assess feasibility and effect sizes rather than to assess statistical significance on study outcomes.

### 3. Results

A total of 80 subjects were randomized to either the HARP intervention (n=41) or usual care (n=39). Among those completing baseline assessments, 65 (81.2%) completed the 6-month follow-up. (Figure 1). Participants in the intervention group attended a mean of 4.75 (SD=4.07) and a median of 5 sessions.

#### 3.1. Baseline Characteristics

The mean age of the population was 48; a majority (82.5%) were African American and most were poor (mean annual income \$7,704 (\$2,520, \$12,306). A total of 20% of participants were uninsured, with the majority having Medicaid and/or Medicare. The most common primary mental diagnoses were bipolar disorder (32.5%), schizophrenia (28.8%),

major depression (26.3%) and PTSD (11.3%). The most common medical comorbidities were hypertension (62.5%), arthritis (48.8%), asthma (22.5%), and heart disease (22.5%).

### 3.2 6- Month Outcomes

At six months, patient activation was clinically and statistically significantly higher in the HARP intervention than the usual care group (52.0  $\pm$  10.1 intervention vs. 44.9  $\pm$  9.6 control,  $p=0.01$ ). The difference in change over time (7.7% improvement in the intervention vs. 5.7% decline in the usual care) in patient activation was statistically significant in a random effects model ( $p=0.03$ ).

There was also a significant improvement in the proportion of the sample reporting one or more visit to a primary care provider, with a 8.3% improvement in the HARP group, compared with a 17.1% decline in the usual care group ( $p=0.04$  for the group\*time interaction).

At six month follow-up, the intervention group reported an additional 40 minutes per week spent in moderate/vigorous exercise compared to the intervention group (191 vs. 151 minutes/week). While not statistically significant, this 20% relative difference in exercise was nearly identical to the six month effect size for the six month follow-up on the original CDSMP study in a general community sample (111 vs. 91 minutes) (Lorig et al. 1999). This represented a 27% improvement in the intervention group versus a 1.6% decline in the usual care group (group\*time interaction not significant).

The scale for medication adherence has a possible range from zero (no problems) to four (more problems). At six month follow-up, the mean scale score for the HARP group was lower (better) than the mean value for the usual care group (1.32 vs. 1.61). This reflected a 14.2% improvement in the intervention group versus a 7.3% decline in the usual care group (group\*time interaction not significant).

At six month follow-up the intervention group scored higher on the HRQOL Physical Component Summary than the usual care group (42.9  $\pm$  14.2 vs. 40.0  $\pm$  13.7). This reflected a twofold larger improvement for the intervention group (16.3% relative increase versus 8.1% improvement for the usual care group, group\*time interaction not significant). For the Mental Component Summary, six month scores (36.8  $\pm$  10.0 vs. 36.8  $\pm$  11.1) and relative improvement (10.5% vs. 8.6%) were smaller (group\*time interaction not significant). The HRQOL effect sizes were comparable to those in studies implementing the CDSMP in general medical populations. (Haas et al. 2005)

Exploratory analyses were conducted to see whether the program's benefits for physical health related quality of life differed across medical and social vulnerability status. Effect sizes for these comparisons indicated substantially greater levels of improvement on the Physical Component Summary in populations with medical vulnerability (23.3% improvement on the PCS for uninsured clients vs. 11.1% improvement for those with insurance; 31% improvement on the PCS for those without a primary care provider vs. 2.9% improvement for those without one). There were also substantially larger effects among the subgroup with social vulnerability (14.3% improvement for those living alone versus 8.9% improvement for those living with a companion; 29.8% improvement for unemployed versus 4.1% for employed). Given the small cell sizes for these moderator analyses, none of these effect sizes were statistically significant.

## 4. Discussion

The Health and Recovery Peer (HARP) Program, an adapted version of the Chronic Disease Self-Management Program, was feasible to implement and showed promise in improving a range of self-management and health outcome measures, including significant improvements in patient activation and greater likelihood of using primary care medical services. These improvements appeared to be greatest in populations with financial and social disadvantage.

The study was associated with a substantial and statistically significant degree of improvement in patient activation, a measure of an individual's self-management capacity. (Hibbard et al. 2004; Hibbard et al. 2007; Mosen et al. 2007) There has been increasing attention in the medical literature about the importance of patient activation both in guiding clinical care and predicting outcomes. In longitudinal studies, positive changes in patient activation have been found to be associated with improved self-management behaviors (Hibbard et al. 2007), medication adherence, and outcomes including quality of life (Mosen et al. 2007). Coupled with the other study findings, these results suggest the intervention's potential to improve other more downstream health outcomes.

Although the focus of this intervention was on improving patient rather than on provider or system-level determinants of health use, there was a significant improvement in the proportion of persons using primary care services. In general populations, the CDSMP has been demonstrated to help direct patients toward appropriate modalities of care and away from more costly services. (Lorig et al. 1999), Future studies should examine how the HARP program affects a broader range of health services such as emergency room visits and inpatient hospitalization as well as its ability to improve quality of medical care.

Across other key study outcomes, the intervention was associated with effect sizes comparable or better to those seen for the CDSMP in general medical populations. The study found larger effect sizes for Health Related Quality of Life than have been reported in similar trials in general clinical populations. (Haas et al. 2005) (Jerant et al. 2009). This suggests considerable potential for these programs to improve care in this population, given their high levels of medical and psychosocial need.

Within the study sample, the intervention appeared to be particularly beneficial among medically and socially disadvantaged subgroups. This finding is consistent with other studies suggesting that mental health quality improvement programs may differentially improve the least well-off individuals, thereby reducing disparities in care. (Wells et al. 2000). Again, this is likely due to the fact that the most disadvantaged groups have the most to gain from efforts to improve their health care and self management skills.

As a pilot study, the study had several limitations, including reliance on self-report outcome measures, a relatively brief follow-up period, and lack of adequate power to assess statistical significance for many of the study outcomes. Further testing using a broader range of outcome measures, longer follow-up periods, and larger sample sizes will be needed to establish the HARP program as an evidence-based practice.

Although medical disease management and the mental health consumer recovery movement grew up independently, there are a number of striking parallels between the two. The core features described for mental health recovery --peer support, holistic orientation, self-direction, and person-centeredness (Substance Abuse and Mental Health Services Administration 2006) -- all are also central features of the CDSMP. These similarities suggest the potential for each of these approaches to inform the other. Medical disease self-management programs may increasingly be integrated into peer workforce to improve health

and healthcare for mental health consumers. At the same time, the recovery model may provide a useful approach for understanding how all persons with all chronic illnesses – both medical and mental health - can lead fuller and healthier lives.

## Acknowledgments

The study would like to acknowledge the support of the DeKalb Community Service Board, where the trial was conducted.

### 1. Role of Funding Source.

The study was funded by NIMH R34MH078583. The study sponsor had no role in study design; in the collection, analysis and interpretation of data; in the writing of the report; or in the decision to submit the paper for publication.

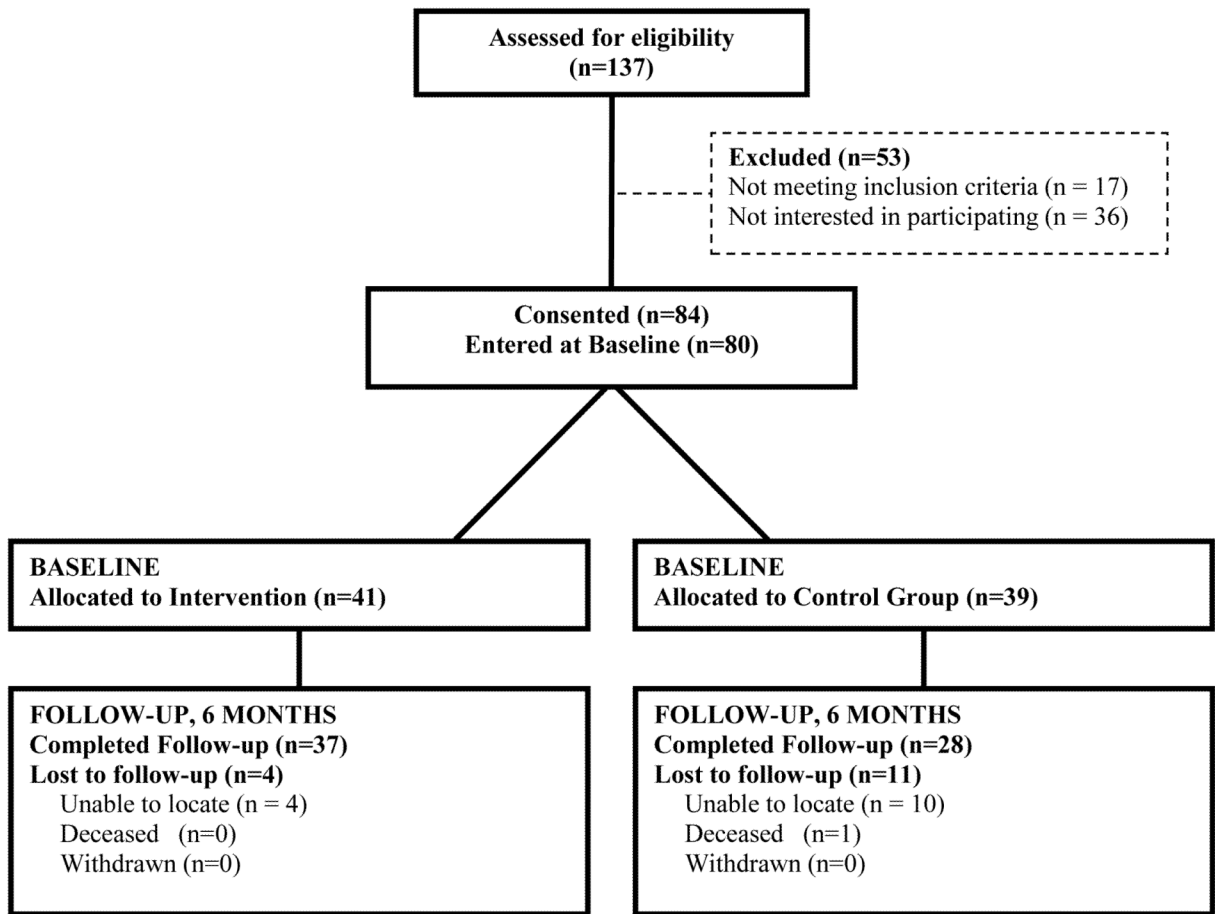
## REFERENCES

- Aday LA. Health status of vulnerable populations. *Annu Rev Public Health* 1994;15:487–509. [PubMed: 8054096]
- Arday DR, Tomar SL, et al. State smoking prevalence estimates: a comparison of the Behavioral Risk Factor Surveillance System and current population surveys. *Am J Public Health* 1997;87(10):1665–9. [PubMed: 9357350]
- Brown S, Birtwistle J, et al. The unhealthy lifestyle of people with schizophrenia. *Psychol Med* 1999;29(3):697–701. [PubMed: 10405091]
- Brownson RC, Eyler AA, et al. Reliability of information on physical activity and other chronic disease risk factors among US women aged 40 years or older. *Am J Epidemiol* 1999;149(4):379–91. [PubMed: 10025482]
- Carney CP, Jones L, et al. Medical comorbidity in women and men with schizophrenia: a population-based controlled study. *J Gen Intern Med* 2006;21(11):1133–7. [PubMed: 17026726]
- Carney CP, Jones LE. Medical comorbidity in women and men with bipolar disorders: a population-based controlled study. *Psychosom Med* 2006;68(5):684–91. [PubMed: 17012521]
- Chodosh J, Morton SC, et al. Meta-analysis: chronic disease self-management programs for older adults. *Ann Intern Med* 2005;143(6):427–38. [PubMed: 16172441]
- Clark N, Becker M, et al. Self-management of chronic illness. *Journal of Aging and Health* 1991;3:3–27.
- Cook, J. “Patient-Centered” and “Consumer-Directed” Mental Health Services: A Report Prepared for the Institute of Medicine. University of Illinois at Chicago; Chicago, Ill: 2005.
- Daumit GL, Goldberg RW, et al. Physical activity patterns in adults with severe mental illness. *J Nerv Ment Dis* 2005;193(10):641–6. [PubMed: 16208158]
- Davidson L, Chinman M, et al. Peer support among individuals with severe mental illness: a review of the evidence. *Clin Psychol Sci Prac* 1999;6(6):165–187.
- Davidson L, Chinman M, et al. Peer support among adults with serious mental illness: a report from the field. *Schizophr Bull* 2006;32(3):443–50. [PubMed: 16461576]
- Dickerson FB, Goldberg RW, et al. Diabetes knowledge among persons with serious mental illness and type 2 diabetes. *Psychosomatics* 2005;46(5):418–24. [PubMed: 16145186]
- Dickerson FB, Kreyenbuhl J, et al. A 5-year follow-up of diabetes knowledge in persons with serious mental illness and type 2 diabetes. *J Clin Psychiatry* 2009;70(7):1057–8. [PubMed: 19653985]
- Dickey B, Normand SL, et al. Medical morbidity, mental illness, and substance use disorders. *Psychiatr Serv* 2002;53(7):861–7. [PubMed: 12096170]
- Effing T, Monninkhof EM, et al. Self-management education for patients with chronic obstructive pulmonary disease. *Cochrane Database Syst Rev*. 2007;(4) CD002990.
- Fricks L. Consumers take charge of wellness. *National Council Magazine* 2009 Winter;;20–22. 2009.
- Gelberg L, Andersen RM, et al. The Behavioral Model for Vulnerable Populations: application to medical care use and outcomes for homeless people. *Health Serv Res* 2000;34(6):1273–302. [PubMed: 10654830]



- Goldman L. Comorbid medical illness in psychiatric patients. *Curr Psychiatry Rep* 2000;2(3):256–63. [PubMed: 11122965]
- Haas M, Group E, et al. Chronic disease self-management program for low back pain in the elderly. *J Manipulative Physiol Ther* 2005;28(4):228–37. [PubMed: 15883575]
- Harris KJ, Ahluwalia JS, et al. Successful recruitment of minorities into clinical trials: The Kick It at Swope project. *Nicotine Tob Res* 2003;5(4):575–84. [PubMed: 12959796]
- Hibbard JH, Mahoney ER, et al. Do increases in patient activation result in improved self-management behaviors? *Health Serv Res* 2007;42(4):1443–63. [PubMed: 17610432]
- Hibbard JH, Stockard J, et al. Development of the Patient Activation Measure (PAM): conceptualizing and measuring activation in patients and consumers. *Health Serv Res* 2004;39(4 Pt 1):1005–26. [PubMed: 15230939]
- Jerant A, Moore-Hill M, et al. Home-based, peer-led chronic illness self-management training: findings from a 1-year randomized controlled trial. *Ann Fam Med* 2009;7(4):319–27. [PubMed: 19597169]
- Jeste DV, G J, Lindamer LA, Lacro JP. Medical comorbidity in schizophrenia. *Schizophr Bull* 1996;22(3):413–30. [PubMed: 8873293]
- Jones DR, M C, Barreira PJ, Fisher WH, Hargreaves WA, Harding CM. Prevalence, Severity, and Co-occurrence of Chronic Physical Health Problems of Persons With Serious Mental Illness. *Psychiatr Serv* 2004;55(11):1250–1257. [PubMed: 15534013]
- Kreyenbuhl J, Dixon LB, et al. Does Adherence to Medications for Type 2 Diabetes Differ Between Individuals With Vs Without Schizophrenia? *Schizophr Bull*. 2008
- Leucht, S.; Burkard, T., et al., editors. *Physical Illness and Schizophrenia: A Review of the Evidence*. Cambridge University Press; New York: 2007.
- Lorig, K. *Chronic Disease Self Management Leader's Manual*. Stanford Patient Education Research Center; Palo Alto, CA: 1999.
- Lorig, K. *Chronic Disease Self Management Leader's Manual*. Stanford Patient Education Research Center; Palo Alto, CA: 2006.
- Lorig, K.; Holman, H., et al. *Living a Healthy Life with Chronic Conditions*. Bull Publishing Company; Palo Alto, CA: 1994.
- Lorig K, Ritter PL, et al. *Community-Based Peer-Led Diabetes Self-management: A Randomized Trial*. Diabetes Educ. 2009
- Lorig KR, Ritter P, et al. Chronic disease self-management program: 2-year health status and health care utilization outcomes. *Med Care* 2001;39(11):1217–23. [PubMed: 11606875]
- Lorig KR, Ritter PL, et al. The internet-based arthritis self-management program: a one-year randomized trial for patients with arthritis or fibromyalgia. *Arthritis Rheum* 2008;59(7):1009–17. [PubMed: 18576310]
- Lorig KR, Sobel DS, et al. Evidence suggesting that a chronic disease self-management program can improve health status while reducing hospitalization: a randomized trial. *Med Care* 1999;37(1):5–14. [PubMed: 10413387]
- McCreadie R, M E, Blacklock C, Tilak-Singh D, Wiles D, Halliday J, Paterson J. Dietary intake of schizophrenic patients in Nithsdale, Scotland: case-control study. *BMJ* 1998;317(7161):784–5. [PubMed: 9740565]
- McHorney CA, Ware JE Jr. et al. The MOS 36-item Short-Form Health Survey (SF-36): III. Tests of data quality, scaling assumptions, and reliability across diverse patient groups. *Med Care* 1994;32(1):40–66. [PubMed: 8277801]
- McHorney CA, Ware JE Jr. et al. The MOS 36-Item Short-Form Health Survey (SF-36): II. Psychometric and clinical tests of validity in measuring physical and mental health constructs. *Med Care* 1993;31(3):247–63. [PubMed: 8450681]
- Meyer, J.; Nasrallah, H., editors. *Medical illness and schizophrenia*. American Psychiatric Press; Washington, DC: 2009.
- Moninkhof EM, van der Valk PD, et al. Self-management education for chronic obstructive pulmonary disease. *Cochrane Database Syst Rev*. 2003;(1) CD002990.

- Morisky DE, Green LW, et al. Concurrent and predictive validity of a self-reported measure of medication adherence. *Med Care* 1986;24(1):67–74. [PubMed: 3945130]
- Mosen DM, Schmittiel J, et al. Is patient activation associated with outcomes of care for adults with chronic conditions? *J Ambul Care Manage* 2007;30(1):21–9. [PubMed: 17170635]
- National Advisory Mental Health Council. Health care reform for Americans with severe mental illness: report of the National Advisory Mental Health Council. *Am J Psychiatry* 1993;150:1447–1465. [PubMed: 8379547]
- Nelson DE, Holtzman D, et al. Reliability and validity of measures from the Behavioral Risk Factor Surveillance System (BRFSS). *Soz Praventivmed* 2001;46(Suppl 1):S3–42. [PubMed: 11851091]
- Parks, J.; Svendsen, D. *Morbidity and Mortality in People with Serious Mental Illness*. National Association of State Mental Health Program Directors; Alexandria, VA: 2006.
- Sokal J, M E, Dickerson FB, Kreyenbuhl J, Brown CH, Goldberg RW, Dixon LB. Comorbidity of medical illnesses among adults with serious mental illness who are receiving community psychiatric services. *J Nerv Ment Dis* 2004;192(6):421–7. [PubMed: 15167405]
- Stein AD, Lederman RI, et al. The Behavioral Risk Factor Surveillance System questionnaire: its reliability in a statewide sample. *Am J Public Health* 1993;83(12):1768–72. [PubMed: 8259816]
- Substance Abuse and Mental Health Services Administration. National Consensus Statement on Mental Health Recovery. 2009. 2006from <http://mentalhealth.samhsa.gov/publications/allpubs/sma05-4129/>
- Ware JE Jr, Kosinski M, et al. Comparison of methods for the scoring and statistical analysis of SF-36 health profile and summary measures: summary of results from the Medical Outcomes Study. *Med Care* 1995;33(4 Suppl):AS264–79. [PubMed: 7723455]
- Wells KB, Sherbourne C, et al. Impact of disseminating quality improvement programs for depression in managed primary care: a randomized controlled trial. *JAMA* 2000;283(2):212–20. [PubMed: 10634337]
- Wingood GM, DiClemente RJ. The ADAPT-ITT model: a novel method of adapting evidence-based HIV Interventions. *J Acquir Immune Defic Syndr* 2008;47(Suppl 1):S40–6. [PubMed: 18301133]



**Figure 1.**  
Study Flow Chart

**Table 1**  
**Baseline Characteristics**

variable	HARP (n=41)	Usual Care (n=39)	p value
<b>Race</b>			0.07
African American	30 (73.2%)	36 (92.3%)	
White	10 (24.4%)	3 (7.7%)	
Other	1 (2.4%)	0 (0%)	
<b>Gender</b>			0.58
Female	27 (65.9%)	29 (74.4%)	
Male	14 (34.1%)	10 (25.6%)	
<b>Age</b>	47.8+/-10.1	48.4+/-10.1	0.92
<b>Insurance</b>			0.62
No Insurance	9 (22.0%)	7 (17.9%)	
Medicare/Medicaid	30 (73.2%)	29 (74.4%)	
Private Insurance	2 (4.9%)	2 (5.1%)	
<b>Annual income</b>	\$10,620 (4560-14,400)	\$7476 (2400-9444)	0.20
<b>Mental Diagnosis</b>			
Schizophrenia	11 (26.8%)	12 (30.8%)	0.60
Bipolar Disorder	14 (34.1%)	12 (30.8%)	0.70
Major Depression	9 (22.0%)	12 (30.8%)	0.31
PTSD	7 (17.1%)	2 (5.1%)	0.11
<b>Medical Comorbidity</b>			
Hypertension	25 (60.9%)	25 (64.1%)	0.57
Arthritis	23 (56.1%)	16 (41.0%)	0.26
Asthma	10 (24.4%)	8 (20.5%)	0.82
Heart Disease	10 (24.4%)	8 (20.5%)	0.77

**6-Month Outcomes** **Table 2**

	HARP (n=41)	Usual Care (n=39)	p value	p value for group*time interaction
<b>Patient Activation (0-100)</b>				
Baseline	48.3 +/-11.5	47.6+/-12.3	0.96	
6-months	52.0+/-10.1	44.9+/-9.6	0.01	0.03
<b>One or More Primary Care Visit</b>				
Baseline	24 (58.5%)	23 (61.1%)	0.60	0.046
6-months	26 (68.4%)	14 (51.9%)	0.18	
<b>Moderate or Vigorous Physical Activity (minutes/week)</b>				
Baseline	150+/-236	154+/-194	0.88	0.40
6-months	191+/-278	152+249	0.14	
<b>Medication Adherence (lower score indicates better adherence)</b>				
Baseline	1.5+/-1.2	1.5+/-1.4	0.78	0.22
6-months	1.3+/-1.3	1.6+/-1.4	0.25	
<b>Physical Health Related Quality of Life (higher score indicates better health)</b>				
Baseline	36.9+/-10.3	37.0+/-12.5	0.98	0.41
6-months	42.9+/-14.2	40.0+/-13.7	0.27	
<b>Mental Health Related Quality of Life (higher score indicates better health)</b>				
baseline	33.3+/-9.13	33.9+/-9.3	0.80	0.96
6-months	36.8+/-10.0	37.0+/-11.8	0.95	