6921 Snowdon Ave.
El Cerrito, CA 94530
(800) 615-8744
OpenSourceWellness.org
EIN: 81-3440555

Research Summary
Community As Medicine

This document includes a summary of the current research of Open Source Wellness' Community As Medicine® model. It includes internal research conducted by Open Source Wellness as well as research completed through external partnerships with UCSF and Stanford University. An executive summary, giving the title of each paper and a brief summary, is below; full citations and abstracts start on page 3.

2026 - Community As Medicine: A Qualitative Study of How Group Health Coaching and Social Connection Improve Mental Well-Being in Older Adults

This qualitative analysis reports on ten semi-structured interviews conducted with older adult (65+) participants in Community As Medicine (CAM). Four interconnected themes emerged, explaining the impact of the CAM program: 1) Belonging and inclusion through trust and safety; 2) Personal accountability through relational accountability; 3) Self-efficacy through social learning and reciprocal support; 4) Agency through positive actions. Findings suggest that CAM supports mental well-being by creating conditions that help older adults overcome internalized ageism and feel connected, capable, and in control of their lives.

2025 - Community As Medicine: A Novel Approach to Improve Health Behaviors and Mental Well-Being for Vulnerable Populations

This paper presents the outcomes of OSW participants from 2022-2024 who were not part of the broader Recipe4Health partnership. Participants saw significant improvements in their health, including increases of .5 servings of fruits and vegetables per day and 21 minutes of exercise per week, as well as a 34% decrease in depression, 36% decrease in anxiety, and a 17% decrease in loneliness. Qualitative analyses identified central themes of belonging, meaningful communication, mutual support, and increased self-worth.

2025 - Frequency of Attendance to a Behavioral Intervention on Health-related Outcomes in a Multicomponent Food as Medicine Intervention

This paper examines the impact of attendance (comparable to dose in a prescription model) on outcomes, finding that a larger "dose" of Community As Medicine is associated with better outcomes, including greater improvements in depression, physical activity, diet, and even hemoglobin A1c (blood sugar).

2025 - Equitable Access to Lifestyle Medicine: FQHCs, YMCAs, Trauma-Informed Health Coaching, and "Community as Medicine

This paper advocates for implementing transdiagnostic, culturally- relevant, trauma-informed, and integrative treatment frameworks that address mental, social, and physical health in tandem. It demonstrates how the Community as Medicine model can bridge the divide between clinical settings such as Federally Qualified Health Centers (FQHCs) and community settings, such as YMCAs, improving accessibility for diverse groups.

2025 - Impact of a Multicomponent Food as Medicine Intervention on Behavioral and Mental Health Outcomes for Patients with and without Food Insecurity

While all participants experienced improvements in depression, anxiety, and loneliness, only patients with food insecurity experienced additional improvements in diet and exercise. Because food insecurity led to greater overall improvements in health, policymakers may want to expand eligibility criteria to include food insecurity as an independent qualifying condition for Food as Medicine programs.

2025 - Implementing Food as Medicine During COVID-19: Produce Prescriptions and Integrative Group Medical Visits in Federally Qualified Health Centers

Utilizing the RE-AIM implementation science framework, this paper describes the implementation of Food Prescriptions with an integrated GMV Behavioral Pharmacy program. Key drivers of success included: (1) support from county government leadership, (2) centralized coordination of the multi-sector partnership, and (3) a flexible approach responsive to organizational and COVID-related shifts. Program implementation informed statewide Medicaid policy changes.

2025 - Food as Medicine, Community as Medicine: Mental health effects of a social care intervention

Evaluated mental health outcomes for patients receiving produce prescriptions and the Community as Medicine model at 5 low-income clinics from 2020-2023. Patients saw significant decreases in depression, anxiety, and loneliness if they received both interventions; food farmacy only patients saw improvements in depression and anxiety in certain populations.

2024 - The Effectiveness of Recipe4Health: A Quasi-Experimental Evaluation

Evaluated overall outcomes of the Recipe4Health program, a pairing of a Food Farmacy intervention and Open Source Wellness' Community As Medicine program. Participants who received both interventions saw significant improvements in diet, exercise, depression, anxiety, loneliness, and overall healthy days. Participants who received food alone saw significant improvements in anxiety, loneliness and overall healthy days. Participants receiving both interventions also saw improvements in food security, whereas those who received food only did not significantly improve food security.

2023 - Addressing food insecurity and chronic conditions in community health centres: Protocol of a quasi-experimental evaluation of Recipe4Health

The protocol paper for the evaluation of the effectiveness of Recipe4Health's paired intervention of Food Farmacy and Open Source Wellness' Community as Medicine model.

2019 - Group Medical Visits 2.0: The Open Source Wellness Behavioral Pharmacy Model

Initial evaluation of Open Source Wellness' Community as Medicine model in a single low-income clinic. Participants significantly improved their diet, exercise, depression, and blood pressure.

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Duplantier, S. C., Hayes, M. G., Sanchez-Zaragoza, N., Londoño, A. I., Hamilton, E., Markle, E. A., & Emmert-Aronson, B. O. (2026). Community as Medicine: A Qualitative Study of How Group Health Coaching and Social Connection Improve Mental Well-Being in Older Adults. *Healthcare*, *14*(4). https://doi.org/10.3390/healthcare14040510

Abstract:

Background/Objectives. Older adults in under-resourced communities experience high levels of social isolation, chronic illness, and reduced access to healthcare, which can undermine mental well-being. Open Source Wellness's Community As Medicine. (CAM) program is an evidence-based, community-delivered, clinically integrated program that combines trauma-informed, culturally-relevant, experiential group health coaching with social connection to improve mental and physical well-being. This qualitative study, conducted in early 2025, examined how participation in CAM supports mental wellbeing among older adults (age 65+) in under-resourced communities who are managing chronic physical and mental health challenges. **Methods.** Semi-structured interviews were conducted with participants who completed CAM. Transcripts were analyzed using reflexive thematic analysis to explore relational and experiential processes associated with improved well-being. **Findings.** Participants entered CAM with internalized ageist beliefs and low expectations for personal change. As they engaged in new behaviors, experienced successes, and observed similar progress among peers, they gained motivation, confidence, and a sense of control. Four interconnected themes appear to explain the mechanisms through which CAM supports mental well-being: (1) belonging and inclusion through trust and safety; (2) personal accountability through relational accountability; (3) self-efficacy through social learning and reciprocal support; and (4) agency through positive actions. **Conclusions.** Findings suggest that CAM supports mental well-being by creating conditions that help older adults overcome internalized ageism and feel connected, capable, and in control of their lives. These results identify actionable strategies that community organizations and health systems can adapt to support mental well-being for older adults in under-resourced communities.

Duplantier, S. C., Barach, R., St. John, S., Emmert-Aronson, B., & Markle, E. A. (2025). Equitable Access to Lifestyle Medicine: FQHCs, YMCAs, Trauma-Informed Health Coaching, and "Community as Medicine." *American Journal of Lifestyle Medicine, 15598276251325799.* *https://doi.org/10.1177/15598276251325799*

Abstract:

Without intentional and collaborative input from stakeholders and members of the communities we serve, Lifestyle Medicine (LM) is at risk of evolving in ways that are inapplicable and even alienating to diverse and underserved populations. To mitigate this risk, this paper advocates for implementing transdiagnostic, culturally- relevant, trauma-informed, and integrative treatment frameworks that address mental, social, and physical health in tandem. It demonstrates how the

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Community as Medicine model can bridge the divide between clinical settings such as Federally Qualified Health Centers (FQHCs) and community settings, such as YMCAs, improving accessibility for diverse groups. It also shows how emerging professional identities - exemplified by health coaches - can be cultivated to expand the reach of care while simultaneously opening pathways to employment. By centering inclusivity, cultural affirmation, and interprofessional collaboration, LM can more effectively meet the needs of vulnerable communities and enhance overall public health outcomes.

Radtke, M. D., Xiao, L., Chen, W., Chen, S., Emmert-Aronson, B. O., Thompson-Lastad, A., Markle, E., Rosas, L. G., & Tester, J. (2025). Frequency of Attendance to a Behavioral Intervention on Health-related Outcomes in a Multicomponent Food as Medicine Intervention. *Journal of Nutrition Education and Behavior*, S1499404625003136. https://doi.org/10.1016/j.jneb.2025.05.197

Abstract:

Objective: Determine whether the frequency of attendance to Recipe4Health was associated with improvements in health-related outcomes.

Design: Secondary analysis of the Recipe4Health quasi-experimental study.

Setting: Federally Qualified Health Centers in Alameda County, California.

Participants: Patients with nutrition-related chronic conditions and/or food insecurity.

Intervention: Sixteen weekly produce deliveries and behavioral intervention sessions.

Main Outcome Measures: Attendance was categorized by percentage: low (< 50%), moderate (50% to < 75%), and high (≥ 75%), and outcomes included vegetable/fruit intake, physical activity (PA), mental health, and clinical biomarkers.

Analysis: Prepost changes were assessed using repeated measures linear mixed-effects models, adjusting for baseline values.

Results: Of the 199 patients, approximately one-third had low (36%), moderate (30%), and high (34%) attendance. Patients with high attendance had greater improvements in vegetable/fruit intake (0.3 cups/d; $P = 0.03$), PA (24.4 min/wk; $P < 0.01$), and depression symptoms (Patient Health Questionnaire score: −1.1; $P < 0.01$) compared with patients with low attendance. Patients with moderate attendance had greater improvements in PA compared with low attendance (15.1 min/wk; $P = 0.03$). Patients with high attendance had greater improvements in physically unhealthy days compared with moderate attendance (−2.4 d/mo; $P < 0.01$). Patients with high attendance had significant improvements in hemoglobin A1c from baseline (−0.7%; $P = 0.02$).

Conclusions: Strategies to improve attendance should be prioritized in food as medicine interventions.

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Duplantier, S. C., Lee, J., Markle, E. A., & Emmert-Aronson, B. (2025). Community as Medicine: A Novel Approach to Improve Health Behaviors and Mental Well-Being for Vulnerable Populations. *American Journal of Lifestyle Medicine*, 15598276251321453. https://doi.org/10.1177/15598276251321453

Abstract:

Purpose: Evaluate a group-based, trauma-informed health coaching model based on Lifestyle Medicine pillars, delivered by community health coaches, to improve mental well-being and health behaviors in vulnerable populations.

Methods: This program evaluation analyzed quantitative longitudinal data with linear mixed models and qualitative data with reflexive thematic analysis. Participants (n=720) were low-income adults referred through Federally Qualified Health Centers (FQHCs), who participated in weekly 90-120 minute groups for three months. Data were collected via monthly surveys, including the PHQ-9, GAD-7, UCLA 3-item loneliness, exercise as a vital sign, a 2-item dietary screener, and three qualitative questions.

Results: Participants saw significant reductions in depression, anxiety, and isolation, and significant increases in daily servings of fruits and vegetables, and weekly minutes of exercise. The qualitative analysis identified four themes related to the drivers and reinforcers of positive behavior change and improved mental well-being.

Conclusions: Initial data suggest this model helps reduce depression, anxiety, and isolation, and promotes positive behavior change within populations most impacted by health inequity. Qualitative results identified drivers of positive change, such as creating a sense of belonging and mutual support. Future research should consider how to continue to scale this program to a variety of populations and across different settings.

Radtke, M. D., Tester, J. M., Xiao, L., Chen, W., Emmert-Aronson, B. O., Markle, E. A., Chen, S., & Rosas, L. G. (2025). Impact of a Multicomponent Food as Medicine Intervention on Behavioral and Mental Health Outcomes for Patients with and without Food Insecurity. *Nutrition*, *134*, 112734. https://doi.org/10.1016/j.nut.2025.112734

Abstract:

Background

Increasingly, food-as-medicine (FAM) programs are being implemented as a strategy for improving the health of patients. However, current policies limit nutrition resources to patients with specific chronic condition diagnoses and do not include food insecurity as a qualifying condition.

Objective

Explore the impact of Recipe4Health (R4H), a multicomponent FAM intervention, on behavioral and mental health outcomes in patients with and without food insecurity.

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Methods
Patients (n = 336) with diet-related chronic conditions and/or food insecurity were referred to R4H, which included 16-weekly produce deliveries and behavioral intervention sessions. Food security status was assessed using the U.S. Department of Agriculture 6-item survey. Outcomes included vegetable/fruit intake, physical activity (PA) and mental health. Within- and between-group pre-post changes were assessed using repeated-measures linear mixed-effects models, adjusting for baseline.

Results
The majority of patients had one or more chronic conditions (96%) and identified as food insecure (62%). Patients with food insecurity experienced significant increases in daily servings of vegetables/fruit (+0.38 ± 0.15; $P = 0.01$) and minutes of moderate-to-vigorous PA per week (+28.94 ± 9.84; $P < 0.01$). Patients with food security did not experience significant increases in vegetables/fruit ($P = 0.09$) or PA ($P = 0.06$). Food-insecure and food-secure patients both experienced significant improvements in loneliness, anxiety, and depressive symptoms from baseline ($P < 0.01$ for all). Between-group differences were observed only for anxiety, where patients with food security experienced significant improvements in anxious symptoms compared to food-insecure patients (–1.24 [–2.33, –0.14]; $P = 0.03$).

Conclusion
Policymakers may consider expanding eligibility criteria to include food insecurity as an independent qualifying condition for FAM.

Thompson-Lastad, A., Ruvalcaba, D., Chen, W.-T., Espinosa, P. R., Chiu, D. T., Xiao, L., Rosas, L. G., & Chen, S. (2025). Implementing Food as Medicine During COVID-19: Produce Prescriptions and Integrative Group Medical Visits in Federally Qualified Health Centers. *Global Advances in Integrative Medicine and Health*, *14*, 27536130251316535. https://doi.org/10.1177/27536130251316535

Abstract:

Background
Food as Medicine is a rapidly developing area of health care in the United States, aimed at concurrently addressing nutrition-sensitive chronic conditions and food and nutrition insecurity. Recipe4Health (R4H) is a Food as Medicine program with an integrative health equity focus. It provides prescriptions for locally grown produce ('Food Farmacy') with or without integrative group medical visits, alongside training for clinic staff.

Objectives
To describe the initial implementation of R4H in four Federally Qualified Health Centers in Northern California, using a convergent mixed-methods approach.

Methods
We used the Reach, Effectiveness, Adoption, Implementation and Maintenance (RE-AIM) implementation science framework to assess the first two years of R4H (2020-2022). We draw from 40

interviews (26 partner organization staff, 14 patients) and program data on reach and adoption. Qualitative data were analyzed using codebook thematic analysis.

Results
Reach: From January 2020 to August 2022, 3255 patients were referred to the program; 1997 of those referred (61%) enrolled in the Food Farmacy only (*N* = 1681) or Food Farmacy + integrative group medical visits (*N* = 316). Participating patients included a wide range of ages (mean age 41.4, [SD 20]; 18% < 18 years old) and racial and ethnic backgrounds (3% American Indian or Alaska Native, 6% Asian or Pacific Islander, 19% Black, 57% Hispanic/Latine, 7% white). 69% were female; 43% primarily spoke Spanish. *Adoption*: 84% of trained clinic staff referred two or more patients to R4H. *Implementation*: Elements of successful implementation included: (1) support from county government leadership, (2) centralized coordination of the multi-sector partnership, and (3) a flexible approach responsive to organizational and COVID-related shifts. R4H implementation informed statewide Medicaid policy changes. *Maintenance*: To date, all four clinics continue to participate in R4H.

Conclusion
Centralized implementation, training, and administration of Food as Medicine programs can strengthen community health centers' capacities to concurrently address chronic conditions and food insecurity. Multi-sector partnerships can support Food as Medicine program sustainability.

Thompson-Lastad, A., Chiu, D. T., Ruvalcaba, D., Chen, W.-T., Tester, J., Xiao, L., Emmert-Aronson, B. O., Chen, S., & Rosas, L. G. (2025). Food as medicine, community as medicine: Mental health effects of a social care intervention. *Health Services Research*, e14431. https://doi.org/10.1111/1475-6773.14431

Abstract:

Objective
To assess mental health related outcomes of Recipe4Health, a multisectoral social care partnership implementing produce prescriptions with or without group medical visits (GMVs).

Study Setting and Design
Recipe4Health was implemented at five community health centers from 2020 to 2023. Primary care teams referred patients with food insecurity and/or nutrition-sensitive chronic conditions (e.g., diabetes, depression) to 16 weeks of Food Farmacy (produce prescriptions) with the option of GMV participation. We used a convergent mixed-methods design including survey and interview data.

Data Sources and Analytic Sample
We conducted (1) participant surveys pre- and post-intervention and (2) semi-structured interviews with Recipe4Health participants and partner organization staff. Linear mixed effects models examined changes in mental health and related outcomes. Interviews were analyzed using codebook thematic analysis.

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Principal Findings
Program participants were middle-aged, primarily women, and from diverse racial/ethnic backgrounds (majority Latine and Black). At baseline, moderate or severe depression and/or anxiety symptoms were reported by 77/188 (41%) of Food Farmacy-only participants, and 113/284 (40%) of Food Farmacy +GMV participants. Among Food Farmacy-only participants, post-intervention depression and anxiety symptoms significantly improved only among those who did not have baseline depression/anxiety (PHQ9: −1.7 [95% CI: −2.8, −0.6]; GAD7: −1.8 [95% CI: −2.9, −0.8]). Among Food Farmacy +GMV participants, mental health symptoms improved regardless of baseline mental health; among those with baseline depression/anxiety: PHQ9: −2.4 (95% CI: −3.6, −1.2); GAD7: −0.9 (95% CI: −2.0, 0.1); among those without: PHQ9: −2.2 (95% CI: −3.2, −1.2); GAD7: −2.2 (95% CI: −3.1, −1.2). Improvements in social needs (food insecurity, loneliness) and health-related behaviors (fruit/vegetable intake, physical activity) varied by intervention arm and baseline depression/anxiety symptom level. In interviews, staff and patients endorsed produce prescriptions for improving nutrition and food insecurity, and GMVs for increasing social support.

Conclusion
Social care interventions providing vegetables and fruit, with or without group medical visits, may concurrently address mental health symptoms and social needs.

Rosas, L. G., Chen, S., Xiao, L., Baiocchi, M., Ng, E., Benjamin O. Emmert-Aronson, Chen, W.-T., Thompson-Lastad, A., Martinez, E., Perez, J., Melendez, E., Markle, E., Radtke, M. D., & Tester, J. (2024). The Effectiveness of Recipe4Health: A Quasi-Experimental Evaluation. *American Journal of Preventive Medicine*. https://doi.org/10.1016/j.amepre.2024.10.020

Abstract:

Introduction
Food as Medicine is increasingly recognized as an important strategy for addressing the related challenges of food insecurity and nutrition-related chronic conditions. Food as Medicine refers to integration of food-based nutrition interventions into healthcare to prevent and treat disease. However, there is limited evidence to understand the effectiveness of Food as Medicine.

Methods
Recipe4Health (R4H), a comprehensive Food as Medicine program, was implemented in 4 Federally Qualified Health Centers in California for patients with food insecurity and/or nutrition-related chronic conditions. Patients were referred by a healthcare provider to a "Food Farmacy" (16 weekly produce home deliveries) alone or in combination with a "Behavioral Pharmacy" (16 weekly group visits). A quasi-experimental study with pre/post surveys (4 months) and propensity score matched controls for Electronic Health Record outcomes over 12 months was conducted. Participants were 2,643 R4H patients and 2,643 controls identified from 1/2020 to 12/2022; data were analyzed from 2023 to 2024.

Results
There was a significant increase in produce consumption from baseline to 4 months (0.41 servings/day [0.11, 0.72], *p*=0.007) in the Food Farmacy in combination with Behavioral Pharmacy. Compared to controls, there were improvements in non-HDL cholesterol for the Food Farmacy alone (–17.1 mg/dL [–26.9, –7.2], *p*<0.001) and in combination with Behavioral Pharmacy (–17 mg/dL [–28.3, –5.8], *p*=0.003) at 12 months. Compared to controls, HbA1c significantly decreased in the Food Farmacy alone at 12 months (–0.37%, 95% CI [–0.65, –0.08]; *p*=0.01), but not the Food Farmacy with Behavioral Pharmacy.

Conclusions
R4H resulted in improvements in diet and multiple clinical health outcomes, such as non-HDL cholesterol and HbA1c.

Rosas, L. G., Chen, S., Xiao, L., Emmert-Aronson, B. O., Chen, W., Ng, E., Martinez, E., Baiocchi, M., Thompson-Lastad, A., Markle, E. A., Tester, J. (2023). Addressing food insecurity and chronic conditions in community health centres: Protocol of a quasi-experimental evaluation of Recipe4Health. *BMJ Open, 13*(4), e068585. https://doi.org/10.1136/bmjopen-2022-068585

Abstract:

Introduction Chronic conditions, such as diabetes, obesity, heart disease and depression, are highly prevalent and frequently co-occur with food insecurity in communities served by community health centres in the USA. Community health centres are increasingly implementing 'Food as Medicine' programmes to address the dual challenge of chronic conditions and food insecurity, yet they have been infrequently evaluated.

Methods and analysis The goal of this quasi-experimental study was to evaluate the effectiveness of Recipe4Health, a 'Food as Medicine' programme. Recipe4Health includes two components: (1) a 'Food Farmacy' that includes 16 weekly deliveries of produce and (2) a 'Behavioural Pharmacy' which is a group medical visit. We will use mixed models to compare pre/post changes among participants who receive the Food Farmacy alone (n=250) and those who receive the Food Farmacy and Behavioural Pharmacy (n=140). The primary outcome, fruit and vegetable consumption, and secondary outcomes (eg, food security status, physical activity, depressive symptoms) will be collected via survey. We will also use electronic health record (EHR) data on laboratory values, prescriptions and healthcare usage. Propensity score matching will be used to compare Recipe4Health participants to a control group of patients in clinics where Recipe4Health has not been implemented for EHR-derived outcomes. Data from surveys, EHR, group visit attendance and produce delivery is linked with a common identifier (medical record number) and then deidentified for analysis with use of an assigned unique study ID. This study will provide important preliminary evidence on the effectiveness of primary care-based strategies to address food insecurity and chronic conditions.

Ethics and dissemination This study was approved by the Stanford University Institutional Review Board (reference protocol ID 57239). Appropriate study result dissemination will be determined in partnership with the Community Advisory Board.

Emmert-Aronson, B. O., Grill, K. B., Trivedi, Z., Markle, E. A., Chen, S. (2019). Group Medical Visits 2.0: The Open Source Wellness "Behavioral Pharmacy" model. *Journal of Complementary and Alternative Medicine, 25*(10), 1026-1034.

Abstract:

Objectives: The Open Source Wellness (OSW) model was designed to function as a behavioral pharmacy; an affordable, accessible delivery system for a universal experiential prescription: MOVE (physical activity), NOURISH (healthy meals), CONNECT (social support), and BE (stress reduction). This study evaluates the OSW model in a billable group medical visit (GMV) format in a federally qualified health center (FQHC).

Intervention: Patients with behaviorally mediated conditions, including cardiovascular disease, diabetes, and depression, as well as poor social determinants of health, such as food insecurity, were prescribed participation in the OSW program by their medical team. Groups met for 2 h each week for 16 weeks to complete 30 min of socially engaging physical activity, 5 min of mindfulness meditation, a 10-min interactive, didactic health lesson, a 5-min nutrition lesson, and 60 min of small-group coaching over a plant-based meal. Paraprofessional health coaches worked with participants in small groups to provide support and create accountability to goals. In addition, participants received a $10 voucher to Food Farmacy, which provided free produce.

Subjects: The sample consisted of 49 patients from the Hayward Wellness Center, an FQHC in Hayward, California. They were mostly women, 59.6%, and racially and ethnically diverse: 23.1% African American, 5.8% Asian, 26.9% Hispanic/Latino, 11.5% Pacific Islander, and 32.7% Caucasian. Participants averaged 59.1 years of age (SD = 10.6).

Outcome measures: Blood pressure and weight were recorded weekly. Demographic and acute care utilization data were drawn from the electronic medical record. Self-report questionnaires assessed diet, exercise, and mood on a monthly basis.

Methods and results: Longitudinal data were analyzed with linear mixed models. Participants (n = 49) demonstrated significant increases in daily servings of fruits and vegetables, $b = 0.31$, $p < 0.01$, and exercise, $b = 11.50$, $p < 0.01$, and significant reductions in body mass index, $b = -0.10$, $p = 0.05$. Acute care utilization decrease was not statistically significant, $b = -0.07$, $p = 0.14$. Depressed patients (n = 11) saw reductions in depression, $b = -1.72$, $p < 0.01$, and hypertensive patients (n = 24) saw reductions in systolic blood pressure, $b = -4.04$, $p < 0.01$, but not diastolic blood pressure, $b = 0.04$, $p = 0.95$.

Conclusions: This study demonstrates the effectiveness of the OSW behavioral pharmacy model within a GMV context; pathways for adaptation, spread/scale, and incorporation of this work as a component of the broader health ecosystem and national commitment to health equity are discussed.