

Design of and Outcomes in a Student-Run Free Mental Health Clinic Serving the Uninsured in East Harlem

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Abstract

Background

Safety-net clinics are an important source of low-cost or free mental healthcare to those with limited financial resources. Such clinics are often staffed by trainees in early stages of their career. Only limited data exists on best practices in treatment-implementation and on clinical outcomes attained in such clinics. The primary purpose of this article is to describe the design of a student-run free mental health clinic serving uninsured individuals in New York City's East Harlem neighborhood and to analyze the quality of services provided and the clinical outcomes attained.

Methods

The authors conducted a retrospective chart review of n=69 patients treated in the EHHOP Mental Health Clinic (E-MHC). Utilizing Health Effectiveness Data and Information Service metrics, they estimated the likelihoods of patients meeting metric quality criteria compared to those in other New York State (NYS) insurance groups. The authors derived linear mixed effect and logistic regression models to ascertain factors associated with clinical outcomes. Finally, the authors report on feedback provided by the patients collected via a customized survey.

Results

The clinical service performance of the E-MHC was non-inferior on most measures examined. The E-MHC underperformed NYS HMO clinics in the provision of acute-phase antidepressant medication management; the authors did not find any performance differences in continuation-phase antidepressant management. Additionally, the E-MHC outperformed NYS commercial and Medicaid plans on optimal provider contacts for depression and follow-up care after ED visit for alcohol or other drugs within 30 days. Factors associated with symptom improvement were number of treatment sessions and certain demographic and clinical variables. Patients provided highly positive feedback on the care they received.

Conclusions

SRFCs can provide quality care to vulnerable patients that leads to clinically meaningful reductions in psychiatric symptoms and is well-received by patients.

Background

A substantial proportion of those with psychiatric conditions do not receive adequate clinical care. A 2015 nationally representative survey found that 62% of adults with mental illness did not receive treatment and that health insurance status was a leading predictor of mental healthcare utilization [1].

From 1999-2010, a majority (64.0%) of uninsured individuals with mental illness reported difficulty accessing care due to costs compared to 18.2% of those with public health insurance and 30.3% of those with private insurance [2]. This challenge is compounded by the increased rates of un- or under-insurance among those with psychiatric conditions compared to those without [3]. The proportion of individuals who are uninsured is particularly high among immigrants who have not met legal residency requirements [4]. In New York City alone, at least 40% of the estimated 2.2 million immigrants lack health insurance [5]. As a result, utilization of mental healthcare is particularly low among these individuals [6–8].

Safety-net clinics affiliated with academic medical centers are an important source of free or low-cost care to those with limited financial resources. These clinics are often staffed by unpaid volunteers, many of whom are students and trainees in early stages of their careers. There are currently over 200 student-run free clinics (SRFCs) which, in total, provided 115,000 patient visits in 2014 [9]. Not yet able to establish their own independent practices, students gain hands-on, supervised clinical experience by providing care to individuals unable to afford treatment with established, more senior practitioners. Although these clinics provide valuable treatment services, ethical concerns remain about the quality of medical care rendered to those without insurance and other vulnerable groups [10]. These concerns include the possibility that SRFCs benefit the trainees, who are able to gain highly valued experience, at the expense of disadvantaged patient populations who have no or limited alternative options; because student-trainees are not as experienced and skilled as more advanced practitioners, there is potential risk that they provide lower-quality, perhaps even sub-standard, care to those they serve [11].

In light of these important ethical concerns, the possibility of SRFCs providing sub-standard care must be evaluated empirically. Especially because such clinics most often serve highly vulnerable individuals, those working in SRFCs should evaluate the quality of the services they provide against accepted guidelines using empirically derived metrics. Data from two California clinics suggest that SRFCs can effectively identify depressive disorders and that those who received treatment had improvements in symptom severity from baseline [12]. A study from the Yale-affiliated HAVEN clinic found that students could be trained to provide psychoeducation and lay counseling to depressed patients that led to improvement in symptom severity [13]. Our clinic has reported preliminary evidence that an SRFC could provide clinical services for depressed patients that were as good as or superior to those rendered to patients enrolled in public health insurance programs [14]. However, a later report [15] documented lower rates of effective acute- and continuation-phase antidepressant treatment. While a follow-up study [16] indicated that on-site antidepressant dispensing may improve adherence rates, it is not known if this led to overall improvements in the number of patients meeting criteria for effective acute- and continuation-phase treatment long-term. Furthermore, it has yet to be determined whether SRFCs can provide quality care on the many other relevant clinical performance metrics beyond antidepressant treatment. A recent report [17] demonstrated that transitioning an SRFC to a telepsychiatry treatment-delivery platform during the onset of the COVID-19 pandemic was positively received by patients, but the investigators did not evaluate the clinic's comparative performance. Finally, no studies to date have reported the long-term clinical outcomes among patients treated in these clinics.

For these reasons, we sought to investigate the comparative performance of our SRFC in the provision of mental healthcare services and the longitudinal outcomes of patients treated in our clinic. With this aim in mind, we had the following goals: (1) evaluate our clinic's performance on behavioral healthcare service measures compared to clinics serving insured patients; (2) assess the extent to which patient's depressive and anxious symptoms changed over time and the factors associated with those changes; and (3) ascertain patients' feedback on the clinical care provided they received. With this data, we generate more comprehensive information on the psychiatric conditions treated in SRFCs, the comparative quality of clinical services provided for these conditions, the clinical outcomes that resulted, and patients' perceptions of their own treatments and outcomes.

Methods

Setting

The East Harlem Health Outreach Partnership (EHHOP) is a student-run and faculty-supervised clinic affiliated with the Icahn School of Medicine at Mount Sinai in New York, NY. Established in 2004, EHHOP provides free primary care to East Harlem adults (22 years and older) who are unable to obtain health insurance, most often because they have not met legal residency requirements. In 2018, 12% of East Harlem adults reported not having insurance [18], and a 2017 study estimated that there were at least 14,000 immigrants living in East Harlem who did not meet residency requirements [19]. Compared to most other NYC neighborhoods, East Harlem has higher rates of unemployment, violent crime, and premature death and a rate of psychiatric hospitalizations that is three times the NYC average [18]. Demographically, 50% of East Harlem residents identify as Hispanic and 30% as black [18].

Approach to the evaluation and treatment of psychiatric disorders

The EHHOP Mental Health Clinic (E-MHC) is a co-habiting clinic that accept patients who receive primary care at the main medical clinic of EHHOP. Interdisciplinary management is key to its success, as student clinicians in the primary care clinic and E-MHC co-manage patients with a high prevalence of complex medical disease and psychiatric illness.

At initial intake to EHHOP and at least once annually, patients are screened for depressive and anxiety disorders using the Patient Health Questionnaire-9 (PHQ-9) [20] and the Generalized Anxiety Disorder-7 Scale (GAD-7) [21], respectively. Patients with positive screening results on either measure or who otherwise express mental health concerns are referred to the E-MHC for further evaluation and treatment as necessary; those who do not wish to receive care in the E-MHC are sometimes managed by the EHHOP primary care clinic. Clinical services provided to E-MHC patients include psychiatric assessment, medication management, non-specific supportive counseling, and individual psychotherapy conducted by supervised medical student trainees. New patients are seen at least once monthly for medication management and more frequently if they are receiving psychotherapeutic interventions. After stabilization, a minority of patients are transitioned to bi-monthly or quarterly follow-up visits.

Fourth-year psychiatric residents, volunteer psychiatrists, and supervising clinical psychologists oversee the services provided by second to fourth year medical students or MD-PhD students who have completed the first year of medical school. Following all E-MHC patient appointments, the student trainees present their patient to a supervising psychiatrist or fourth-year resident in psychiatry. Initial diagnoses are based upon unstructured interviews by the student, who then finalizes the diagnostic formulation with the supervising psychiatrist or resident. Supervisors review the patient's status, formulate a treatment plan with the student, and provide additional mentoring in outpatient psychiatry. After these discussions, both the student and the supervisor meet with the patient to answer questions, review the assessment and treatment plan, and ensure that there are no safety concerns.

Patients expressing suicidality at any time are given a more thorough risk assessment by the supervisor; if needed, patients are taken to a nearby emergency room for continued monitoring and stabilization. As needed, on-call psychiatry and medical faculty supervise trainees who triage phone calls; faculty provide necessary navigation of care and communication with emergency room and inpatient teams.

Psychotropic medications are prescribed under the supervising psychiatrist, and patients receive their medications with no out-of-pocket costs either at a Mount Sinai pharmacy or on-site immediately after their appointments [16]. Of note, there is a limited formulary of medications stratified by cost on a web-based application that providers consult when prescribing medications. In between the Saturdays on which the E-MHC is open, first and second year medical and graduate students manage the clinic's schedule and coordinate follow-up visit and appointment reminders for all patients.

Collection of socio-demographic and clinical variables

Age, race/ethnicity, and gender (male or female) were identified by review of patients' electronic medical records from January 1st, 2009 to March 1st, 2020. Psychiatric diagnoses were collected from the patient's charts and confirmed in provider notes; patients could have multiple diagnoses if they were concomitantly diagnosed or if different diagnoses were listed throughout the course of treatment. Psychiatric diagnoses collected included major depressive disorder, persistent depressive disorder, seasonal affective disorder, depression not otherwise specified (NOS), generalized anxiety disorder, panic disorder, social anxiety disorder, somatic symptom disorder, anxiety not otherwise specific (NOS), adjustment disorder, post-traumatic stress disorder (PTSD), borderline personality disorder, substance use disorders, and persistent complex bereavement disorder. For all statistical tests, major depressive disorder, depression NOS, persistent depressive disorder, seasonal affective disorder, and persistent complex bereavement disorder were combined into a single diagnostic group termed "depressive disorders." Similarly, generalized anxiety disorder, panic disorder, social anxiety disorder, and somatic symptom disorder were combined into a composite diagnostic category of "anxiety disorders." We also collected information about current and past sexual assault and intimate partner violence (SA/IPV) based upon review of provider notes.

Evaluation of clinical performance on behavioral healthcare service measures

We evaluated the quality of clinical care at the E-MHC using the Healthcare Effectiveness Data and Information Set (HEDIS) performance metrics established by the National Committee on Quality Assurance. Many previous studies of clinical care performance utilize the HEDIS metrics, as they are empirically derived and objectively defined measures with specific criteria designed to operationalize each aspect of healthcare performance [22]. We selected HEDIS behavioral healthcare metrics based upon those that were relevant to the clinical services provided by the E-MHC in the year 2019 and that could be calculated using the metric's definition and the availability of patient data. Based upon the available data, we were able to compare our performance on metrics related to optimal provider contacts for treatment of depressive disorders, receipt of effective acute- and continuation-phase antidepressant treatment, smoking cessation interventions, and follow-up care after ED visits for alcohol and other drug dependencies (AOD). We compared the proportions of E-MHC patients who did and did not meet the metric satisfaction criteria to the same proportions reported for various New York State (NYS) managed care groups collected from published reports by the NYS Department of Health [23–25]. For the effective antidepressant medication management acute- and continuation-phase metrics, we also included our previously published data [15] in the comparisons to determine if the E-MHC's performance improved over time. Due to the small sample size in our study and the unbalanced groups, Fisher exact tests were used to quantify the likelihood of a patient having met the specific metric criteria between the E-MHC 2019 data and each of the additional comparator groups. Results are reported as odds ratios with 95% confidence intervals (CIs) and were considered significant if $p < 0.05$.

Assessing the extent to which depressive and anxious symptoms improve over time

We longitudinally assessed depressive and anxious symptoms using the PHQ-9 and GAD-7, respectively, which were available from patients' charts as part of routine care and symptom monitoring in the clinic. We first defined baseline symptom scores as either the score upon referral to the E-MHC or the score(s) reported at the initial assessment visit. Patients who had neither and had no scores reported within the first month of treatment were excluded from the analyses. End-point scores were defined as those achieved at the last recorded visit for the patient within the study period. For each symptom-based measure, we generated two models, each with differing aims:

(1) We first sought to evaluate the extent to which patients' depressive and anxious symptoms improved over the course of their treatment in the E-MHC. Linear mixed effects (LME) models were derived to ascertain whether the number of treatment sessions in the E-MHC was associated with symptom improvement, along with factors that may affect improvements over time. In the exploratory analyses, initial models were built with PHQ-9 or GAD-7 score as the dependent variable with session number as the fixed effect and patient ID as the random effect, accounting for the many non-controlled factors specific to each patient. Subsequently, additional fixed effects were added (see below) and the resulting models were selected using a Bayesian Information Criterion (BIC) score, a measure of how much each model explained while also penalizing for overfitting [26].

(2) We generated logistic regression models to identify what factors, if any, were associated with the probability of a patient achieving a clinically significant improvement in symptoms at the endpoint time. “Clinically significant improvement” (CSI) was defined as a reduction in the magnitude of symptoms (separately on each measure) of at least 50% [26, 27]. Candidate logistic regression models were selected using all subsets regression with the *bestglm()* function of the *bestglm* package [28]. The model with the best BIC score was selected. Finally, we graphically illustrated model predictions using the *predict()* function in R.

For all models, we only included those who had at least mild PHQ-9/GAD-7 symptoms at baseline, defined as a score of 5 or greater for both scales [20, 21]. Potential predictor variables tested included age, gender, baseline PHQ-9 score, baseline GAD-7 score, whether the patient had more than one psychiatric diagnosis, the number of psychiatric diagnoses at baseline, the number of visits in the E-MHC, and whether the patient was listed as having (Y/N) depression, anxiety, adjustment disorder, alcohol use disorder, post-traumatic stress disorder, and/or intimate partner violence.

Evaluation of Patients Feedback

We created a custom *Patient Feedback Survey* based upon frequently asked questions in the research literature on scales measuring patient satisfaction with mental health services [29]. All questions were asked on a 5-point scale with possible answers of “Strongly Disagree,” “Disagree,” “Neutral,” “Agree,” and “Strongly Agree.” All feedback surveys were collected at the end of patient visits, and some patients completed the survey more than once over the course of their overall treatment in the E-MHC. Copies of the survey in both English and Spanish are provided in [Supplementary File 1](#).

Results

Demographic and Clinical Characteristics of Patient Population:

Data were available from 69 unique patients, including 47 females and 22 males. The mean patient age was 46.8 (SD: 11.8) years old, and female patients tended to be older than male patients by about 8 years (mean female age: 49.3; mean male age: 41.4; Welch’s two-sample t-test: $t = 3.15$, $df = 58.6$, $p = 0.0026$). Two (2.9%) patients were Afro-Caribbean and the remaining (97.1%) were Hispanic (**Table 1**). All patients had a depressive, anxiety, trauma-based, substance use, and/or adjustment disorder. In order of decreasing frequency, the psychiatric disorders diagnosed among our patients were: depressive disorder (62.3%, $n=43$), anxiety disorder (24.6%, $n=17$), post-traumatic stress disorder (PTSD) (24.6%, $n=17$), alcohol use disorder (20.3%, $n=14$), adjustment disorder (14.5%, $n=10$), and borderline personality disorder (2.90%, $n=2$). The full breakdown of all psychiatric disorders is shown in **Table 1**. Consistent with extant data on the frequent comorbidity among psychiatric disorders [30], about half (49.3%, $n=34$) of patients had multiple psychiatric conditions: 27 (39.1%) had two conditions, 5 (7.3%) had three, and 2 (2.9%) had four or more diagnoses listed in their charts. Finally, 8 (11.6%) patients had a history of intimate partner violence (IPV).

Evaluation of Mental Healthcare Service Performance in the E-MHC:

We next sought to evaluate the quality of the outpatient psychiatric services provided to these patients by our clinic.

Depression Care: Optimal Provider Contact and Effective Management with Antidepressants

The National Committee on Quality Assurance (NCQA) defines the “optimal provider contact” for new cases of depression as those patients who receive at least three follow-up visits within the first 12 weeks of receiving a diagnosis of a depressive disorder. There were 10 new E-MHC patients with a depressive disorder diagnosis in 2019, 8 (80%) of whom met the criteria for optimal contact levels. Comparisons to the proportion of patients receiving optimal provider contacts in overall NYS commercial plans and NYS Medicaid indicated that the E-MHC outperformed on this measure in both comparisons (**Fig.1**). E-MHC patients had 13.7-times higher odds (95% CI: 2.7-132.9; $p = 0.00020$) of receiving optimal provider contacts than did those in NYS commercial plans and 9.9-times higher odds (95% CI: 2.0-96.1; $p = 0.0012$) than those with NYS Medicaid. We also found suggestive evidence that depressed E-MHC patients in 2019 were more likely to receive optimal provider contacts than they were during an earlier time period in the clinic [14] (80% versus 45%; OR = 4.7; 95% CI: 0.8 – 53.3; $p = 0.074$), indicating that the clinic may have improved over time on this important outcome.

We then assessed the 2019 performance of the E-MHC on the metrics “effective acute- and continuation-phase antidepressant treatment”. We found that the proportion of depressed patients satisfying criteria for having received effective acute-phase antidepressant treatment was lower in the E-MHC than in patients served by NYS HMO programs (45% versus 70%; OR = 0.35, 95% CI: 0.13 – 0.93; $p = 0.025$); suggestive evidence supported a similar pattern compared to NYS PPO programs (45% versus 68%; OR = 0.39, 95% CI: 0.14 – 1.02; $p = 0.051$) (**Fig.1**). We did not detect differences in the likelihood that E-MHC receive effective acute-phase antidepressant treatment compared those served by NYS Medicaid. In the case of effective *continuation*-phase antidepressant treatment, the E-MHC did not differ from NYS HMOs, PPOs, or Medicaid (**Fig.1**).

Smoking Cessation

Few patients in the E-MHC were documented as current smokers ($n = 5$). Across the three HEDIS performance metrics of (1) “advising smokers and tobacco users to quit,” (2) “discussing cessation medications”, and (3) “discussion cessation strategies”, we did not find evidence that the E-MHC performed differently than NYS HMO, PPO, and Medicaid programs (**Fig.1**).

Alcohol and Other Drug Dependency-Related Clinical Care Services

Rates of follow-up care within 7 and 30 days after an ER visit for alcohol and other drug dependencies for E-MHC patients ($n=5$) were 20% and 60%, respectively, while the corresponding rates among Medicaid patients were 13% and 19%, 10% and 13% among PPOs, and 14% and 19% among HMOs. We did not detect pairwise differences in the likelihood of receiving 7-day follow-up between the E-MHC and

Medicaid, PPOs, or HMOs (**Fig.1**). The likelihood of appropriate follow-up within 30 days of ER visit, however, was higher in the E-MHC compared to rates in all three comparison groups: Medicaid (OR = 6.39; 95% CI: 0.73 – 76.45; $p = 0.051$); PPOs (OR = 10.04; 95% CI: 1.15 – 120.29; $p = 0.018$); HMOs (OR = 6.39, 95% CI: 0.73 – 76.47; $p = 0.051$). (**Fig.1**).

Factors Associated with Clinical Outcomes:

Finally, we wished to model longitudinal change in depressive and anxious symptom severity among patients seen in our clinic and to identify whether the number of treatment sessions was associated with improvement symptoms. Across diagnoses, there were significant pre-post improvements in the magnitude of depressive and anxious symptoms (see **Supplementary Figure 1**). We found that the session number predicted lower symptom severity over the course of treatment on both PHQ-9 and GAD-7, thus providing robust evidence of a treatment effect of sessions in the E-MHC. Furthermore, baseline PHQ-9, baseline GAD-7, and a diagnosis of a depressive disorder predicted higher depressive symptom severity throughout the treatment period (**Fig.2**). Longitudinal modeling of GAD-7 scores revealed a similar pattern, with baseline GAD-7 (but not baseline PHQ-9) and diagnosis of a depressive disorder predicting higher anxious symptom severity (**Fig.2**).

For the model of those factors associated with likelihood of achieving a clinically significant improvement in depressive symptom severity, we found that it was baseline GAD-7, and not baseline PHQ-9, as well as diagnosis of an anxiety disorder that were associated with lower likelihood of a clinically significant improvement (**Fig.3**). For clinically significant improvement in anxious symptoms, an initial model consisting of GAD-7 score at baseline had the best performance. However, upon inspecting the individual datapoints grouped by gender, we noticed that the effect of baseline GAD-7 score appeared to differ remarkably between male and female patients. A model that included an interaction term revealed that the effect of baseline anxious symptom severity varied by gender. Simulation data demonstrated little relationship between baseline GAD-7 score and probability of improvement in males, whereas a sigmoidal relationship was found between baseline GAD-7 and probability of improvement in females (**Fig.3**).

Patients Express Highly Positive Feedback to E-MHC Care

We finally set out to ascertain patients' feedback on the care they received in our clinic and self-reported perceptions of overall improvement in broad domains of psychosocial functioning. In sum, a total of 73 patient feedback surveys were collected. As shown in **Fig.4**, patients provided highly positive feedback on the care they received from their student providers (Part A). Results from Part B of the survey demonstrated that patients also perceived that they improved in broad dimensions of their mental health and psychosocial functioning (**Fig.4**). Overall, these results clearly show that the outpatient mental healthcare services rendered by student providers in the E-MHC are highly well-received by patients.

Discussion

In this study, we sought to describe the design of an outpatient psychiatry SRFC integrated within a comprehensive primary care clinic, the patient population treated, and various aspects of clinical care quality. We provide important data on the prevalence of common psychiatric disorders encountered in an outpatient setting serving uninsured immigrants in East Harlem. Upon evaluating the quality of service provided by the E-MHC in 2019, we found that patients were more likely to receive the optimal number of provider contacts following a diagnosis of a depressive disorder than were patients insured by NYS commercial plans and Medicaid. Additionally, we found suggestive evidence that patients were more likely to have received optimal provider contacts in the clinic in 2019 compared to the data reported from the previous EHHOP study, which covered the years 2004-2009 [14]. This is likely due to the fact that it was not until 2008 that a separate, outpatient mental health clinic was founded within EHHOP, along with the substantial expansion of the number and kinds of services provided since.

In terms of the proportions of patients receiving effective acute- and continuation-phase antidepressant treatment, we found evidence that E-MHC patients were less likely to have received effective acute-phase antidepressant medication treatment than were HMO patients; an identical finding almost reached statistical significance when comparing the E-MHC to PPOs. No differences were detected between the E-MHC and Medicaid. These results indicate only somewhat of an improvement over our previously reported findings [15] that spanned 2009-2016. Comparisons between the present data and that from the previous report [15], however, did not yield sufficient evidence that rates of antidepressant adherence have improved. Even though it was noted in a recent report [16] that on-site prescription dispensing improved adherence rates at the level of individual patient visits as well as overall percent adherence rates per patient, that study did not utilize the specific HEDIS metric criteria (84 days for acute-phase management and 180 days for continuation-phase management). With the present results in mind, it appears that larger sample sizes and/or additional interventions are needed to demonstrate improvement in our clinic over time.

This study is the first report performance metrics of an outpatient psychiatry SRFC on clinical services related to tobacco-smoking and alcohol abuse. Although limited by small sample size, we did not find evidence that the E-MHC differed from NYC PPO, HMO, and Medicaid in the rates of advising smokers to quit, discussion of cessation medications, and discussion of cessation strategies. The E-MHC outperformed NYS PPO, HMO, and Medicaid groups on appropriate follow-up visits after an alcohol- or other drug-related ED visits within 30 but not 7 days. These limited and preliminary results warrant expanded study in the E-MHC and other SRFCs.

The results from our performance analyses are complemented by longitudinal modeling of depressive and anxious symptom severity over time. Indeed, for both depressive and anxious symptoms, we found that the incident session number in the E-MHC predicted lower scores, directly suggesting an effect of treatment session in the clinic. In terms of the likelihood of patients attaining a clinically significant improvement in depressive symptoms, baseline anxiety symptoms and diagnosis of an anxiety disorder diagnosis both predicted lower odds. These findings may be due in part to the fact that co-morbid psychiatric diagnoses can decrease the likelihood of positive clinical responses in the treatment of

depressive conditions [31]. However, our analysis of clinically significant response in anxiety symptoms found a strong effect of higher baseline anxiety symptoms increasing the likelihood of a response in females but not males. To our knowledge, sex-specific modification of the effect of baseline symptom severity on likelihood of response has not been previously reported. These results suggest the possibility of a sex-specific effect of gender on the utility of baseline anxious symptom severity in predicting likelihood of overall treatment response; however, large, multi-site studies on diverse populations are needed to ascertain whether this is a generalizable phenomenon or idiosyncratic to the data analyzed herein.

Finally, results from feedback surveys demonstrate strongly that patients viewed the clinical services they received in the E-MHC positively. These findings are important, as little data exist on the perceived quality of services received from psychiatric SRFCs. Additionally, a substantial proportion of patients perceived that they had improved in broad domains of psychosocial functioning, and these data complement strictly symptom-based measures such as the PHQ-9 and GAD-7. Our results support the notion that SRFCs can provide outpatient psychiatric care that is well-received by patients.

The primary limitation of this study is its sample size. While the number of patients included in this study is comparable to many prior reports [e.g., 12, 13, 15] on SRFCs, larger and multi-site studies are needed to more robustly characterize the demographic and clinical profiles of low-resource patients served at SRFCs. Such studies are also needed to establish evidence-based best-practice guidelines for student training and the provision of behavioral health services in SRFCs. Furthermore, the structure of the E-MHC as part of an integrated system of clinics serving chronically ill patients had important effects on our sampling plan, and therefore, the generalizability of our findings. Here, the clinical population under study is not just particularly vulnerable due to lack of insurance and the associated psycho-social-economic difficulties, but also because of high rates of complex medical diseases. As such, the generalizability of the findings reported herein may be limited more to uninsured individuals with high medical comorbidities than to outpatient psychiatric patients overall. Despite these limitations, we believe this study is an important advancement in establishing empirical approaches to evaluating the clinical outcomes and treatment service quality in an SRFC serving vulnerable patients.

Declarations

Ethics Approval and Consent to Publish: This study was approved by the Institutional Review Board at the Icahn School of Medicine at Mount Sinai, #19-00277.

Consent for Publication: Not applicable.

Availability of Data and Materials: All primary data and analysis scripts (in R) are available from the corresponding author upon request.

Competing Interests: The authors declare that they have no conflicts of interest to report.

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Author Contributions: SKP, AS, JF, RAS, AA, YSM, VG, and CLK designed the study. SKP, AS, JF, RAS, and SS created or modified study questionnaires and measures. SKP, AS, JF, EM, RAS, SS, HK, BD, MA, JHA, VK, and DD collected data. SKP, AS, and EM analyzed the data. All study authors contributed to interpretation of the results. SKP and AS wrote the manuscript. All study authors reviewed the manuscript and made important revisions to its structure and content.

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Tables

Table 1 is available in the Supplementary Files section.

Figures

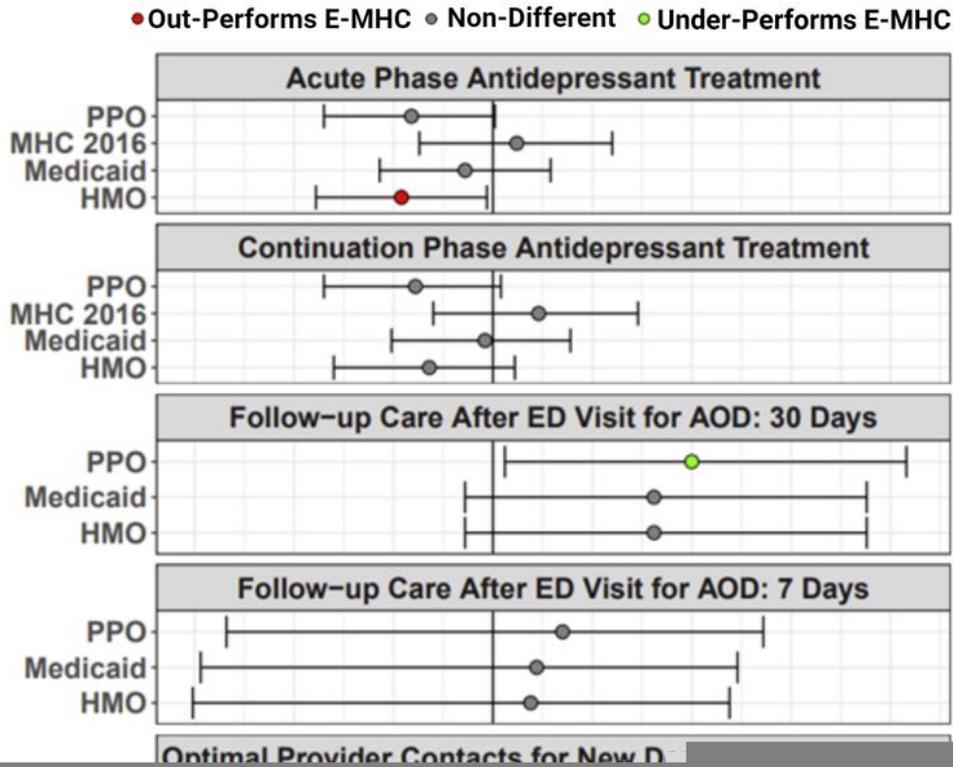


Figure 1

Performance quality in the provision of behavioral healthcare services by the E-MHC compared to various public and private New York State (NYS) insurance programs. Performance is operationalized as the odds ratio of a patient meeting criteria for a given performance metric compared to those in the insurance group indicated on the y-axis. Gray point-estimates of the log-transformed ORs indicate no evidence of a

difference, while red indicates that the E-MHC underperforms the group shown and green indicates that the E-MHC outperforms the group shown.

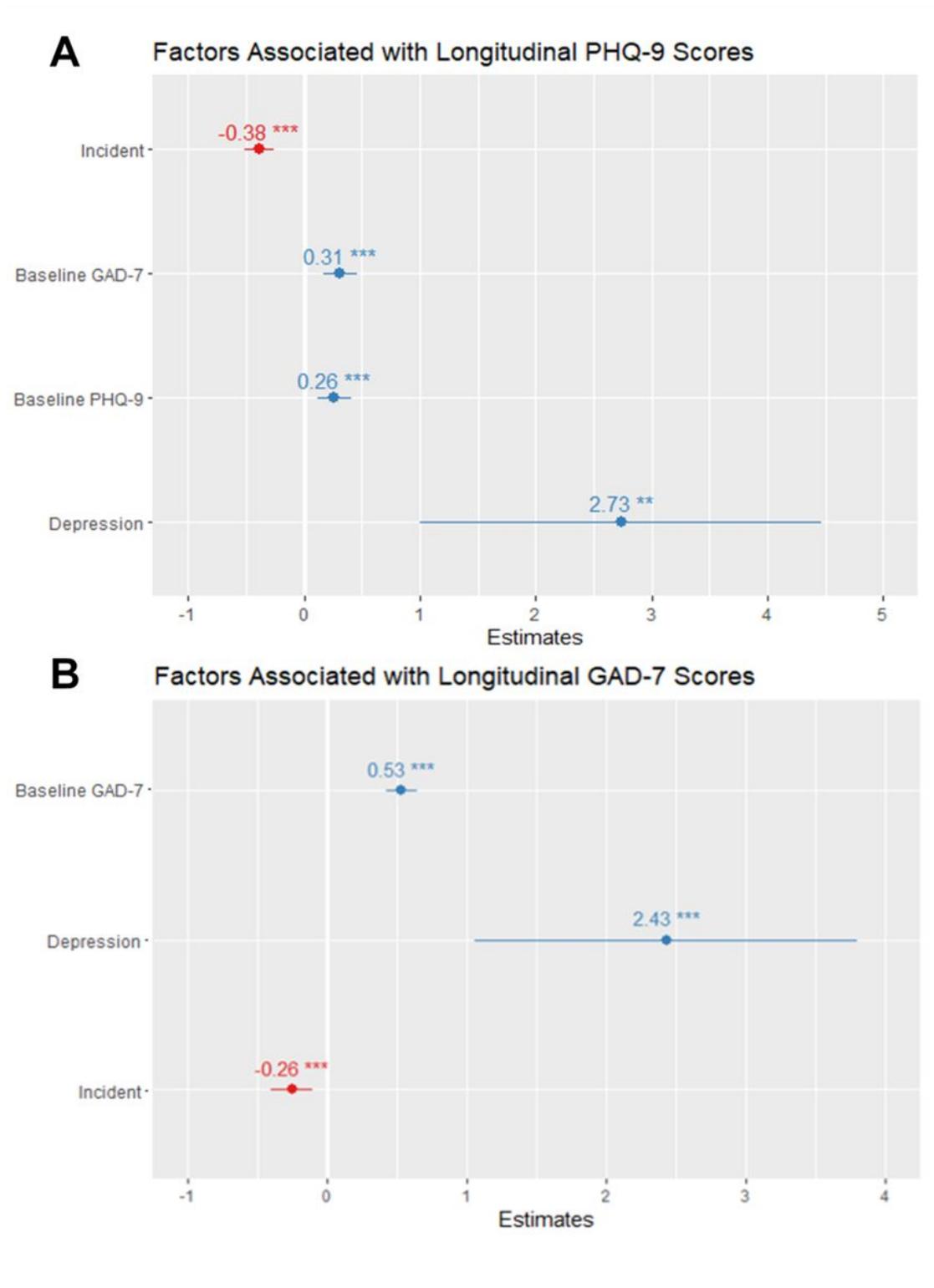


Figure 2

Modeling longitudinal change in depressive and anxious symptom severity over time. (A) Coefficients for the fixed effects in the LME model accounting for the change in PHQ-9 over time. Both baseline PHQ-9

and GAD-7 predict higher depressive symptom severity, as does a depressive disorder diagnosis. In contrast, incident session number predicts lower symptom severity. (B) Coefficients for the fixed effects in the LME model accounting for the change in GAD-7 over time. Baseline GAD-7 and a depressive disorder diagnosis predict worse anxious symptom severity while incident session predict lower anxious symptom severity.

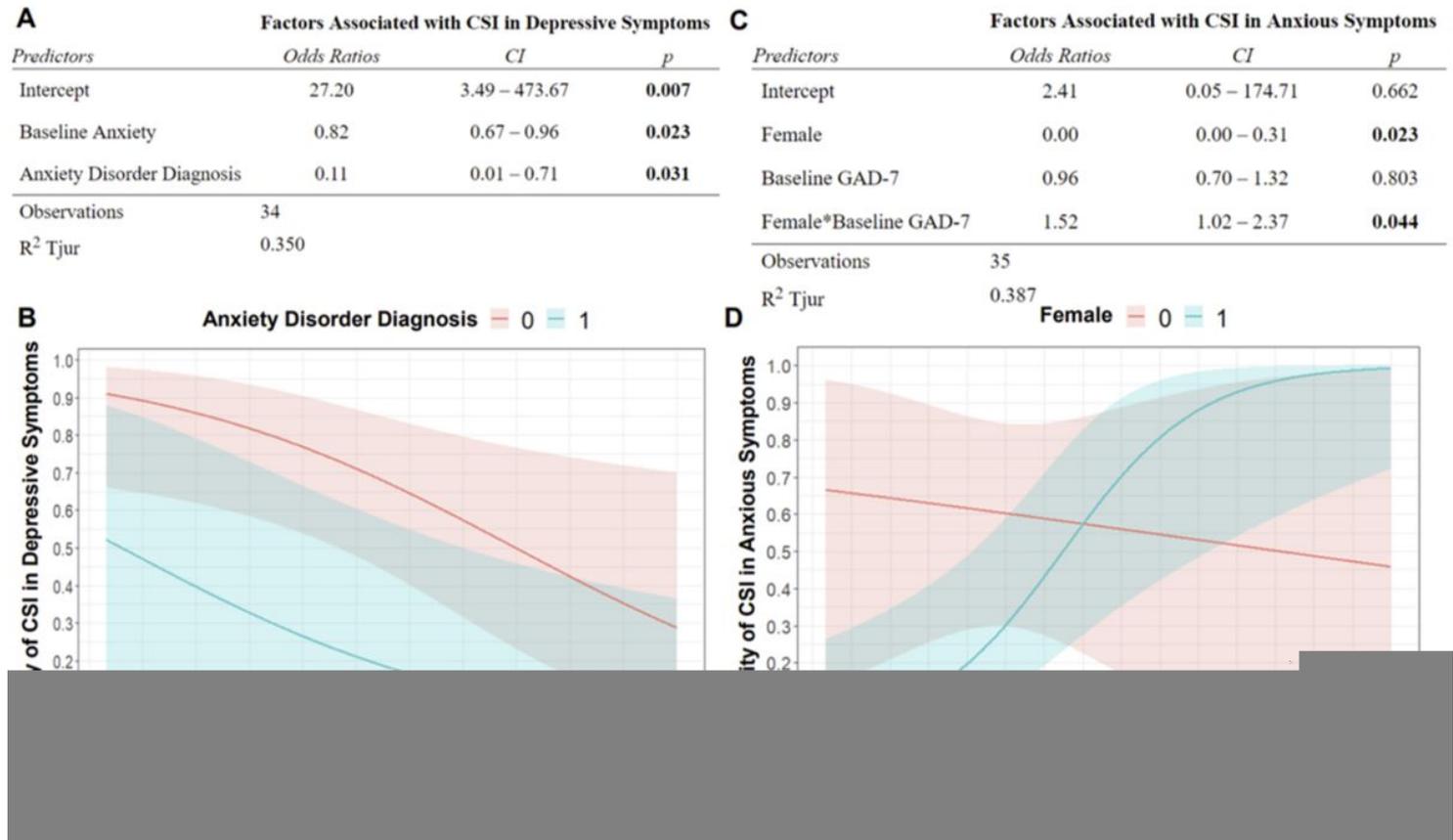


Figure 3

Logistic Regression modeling of likelihood of clinically significant improvement (CSI) in depressive and anxiety symptom scores. (A) Baseline GAD-7 score and diagnosis of an anxiety disorder predict lower odds of a clinically significant improvement in depression symptom severity. (B) Graphical illustration of the predicted impact of baseline GAD-7 and the presence versus absence of an anxiety disorder diagnosis based upon simulation data. (C) Interaction of female gender with baseline GAD-7 score in the likelihood of clinically significant improvement in anxiety. (D) There is little relationship between baseline score and likelihood of improvement in anxious symptoms for men, but a clear sigmoidal curve for female patients showing a higher predicted likelihood of improvement with increasing baseline GAD-7 score

Figure 4

Results from n = 73 surveys show that patients receiving care at an outpatient psychiatric SRFC provide highly positive feedback. (Top) In Part A of the *Patient Feedback Survey*, subjects were asked to rate various aspects of the provision of care by their student providers. Results show that the vast majority of patients either agreed or strongly disagreed that their student provider spent enough time with them, showed respect for what they had to say, explained things in an understandable way, and made them feel safe. (Bottom) In Part B of the *Patient Feedback Survey*, subjects were asked to self-report on their perceived improvement in broad domains of mental health and psychosocial functioning compared to their prior session. About half reported improvements across the various domains.

Supplementary Files

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- [SupplementaryFig1.jpeg](#)
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