Mental Health Services Act

Collaborative Statewide Early Psychosis Program Evaluation

Annual Innovation Report:

Summary Report of the Activities of the LHCN

Fiscal Year 2023-2024

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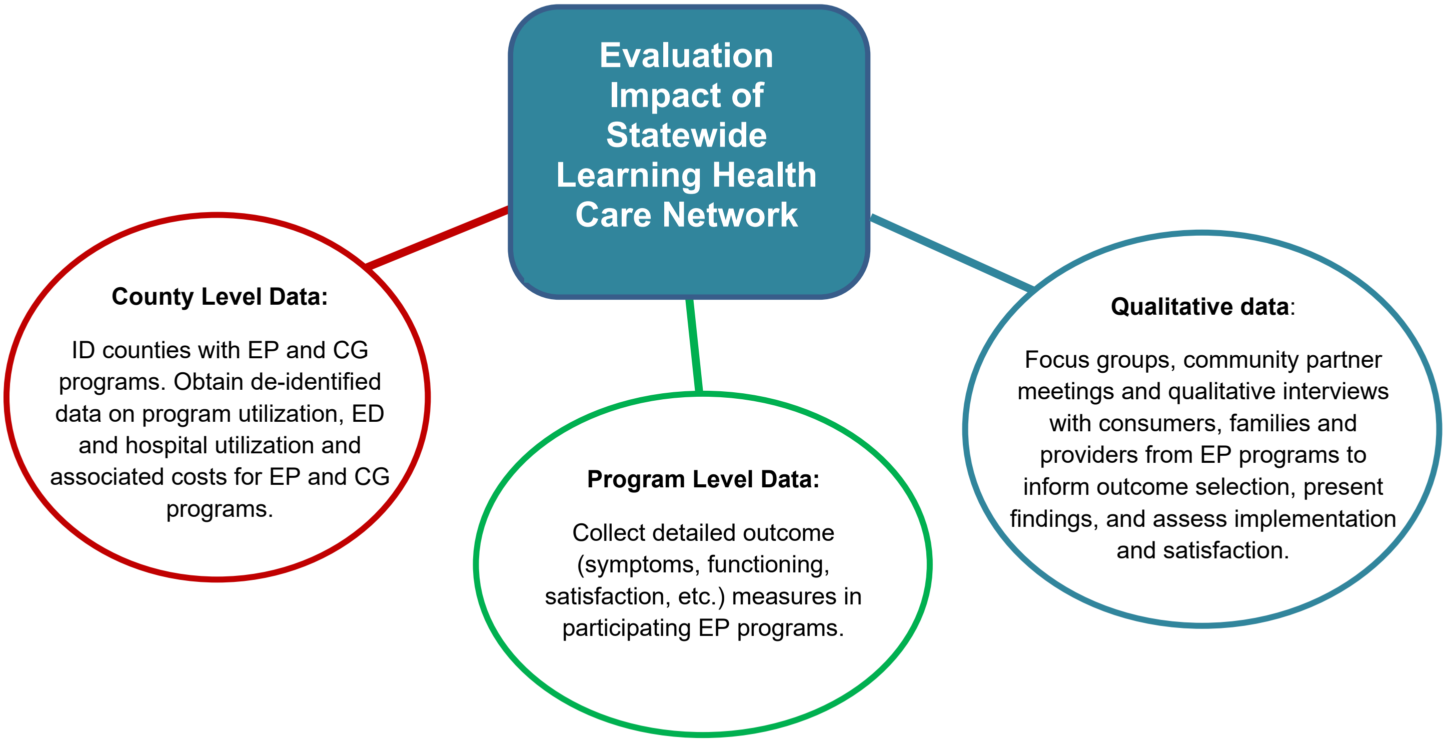
Table of Contents

Background

Multiple California counties in collaboration with the UC Davis Behavioral Health Center of Excellence received approval to use Innovation or other Prop 63 funds to develop infrastructure for a sustainable learning health care network (LHCN) for early psychosis (EP) programs. Of those counties with approved funding, the following counties have processed and executed contracts between their behavioral health services departments and UC Davis: San Diego, Solano, Sonoma, Los Angeles, Orange, Stanislaus, Napa, Lake, and the Multi-County Collaborative (MCC) which includes Nevada, Mono, and Colusa Counties. One Mind has also contributed $1.5 million in funding to support the project. This Innovation project seeks to demonstrate the utility of the network via a collaborative statewide evaluation to assess the impact of the network and these programs on the consumers and communities that they serve. This project, led by UC Davis in partnership with UC San Francisco, UC San Diego, University of Calgary and multiple California counties, will bring consumer-level data to the providers' fingertips for real-time sharing with consumers, and allow programs to learn from each other through a training and technical assistance collaborative. This Statewide EP Evaluation and LHCN propose to 1) increase the quality of mental health services, including measurable outcomes, and 2) introduce a mental health practice or approach that is new to the overall mental health system. The project must comply with the regulatory and funding guidelines for evaluation as stipulated by the applicable Mental Health Services Act (MHSA) funding regulations, contract deliverables, and best practices.

There are three components to the data collected for the LHCN: County Level, Program Level, and Qualitative data (Figure 1). The protocol for collecting each component has been reviewed by an Institutional Review Board (IRB) and approved before commencement of data collection. Further, aspects of the data design have been and continue to be shaped by the input of community partners, including mental health consumers, family members, and providers.

Figure 1. Three Components of the Evaluation Associated with the Statewide LHCN.



County Level Data:

ID counties with EP and CG programs. Obtain de-identified data on program utilization, ED and hospital utilization and associated costs for EP and CG programs.

Program Level Data:

Collect detailed outcome (symptoms, functioning, satisfaction, etc.) measures in participating EP programs.

Qualitative data:

Focus groups, community partner meetings and qualitative interviews with consumers, families and providers from EP programs to inform outcome selection, present findings, and assess implementation and satisfaction.

This project was approved for funding using Innovation Funds by the MHSOAC in December of 2018 and included Los Angeles, Solano, Orange, and San Diego counties. The California Early Psychosis Learning Health Care Network (LHCN) represents a unique partnership between the University of California, multiple California counties, and One Mind to build a network of California early psychosis (EP) programs. We were able to leverage this initial investment to obtain additional funding from the National Institutes of Health (NIH) in 2019, which enabled six university and two county early psychosis programs to join and also linked the California network to a national network of EP programs, including UCSF PATH, UCSD CARE, UCLA Aftercare & CAPPS, Stanford Inspire, San Mateo Felton BEAM UP/(re) MIND, UC Davis EDAPT and SacEDAPT programs. Since then, we have also had additional counties join EPI-CAL, including Napa, Stanislaus, Sonoma, Lake, Nevada, Mono, and Colusa. The overarching name of the project, which encompasses the LHCN and the NIH-funded components, is now “EPI-CAL.” In this report, we will refer to the LHCN only when describing components of the project that are specific to the LHCN evaluation (e.g., county data analysis).

The EPI-CAL team has made significant progress towards our goals outlined in the innovation proposal during the 23/24 fiscal year, which are summarized in the current report.

Executive Summary

The purpose of this document is to provide the EP LHCN Mental Health Services Act (MHSA) Annual Innovation Report to review EP LHCN goals accomplished during FY2023/2024. This report will include summaries and status updates on the infrastructure of the LHCN, steps taken towards implementation, and barriers that have been identified over the course of the last fiscal year. While the counties involved in the EP LHCN may be at different stages in the process, the overarching LHCN is moving forward as planned.

- We have held two LHCN Advisory Committee meetings in the last fiscal year, which was comprised of a county representative from each participating county, a clinical provider from each participating EP program, and consumers and family members who have been or are being served by the participating programs. We will continue to hold Advisory committee meetings on a bi-annual basis and summarize meetings activities in our deliverables and annual reports.
- As each new program joins the Learning Health Care Network, our team holds a synchronous EPI-CAL introductory meeting with all team members at participating programs to introduce the project in detail. At this introductory meeting, providers and staff are invited to complete baseline questionnaires that assess provider and program variables as these variables are hypothesized to influence the observed outcomes of clients in EP programs. We administer provider surveys that assess demographics, eHealth Readiness, Organizational Readiness for Change, Attitudes Toward Evidence Based Practice, Clinician Attitudes of Recovery and Stigma, Modified Practice Pattern Questionnaire, and Professional Quality Scale. This battery of questionnaires is termed the “baseline” surveys and have been designed to assess potential factors that could influence outcomes for EP consumers that are measured in the project. If new staff miss this initial introductory meeting, they are still able to complete these baseline surveys if they are interested.
- Since the EPI-CAL project began, our team has conducted a total of 31 fidelity assessments (this includes non-LHCN programs as well that are part of EPI-CAL through the training and technical assistance program). In the current report, we present aggregate results from fidelity assessments of EP programs in EPI-CAL, including data from both the CHRPS and FEPS. Amongst those where a full or formative assessment could be conducted, the mean FEPS-FS score was 3.86 out of 5. With the CHRPS, mean scores were slightly higher at 3.95 out of 5.
- In the LHCN proposal, we proposed to ask clients and providers to complete self-report questionnaires in the pre-implementation period of the project. To examine adoption of a new technology in the EP

program, we proposed to compare providers with respect to their reporting use of data to determine treatment choices at two timepoints, prior to Beehive implementation and after training in and using Beehive. Prior to Beehive implementation in each EP program, providers completed "pre-implementation" surveys. We are now currently at the stage of the project where we want to evaluate change in these same variables after Beehive implementation. To do this, the same set of surveys are administered to EP programs who have sufficiently implemented Beehive in their program. During the past fiscal year, we have administered post-implementation surveys to nine programs' staff that meet the criteria for post-implementation.

- As a first step to assessing the successful implementation of the LHCN in EP programs across California, we assess preliminary data on feasibility and acceptability of LHCN app in all EP programs. To do this, we used a previously defined benchmark of enrollment of at least 70% of eligible participants and 50% of their available family members across the network as enrolled to meet our criteria as feasible and acceptable. We compare actual enrollment against this benchmark and summarize the results in this report.
- In the current report, we describe a detailed statistical analysis plan for outcomes data collected via Beehive.
- In the current annual report, we provide a brief summary that focuses primarily on the data collected via Beehive, including client self-report data, data from the primary support person (PSP) for the client, and clinician-rated data. Our team has also begun to examine descriptive summaries of specific outcomes data from all EP programs, as well as preliminary analyses examining relationships between specific outcomes. Data is only reported for those users who opted into data sharing for research purposes with UC Davis. Many of the preliminary data summarized in the section have been prepared for conference abstracts for wider dissemination.
- We conducted an interim analysis of Beehive enrollment, consumer demographics, data sharing preferences, and survey completion. The observed rate of enrollment across the LHCN is 597 clients across all diagnoses or 436 clients with a diagnosis that indicates FEP. There are an additional 258 clients who have been registered by the clinic in Beehive, but who have not engaged with Beehive by completing the EULA or starting their surveys. We found that a large majority of service users (88%) opted in to sharing data for research purposes with UC Davis, and high completion rates of enrollment surveys (97% of service users have completed at least one service). We will shift our focus in the future to higher survey completion rates, as we know that while most consumers have completed some self-report surveys, not many have completed the full EPI-CAL bundle of surveys for each time point.
- Over the last fiscal year, we have made a number of changes and improvements to Beehive based on feedback from programs and community partners. We summarize these changes in the current report.
- In the past year, we continued implementation of the Beehive application in EPI-CAL/LHCN clinics, which has included extensive training and site-specific support. We have refined our training approach and have completed Beehive training in 17 participating EPI-CAL programs, with a total of 21 programs completing at least some of the core training series.
- As part of the EPI-CAL LHCN project, we conducted a series of qualitative interviews to explore provider and service user experiences of utilizing the Beehive platform and adopting measurement-based care in an early psychosis setting. Understanding the potential benefits and challenges to using the Beehive as part of care from the perspective of those that either deliver or receive it is critical to 1) evaluating the impact of utilizing Beehive in care, 2) understanding how Beehive may improve early psychosis care, with the goal of supporting the dissemination of positive practices across the network, and 3) Supporting efforts to refine the Beehive platform to further support positive practices from the perspective of those that delivery or receive care. Findings from these interviews are summarized in the

current report.

- During the last fiscal year, our team finalized our plan and timeline for working with counties to support infrastructure to access final round of county-level cost and utilization data for EP and CG programs. One goal of this analysis was to provide a preliminary demonstration of the proposed method for accessing data regarding EP programs and CG groups across California. The secondary goal was to analyze service utilization and costs associated with those services across counties.
- In the last fiscal year, we provided an updated analysis on the county-level data analysis. The results in this report summarize an analysis based on data provided by Los Angeles, Orange, and San Diego counties. We used administrative data to identify youth aged 12 to 25 years who (1) were enrolled in a specialized early psychosis (EP) program from January 2017 to July 2021, and (2) received a first diagnosis of psychosis within one year prior to enrollment. We identified a comparison group (CG) of youth with a first diagnosis of psychosis who received at least one outpatient service during the study period, also within one year of receiving their first diagnosis of psychosis. We summarize service use and cost for Medi-Cal covered outpatient and inpatient services over the first and second years following the first diagnosis of psychosis. We calculated the number of outpatient mental health visits and the number of inpatient psychiatric days. We also summarized the costs of outpatient and inpatient mental health services.
- During the last fiscal year, our team continued to hold meetings with the EP program managers and the county data analysts for each participating LHCN county to identify county-level available data and data transfer methods. We discussed services provided by the EP program, description of consumers served, staffing specifics and billings codes for each service. We also reviewed details of funding sources, staffing levels during certain time-periods and other types of services provided for specific types of consumers (i.e., foster care). We have discussed time-periods for which the LHCN team will request data, description of the consumers from EP programs and how similar consumers served elsewhere in the county will be identified, services provided by each program, other services provided in the county to the EP consumers (i.e., hospitalization, crisis stabilization and substance use treatment), and data transfer methods. Our research team has gathered all the information from each program/county, including each new LHCN county, and summarized it in a multicounty data table included in this report.
- Our team is working with counties and programs, as well as internally, to disseminate findings from the LHCN through multi-media work products. The first is by disseminating the draft summary report to all participating programs for review and feedback. Our team has also worked on ensuring that results from the EPI-CAL Learning Health Care Network project are disseminated on our website and updated regularly: https://epical.ucdavis.edu/. We are also working with an outside vendor to create a visual representation of the project by creating a comic.
- This 23/24 fiscal year was the last project year for many of the counties and programs that were part of the original multi-county collaborative innovation plan and therefore our team prepared a report that summarizes the overall progress of the LHCN to date. This report included a summary of qualitative data that has been collected over the course of the project, outcomes data collected via Beehive, and a multi-county integrated analysis of cost and utilization data. The summary report is prepared in a separate document from the deliverable and was submitted to our EP program and county partners on May 12, 2024.

Current Project Goals

The current document summarizes project activities for the LHCN for fiscal year 2023/2024. This includes the following project activities:

1. Establish a stakeholder (community partner) advisory committee that will meet at least every 6 months

2. Provide results from fidelity assessments of EP programs

3. Complete Post-LHCN implementation questionnaires administered to program and county staff

4. Draft preliminary data on feasibility and acceptability of LHCN app in all EP programs

5. Submit final data analysis plan for all data

6. Provide report that summarizes outcomes data collected to date via Beehive, including client-level data on outcomes of interest

7. Submit report on LHCN enrollment and follow up completion rates for LHCN software application and dashboard in all EP Programs

8. Provide report on ongoing issues and suggestions on the app/dashboard from EP program staff and other stakeholders

9. Support training and implementation of outcomes measurement on app in EP program

10. Provide feedback from interviews with EP stakeholders about experience in EP treatment programs

11. Deliver a plan and timeline for working with counties to support infrastructure to access final round of county-level cost and utilization data for EP and comparator group programs

12. Present preliminary results from second round of analysis for county-level cost and utilization data from all EP/CG programs

13. Report on feasibility of obtaining cost and utilization data from preliminary multi-county integrated evaluation

14. Collaborate with counties and programs to disseminate findings through multi-media work products

15. Submit a final report detailing all program- level, county-level outcomes data collected summarizing experiences and feedback from all stakeholders that is responsive to stakeholder feedback on the draft report

1. Establish a community partner advisory committee that will meet at least every 6 months

The Advisory Committee for the LHCN is comprised of a county representative from each participating county, a representative of each participating EP program, and up to five consumers and five family members who have been, or are being served, by EP programs. This committee is co-led by Bonnie Hotz, family advocate from Sacramento County. Recruitment for the Advisory Committee is ongoing, and we have confirmed membership with multiple community partners. These include past consumers, family members, clinic staff and providers. Even though we have already held several Advisory Committee meetings, we continue to distribute flyers to all participating clinics, as their contracts are coming through, to make sure the Advisory Committee is open to all LHCN member clinics.

November 29th, 2023 Meeting

We held the first Advisory Committee meeting of the fiscal year on November 29th, 2023. The meeting was held remotely to allow for statewide participation. During the meeting, we discussed recruitment and enrollment progress and challenges. Kathleen Nye gave a general overview of enrollment across the LHCN, including comparing enrollment today to the last progress report at the last Advisory Committee Meeting in June 2023. While incremental progress continues for most participating EP programs, multiple programs' enrollment has now plateaued and several still have not integrated Beehive into their program to the degree necessary to achieve project aims. We also covered survey completion by clients in participating clinics.

The next section of the meeting was presented by Katie Sanford, who introduced the Lived Experience Integration (LEI) Team of EPI-CAL to the group. Katie described the structure, mission and vision of the LEI team. The LEI team is comprised of individuals with research or clinical training or interests in addition to direct experience as mental health service users with a mission to elevate the voices of people with lived and living experience of psychosis and facilitate their substantive presence in all areas of early psychosis work in ways that transform historically disempowering narratives about mental health and treatment. The LEI team envisions a world where people with lived experience are valued, treated as equals, and where our voices directly and meaningfully guide psychosis care, research, and public perception. The LEI team has created an online forum on discord that is a peer-moderated online support and resource sharing community open to all individuals with lived and living experience with psychosis, their loved ones, and peer support specialists working with individuals with lived and living experience of psychosis. The LEI team also plans to conduct an associated research project that explores what leads people to seek community, if they are finding it, and if so, where. Lastly, Katie shared details of the Lived Experience Advisory council.

Dr. Mark Savill then presented fidelity assessment results from programs that have completed their assessments across EPI-CAL (LHCN and TTA). Dr. Savill described the utility of using fidelity assessments to understand how components of coordinated specialty care (CSC) are delivered across heterogeneous programs and how such assessments have proven feasible across complex networks such as ours. Thus far, the fidelity assessments successfully capturing variability across network and many of the participating LHCN programs are delivering lots of components consistent with best practice, i.e., to good or high fidelity. However, some state, policy, and/or funding barriers are consistently impacting service structure and program delivery, such as age range served and program census being consistently lower than expected. We may need to conduct follow-up assessments to capture the evolution of programs over time.

The next section of the meeting consisted of data presentations. Dr. Katie Pierce gave a presentation on the how experiences of several adverse childhood experiences (ACEs) in individuals with early psychosis is associated with poorer life outlook, and higher risk of suicidal and homicidal ideation in our preliminary data collected in Beehive. Additionally, she reported that individuals with higher ACEs are more likely to have experienced lifetime housing instability and individuals who identify as LGBT are more likely to report higher ACEs. ACEs and other social determinants are likely drivers of poor outcome in early psychosis and should be addressed in treatment. Dr. Pierce's presentation was followed by Madison Miles describing the relationship between experience of ACEs and family functioning. Her preliminary investigation found that clients reported worse family functioning on the strengths and adaptability domain of the SCORE-15 (the family functioning assessment administered in Beehive) than their support person. Given the importance of family treatments as an evidence-based approach for FEP and the negative impacts of ACEs on client outcomes, these data suggest that EP programs should identify and treat individuals who experience traumatic events and to target areas of family functioning, with the goal of improving outcomes. Next, Nitasha Sharma presented data from her examination of the relationship between ACEs and substance use. Individuals who experienced a high number of ACEs showed increased use of nicotine and marijuana only when compared to individuals with low ACEs. Individuals with a high number of ACEs did not show significant differences in alcohol usage when compared to individuals with low ACEs. Adverse experiences that were endorsed most frequently can help identify specific adverse childhood experiences (ACEs) that are more prevalent among the EP population.

Understanding which specific experiences result in increased substance usage can inform targeted interventions and reduce poor outcomes in this population.

Then, Kali Sangervasi, a clinical supervisor at the Aldea SOAR programs, discussed how she has integrated Beehive into her clinical workflow and supervised other clinicians at her clinics to use Beehive. Some key points were that it is very important to inform the clients what to expect with Beehive, e.g., that they'll receive survey links, and to try not to exhaust them by timing the introduction of Beehive correctly. They set them up to expect a follow up assessment every 6 months. Some hurdles include that clients frequently do not click on the link to complete surveys, and so the clinical team at Aldea SOAR tries to balance not bombarding clients with survey requests while also encouraging them to complete their assessments. They are still looking for creative ways to use clinical data more, the graphs aren't currently being used that much, but the clinical team does reflect on the client data and think about how to enhance services based on that data. Dr. Sabrina Ereshefsky then shared her and Dr. Susie Xiong's experiences with integrating Beehive into the clinical workflow at the SacEDAPT and MCC clinics. Dr. Xiong provided an example of how Beehive data has affected clinical care and that she had a client who refused their partnering with their school, however, once they saw the results and how their symptoms impacted their role functioning; they accepted us working with their school. From Dr. Ereshefsky's supervisory perspective, she felt that for Beehive to be integrated successfully, it must be part of weekly team meetings, with time to review urgent clinical issues and upcoming assessments.

Lastly, we ended the meeting by discussing preliminary renewal plans for the EPI-CAL R01 and other funding streams.

June 26th, 2024 Meeting

We held the second recent Advisory Committee meeting of the fiscal year on June 26th, 2024. The meeting was held remotely to allow for statewide participation. During the meeting, we discussed recruitment and enrollment progress. Valerie Tryon gave a general overview of enrollment across the LHCN, including comparing enrollment today to the last progress report at the last Advisory Committee Meeting in November, 2023. We've seen good progress for most participating EP programs, including establishment of new programs in the LHCN. We also covered survey completion by clients in participating clinics.

The next section of the meeting was led by Dr. Valerie Tryon, who described service user self-reported education, employment, and social activities and the relationship to overall life satisfaction. The preliminary data showed that there was significant effect of age on the type of activities that individuals were engaged in ($\chi2(9)=113.72$, $p < 0.001$), with younger people participating in only school to a higher degree than other roles and older adults (27+ years) were engaged in only work or neither work nor school to a higher degree than other age groups. Additional analysis found that overall life satisfaction is related to role satisfaction, quality of social relationships, and symptom frequency. Given this data, EP service providers are encouraged to focus on occupational, educational, and social relationship satisfaction, in addition to symptoms, as recovery goals for individuals receiving early intervention services.

Gina Gemignani then presented results from recently completed barriers and facilitator interviews that examined the benefits and drawbacks of adopting a measurement-based care approach, i.e. Beehive, from the perspective of those who deliver and receive early psychosis care. She first reviewed the benefits to using Beehive in care that that program providers and service users described, including mitigate risks via an alert system, supporting the clinical assessment process, supporting ongoing care, supporting service user reflection of experiences, and finally supporting a person-centered approach to care. Barriers or drawbacks to using Beehive in care were also described, including reduction of time for care to administer surveys, can negatively impact rapport, and finally that survey content can be triggering or distressing. Gina and the qualitative team are still recruiting service users for barrier and facilitator interviews at this time.

Dr. Rachel Loewy then gave an update on the Duration of Untreated Psychosis (DUP) project, including a refresher on the goal of creating and using a DUP form in clinical practice. To date, there are 23 participants enrolled across 8 participating clinics and our goal is to reach 100 total participants by Fall 2025. Dr. Loewy then covered some recent changes to incentives and procedures when using the DUP form, and concluded by asking interested parties to reach out if they are interested in using the DUP form in their clinic.

The next section of the meeting was presented by Katie Sanford, who updated the group on the Lived Experience Integration (LEI) Team of EPI-CAL. Katie described the structure, mission and vision of the LEI team. The LEI team is comprised of individuals with research or clinical training or interests in addition to direct experience as mental health service users with a mission to elevate the voices of people with lived and living experience of psychosis and facilitate their substantive presence in all areas of early psychosis work in ways that transform historically disempowering narratives about mental health and treatment. The LEI team envisions a world where people with lived experience are valued, treated as equals, and where our voices directly and meaningfully guide psychosis care, research, and public perception. Katie shared details of the Lived Experience Advisory council progress to date, included that the first planned meeting was scheduled for July 5th, 2024. Katie also described the LEI team's discord that is a peer-moderated online support and resource sharing community open to all individuals with lived and living experience with psychosis, their loved ones, and peer support specialists working with individuals with lived and living experience of psychosis.

Lastly, we ended the meeting with a discussion led Paula Wilhem from DHCS, who discussed the timeline and details of funding and policy changes that impact the implementation of behavioral health care in California. This includes Behavioral Health Transformation plans as a result of the recent passage of Prop 1 and BH-CONNECT.

A recording of the meeting and a copy of the slides was distributed to all meeting attendees for their reference.

2. Provide results from fidelity assessments of EP programs

This section includes preliminary findings from the fidelity assessments conducted across the LHCN. These include programs that are not currently in the LHCN but have received a fidelity assessment from our team through their participation in EPI-CAL.

Fidelity assessments serve many purposes both for the LHCN and EPI-CAL. Fidelity assessments can support quality improvement activities, highlighting individual areas of strength and areas for improvement. Second, it can enable individual clinics to review how their program compares to validated international standards and other programs across the state. Third, the information collected can be vital for county leadership and other key community partners to understand exactly what is being delivered by programs in a concrete, standardized format. Fourth, when combined with systematic data collection of service user outcomes across multiple programs, fidelity assessments can be used to assess how variation in service delivery may impact service user outcomes. Available data on which service components lead to specific outcomes could be used to advance the field of early psychosis care and to advocate for potential changes in program funding and structure. For newer and developing clinics, fidelity assessments can be used as a metric to track clinics' progress as they work to build their program.

In the fidelity assessments, the First-Episode Psychosis Services – Fidelity Scale (FEPS-FS)(Addington, 2021) is used to assess adherence to current best practice guidelines for early psychosis care. However, many programs within EPI-CAL also serve individuals experiencing clinical high risk for psychosis (CHR), in addition to people with a first episode psychosis (FEP), with significant overlap in the range of services offered to both groups. To allow for an evaluation of these differing practices, in addition to using the FEPS-FS to measure

FEP care, in collaboration with the author of the FEPS-FS we have developed a new tool to evaluate CHR care, called the Clinical High Risk for Psychosis Services –Fidelity Scale (CHRPS-FS) (Savill et al., *in press*). A summary of each tool is provided below.

The First Episode Psychosis Services – Fidelity Scale (FEPS-FS)

The FEPS-FS(Addington, 2021) is a widely used fidelity measure of team-based early psychosis care(Durbin et al., 2019; Meneghelli et al., 2023), and is reliable for use in remote assessments(Addington, Noel, Landers, & Bond, 2020). The most recent iteration (version 1.1) assesses 36 different components. Each item assesses a different domain of early psychosis care, including team model and function, population-level interventions and service access, pharmacotherapy, psychosocial therapies, and service user and program assessment and monitoring. All items are rated on a behaviorally anchored 5-point scale, with a score of 4 or 5 considered good-to-high fidelity.

FEPS-FS fidelity scores are typically determined based on three data sources: staff interviews, program-level administrative data, and de-identified data abstracted from chart records. The chart record review is completed using three distinct samples: Chart Review Sample 1) a randomized sample of 10 existing FEP service users enrolled in the program for at least one year; Chart Review Sample 2) the last 10 service users discharged from the program; and Chart Review Sample 3) the last five service users admitted to a psychiatric hospital.

The Clinical High Risk for Psychosis Services – Fidelity Scale (CHRPS-FS)

The CHRPS-FS was developed using a three-step development, measurement, and validation process (see Savill et al., 2024). The final version of the scale includes 33 items, including 28 items identical to the FEPS-FS, two items the same but with modified rating criteria, and three items that are unique to the CHRPS-FS. A crosswalk of the FEPS-FS and CHRPS-FS are presented in Table 1.

Fidelity Assessments for Small and New Programs

In addition to developing new tools to capture the full range of care provided by EPI-CAL EP programs, during the implementation of the fidelity assessments, it became evident that many new and small programs did not have a sufficient program census to complete the assessments in the standard format. For example, in a standard fidelity assessment, the health record review typically requires data from a minimum of five service users (and ideally, 10), who have been in the program for at least one year. However, of the first 23 FEPS-FS assessments completed across EPI-CAL, seven (30.4%) could not meet this requirement. To address this challenge, in collaboration with Dr. Addington, the Fidelity Team has developed additional assessment approaches to accommodate small and new programs.

I. Standard Fidelity Assessments

In standard assessments, the chart record review typically includes a randomized sample of 10 existing FEP service users enrolled in the program for at least one year; the last 10 service users discharged from the program; and the last 5 service users admitted to a psychiatric hospital.

In cases where the program did not have at least 10 current FEP service users enrolled for one year, standard FEPS-FS assessments are still conducted so long as at least 5 service users meet criteria. In items assessed on the proportion of individuals that receive a particular service using chart data, the denominator used is the total number of cases included in the review.

II. Formative Assessments for New Programs

Formative fidelity for new programs is for services that have a sufficient census of service users in treatment (i.e., ≥5), but have not been open long enough for a sufficient proportion to have received care for ≥1 years. To meet eligibility, the program must have been open and serving service users for

<2 years and have 5+ active service users who have received services for 6+ months.

In formative assessments, the criterion for service users to be eligible for the chart review is reduced to six months. Items that measure care typically delivered during the intake stage are scored following standard FEPS-FS assessment rules. For Items scored based on the volume of care provided over 12 months, the number of sessions required to meet the threshold are reduced by 50%. The item focusing on the volume of targeted outreach delivered is pro-rated for the duration the program has been open if this is less than 12 months. Finally, the annual comprehensive assessment item is not typically scored.

III. Formative Assessments for Small Programs

Formative assessments for small programs are for services that have an insufficient service user census of service users to conduct a review of care delivery. In formative assessments for small programs, administrative data collection and interviews are conducted and items scored primarily on these data are scored normally. Items scored from the chart review concerning care provided over time are not typically scored. If the program has 5+ active service users enrolled, then a chart review concerning the initial stages of care is completed following standard assessment rules. If the program does not have five active service users at the point of assessment these items are not scored. Items concerning care planning and contact after inpatient discharge are scored normally, assuming 5+ service users meet the criteria for chart review.

Table 1: Crosswalk of the FEPS-FS and CHRPS-FS items

Component	Where Item is Used	Basis of Rating
1. Practicing Team Leader	FEPS-FS and CHRPS-FS	Team leader provision of clinical care, and administrative and clinical supervision.
2. Patient-to-Provider Ratio	FEPS-FS and CHRPS-FS	Target ratio of active clients to provider team.
3. Services Delivered by Team	FEPS-FS and CHRPS-FS	Presence of key components of the team-based approach to psychosis care.
4. Assigned Case Manager	FEPS-FS and CHRPS-FS	The proportion of clients that have an assigned case manager.
5. Prescriber Caseload	FEPS-FS and CHRPS-FS	Target ratio of active clients to prescriber team.
6. Prescriber Role on Team	FEPS-FS and CHRPS-FS	Degree of integration of the prescriber with the team.
7. Team Meetings	FEPS-FS and CHRPS-FS	Frequency and content of multi-disciplinary team meetings.
8. Diagnostic Admission Criteria	FEPS-FS and CHRPS-FS, with different rating criteria	Programs are mandated to serve clients with psychosis spectrum disorders, and proportions that meet these criteria.
9. Population Served	FEPS-FS only	% of the population served within a specified catchment area.
10. Age Range	FEPS-FS only	The degree to which the program serves the entire age spectrum from 14-65.
11. Duration of Program	FEPS-FS and CHRPS-FS	Duration the service is formally available to clients.
12. Targeted Outreach	FEPS-FS and CHRPS-FS	The frequency and range of outreach to community services the program conducts.
13. Early Intervention	FEPS-FS only	% of clients that receive inpatient care before program admission.
14. Identification of Outcome Targets	CHRPS-FS only*	% of clients that have secondary diagnostic targets for treatment following assessment.
15. Timely Contact Following Referral	FEPS-FS and CHRPS-FS	% of clients seen within 2 weeks of referral.
16. Family Involvement in Assessments	FEPS-FS and CHRPS-FS	% of families seen during initial patient assessment.
17. Stepped Care Approach	CHRPS-FS only†	The degree to which the program implements a stepped-care approach to service delivery.
18. Clinical Assessment	FEPS-FS and CHRPS-FS	% of clinical assessments that include multiple key assessment components.
19. Psychosocial Needs Assessment	FEPS-FS and CHRPS-FS	% of psychosocial needs assessments that include multiple key assessment components.
20. Clinical Care Planning	FEPS-FS and CHRPS-FS	% of clients that have documented treatment plan that the client has signed off on.
21. Antipsychotic Medication	FEPS-FS and CHRPS-FS, with different rating criteria	% of clients receiving antipsychotic medication.
22. Antipsychotic Dosing	FEPS-FS only	% of cases where antipsychotic dosing is within government-approved guidelines.
23. Antidepressant Medication	CHRPS-FS only*	% of clients who are prescribed antidepressant medication.
24. Clozapine Administration	FEPS-FS only	% of the program cohort that are prescribed clozapine.
25. Patient Psychoeducation	FEPS-FS and CHRPS-FS	% of clients who receive ≥6 sessions of psychoeducation within 12 months.

26. Family Education and Support	FEPS-FS and CHRPS-FS	% of families receiving ≥8 sessions of family services within 12 months.
27. Cognitive Behavioral Therapy (CBT)	FEPS-FS and CHRPS-FS	% of clients that receive ≥10 sessions of CBT within 12 months.
28. Supporting Health	FEPS-FS and CHRPS-FS	The degree to which the program supports the client's physical health.
29. Annual Assessment	FEPS-FS and CHRPS-FS	% of clients that receive a comprehensive annual assessment
30. Substance Use Disorder Services	FEPS-FS and CHRPS-FS	Range of substance use disorder services provided to clients in need.
31. Support Employment (SE)	FEPS-FS and CHRPS-FS	Presence of key SE service components.
32. Supported Education (SEd)	FEPS-FS and CHRPS-FS	Presence of key SEd service components.
33. Client Engagement in Community	FEPS-FS and CHRPS-FS	% of time spent engaging with clients out in the community.
34. Patient Retention	FEPS-FS and CHRPS-FS	Ratio of clients who discontinue services within the first year, to the current census.
35. Crisis Intervention Services	FEPS-FS and CHRPS-FS	Presence of key crisis care components
36. Contact After Inpatient Discharge	FEPS-FS only	% of clients seen within 2 weeks of discharge from an inpatient unit.
37. Assuring Fidelity	FEPS-FS and CHRPS-FS	The program monitors quality using a published fidelity scale or quality indicators.
38. Peer Specialist	FEPS-FS and CHRPS-FS	Presence of key peer support specialist components.
39. Care Transitions	FEPS-FS and CHRPS-FS	% of discharged clients that have a documented discharge plan.

The Caveats and Limitations to Consider When Reviewing Fidelity Assessments

While the fidelity assessments can provide multiple benefits to service improvement efforts, it is important to note that they come with multiple caveats:

1. The field of early psychosis is a rapidly developing one, with evidence-based practices and recommendations evolving over time.
2. While there is good evidence for coordinated specialty care leading to improved outcomes in early psychosis (i.e., Guo et al., 2010; Kane et al., 2016; Secher et al., 2015), understanding what the necessary specific components of coordinated specialty care are that leads to these improved outcomes, and how they should be optimally delivered, is in many cases still a matter of debate.
3. The measure selected for use across the EPI-CAL network (the FEPS-FS v1.1), is one of multiple that exist. The FEPS-FS was selected due to the fact the tool is currently one of the most extensively used and validated in the field (Addington et al., 2020; Durbin et al., 2019)
4. The FEPS-FS has been developed as an international standard, and so the tool has been designed to work across different systems of care. This may make high scores on some items much harder to achieve in the US due to the current structure of behavioral health service provision across the country.
5. The ratings and the feasibility of meeting high-fidelity scores may vary widely depending upon the context in which the program is delivered. The FEPS-FS may include items where a high-fidelity score may be constrained by state, local, or insurance coverage decisions outside of the control of the specific program.

Summary of the Fidelity Assessment Results

To date, we have completed assessments in 31 programs – 27 FEP and 21 CHR. Seventeen programs provide services for both FEP and CHR clients, ten serve FEP only, and four serve clinical high-risk only (see Table 2 for details). For both FEPS-FS and CHRPS-FS, the full assessment was possible in the majority of programs (70.4% and 61.9% respectively). Amongst those where a full assessment could be conducted, the mean FEPS-FS score (SD) was 3.86 (0.35) out of 5. With the CHRPS, mean scores were slightly higher at 3.95 (0.28) out of 5. Figure 2 and Figure 3 show a breakdown of the proportion of programs meeting good to high fidelity by each FEPS-FS item and CHRP-FS item. Mean proportion of items meeting good to high fidelity were FEPS-FS 68.4% (8.71), and CHRPS 61.5% (6.37).CBT delivery was notably high across all programs with an average score of 4.39. Items regarding catchment area (component 9) and age range (component 10) were amongst the lowest scoring items with an average score of 1.35 and 1.00 respectively.

Table 2: Fidelity Assessment Findings

FEPS-FS n =27			
Assessment Types			
	Full	19	70.4%
	Formative Small Program	8	29.6%
	Formative New Program	0	0%
Mean FEPS-FS Score*		3.86	0.35
% Items good to high fidelity*		68.4%	8.71

CHRPS-FS n=21			
Assessment Types			
	Full	13	61.9%
	Formative Small Program	8	38.1%
	Formative New Program	0	0%
Mean CHRPS-FS Score*		3.95	0.28
% Items good to high fidelity*		61.5%	6.37

Figure 2: Proportion of programs meeting good to high fidelity on FEPS-FS Items

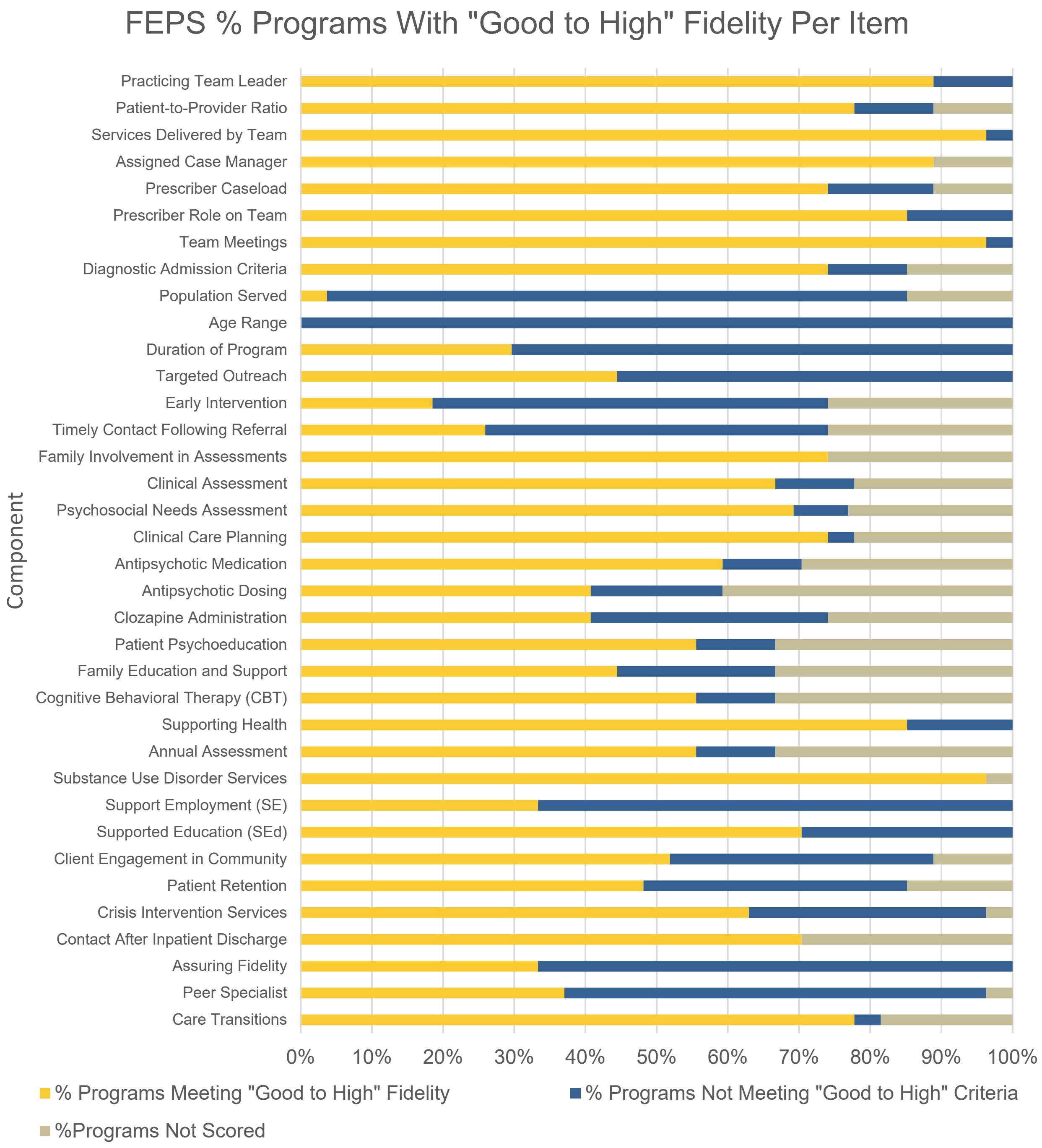
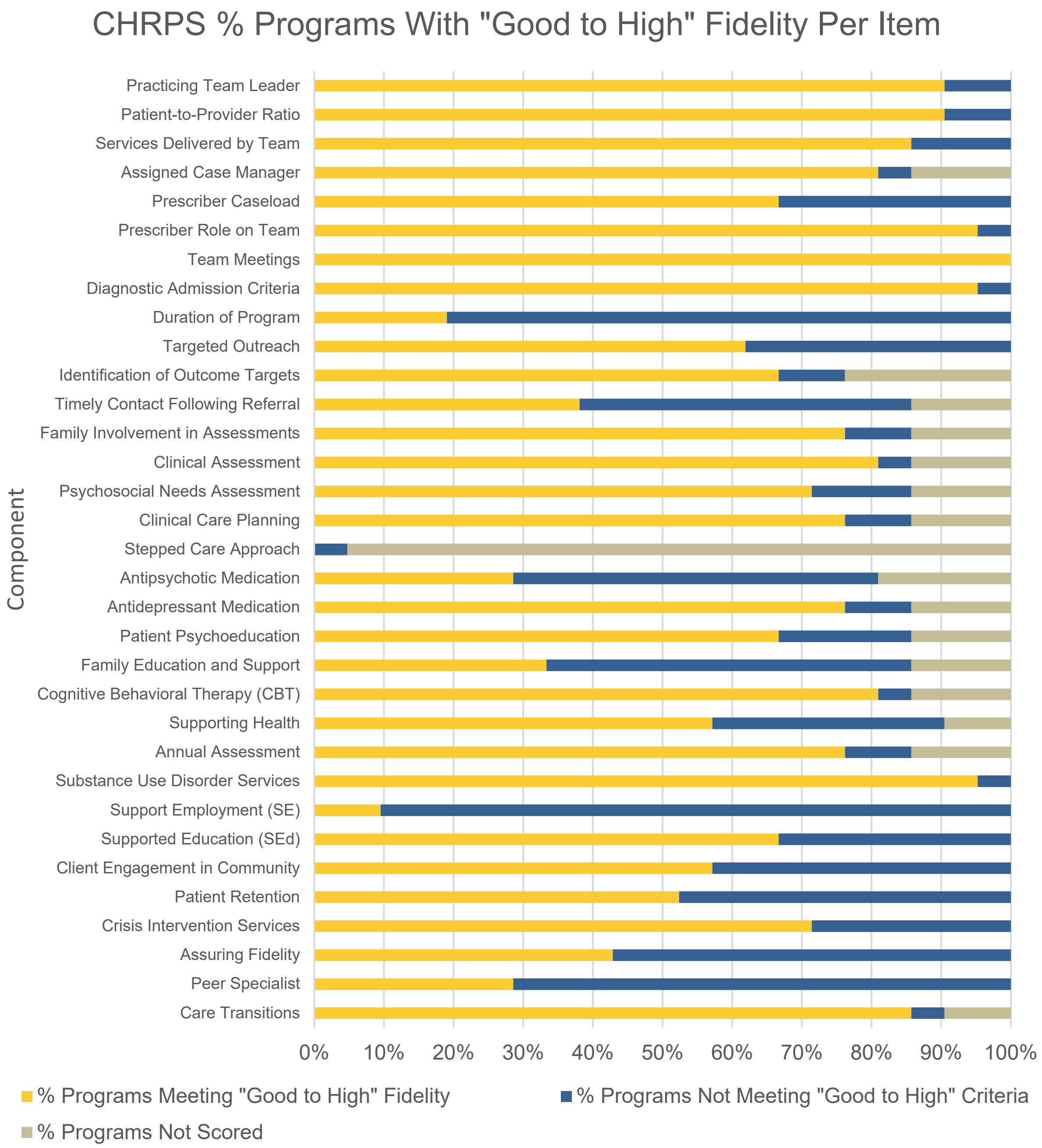


Figure 3: Proportion of programs meeting good to high fidelity on CHRPS-FS Items



3. Complete Post-LHCN implementation questionnaires administered to program and county staff

In the LHCN proposal, we proposed to ask clients and providers to complete self-report questionnaires in the pre-implementation period of the project. To examine adoption of a new technology in the EP program, we proposed to compare providers with respect to their reporting use of data to determine treatment choices at two timepoints, prior to Beehive implementation and after training in and using Beehive. Prior to Beehive implementation in each EP program, providers completed “pre-implementation” surveys about their demographic information (age, sex, race, ethnicity) and professional characteristics (years of education, degree type) and completed questionnaires on their Treatment Alliance, Use of Data in Care Planning, Perceived Effect of Use for the LHCN, and Comfort with Technology. Clients are also asked to complete self-report questionnaires about insight into illness, perceived utility of the application, satisfaction with treatment, treatment alliance, and comfort with technology. Beehive training materials were implemented consistently across participating EP program, highlighting the utility of data to identify treatment goals and metrics of improvement during treatment planning, and provided guidance on client-centered ways to review data to monitor progress during treatment.

We are now currently at the stage of the project where we want to evaluate change in these same variables after Beehive implementation. To do this, the same set of surveys are administered to EP programs who have sufficiently implemented Beehive in their program. At this time, we have 36 provider-completed post-implementation survey packets completed across nine participating EP programs (OC CREW, Kickstart, IMCES, The Help Group, San Fernando Valley Community Mental Health Clinic, The Whole Child, Aldea Solano SOAR, Aldea Sonoma SOAR, and Aldea Napa SOAR). These programs were amongst the earlier programs to be trained to use Beehive in their program in the LHCN. We are continuing to recruit providers and clients from EP programs to complete these surveys once sufficient time has passed from initial Beehive implementation. These data will be used in analyses to assess changes in these variables prior to implementation of Beehive compared to after use of Beehive with clients in EP programs.

Additionally, our post-implementation analysis will include provider-rated “use of data in care” questions, which are intermittently presented to providers while they are reviewing a client’s data page in Beehive so that they may indicate 1) if the data was reviewed during a session with the client or family and, if yes, 2) how the data was used as part of care, such as “followed up by phone” or “scheduled follow up appointment,” or “no action taken.” These data use metrics allow analysis on rates of adoption and level of implementation of Beehive. Exploratory analysis will examine clinician expertise and training needed to effectively implement clinician review of client outcome data using Beehive at 80% of available time points.

4. Draft preliminary data on feasibility and acceptability of LHCN app in all EP programs

One of our primary metrics to evaluate the feasibility and acceptability of the Beehive application in EP programs it to examine is whether we achieved adequate enrollment in Beehive. We examined this using a previously defined benchmark of enrollment of at least 70% of eligible participants, who are representative of the target population based on current program demographics, and 50% of their available family members, across the network were enrolled. To approximate the number of total clients eligible for enrollment, we have asked the programs to provide us with their current total census number. This was compared to clients currently enrolled in Beehive, and not including clients who have been discharged from Beehive. Clients must have completed their EULA to be considered enrolled. For the purposes of the preliminary analysis, we are only considering individuals who have agreed to share data with UCD as “enrolled”, but clients can decline this option and still use their data within their program for clinical purposes. Data on of the number of available family members is available in Beehive and we are able to assess whether a primary support person (PSP) has completed enrollment. Just like clients, primary support persons are not considered enrolled unless they have agreed to share data with UCD. Clients and support persons can make different choices regarding their data sharing permissions, i.e., a client can decline to share their data for research purposes while a support person can opt in. For the purpose of the preliminary feasibility analysis, we are only examining what proportion of enrolled clients also have an enrolled PSP, acknowledging that there may be more enrolled PSPs whose corresponding client opted out of data sharing. Programs who have not begun enrollment are not included in this analysis (Lake County and Stanford INSPIRE).

Table 3: Preliminary client and PSP Beehive enrollment

Program Name	**Current Census**	**Currently Enrolled**	**% Enrolled**	**Clients with an enrolled PSP**	**% with a Primary Support Person**
UCD SacEDAPT	29	30	103%	9	30%
UCD EDAPT	61	34	56%	14	41%
Solano SOAR	11	6	54%	4	67%
Napa SOAR	12	11	92%	8	73%
Sonoma SOAR	13	13	100%	5	38%
Kickstart Pathways	89	1	1%	1	100%
LAC- IMCES 3	14	11	79%	3	27%
LAC - IMCES 4	26	16	62%	2	13%
LAC - SFVCMHC	17	3	18%	0	0%
LAC- The Whole Child	25	16	64%	3	19%
LAC- The Help Group	19	13	68%	8	62%
OC CREW	46	18	39%	3	17%
San Mateo Felton	ReMIND: 44 Beam: 25	ReMIND: 5 Beam: 10	ReMIND:11% Beam: 40%	ReMIND:2 Beam: 0	ReMIND:40% Beam: 0%
UCLA Aftercare	22	10	45%	4	40%
UCLA CAPPS	43	0	0%	0	N/A
UCSD CARE	379	27	7%	2	7%
Stanislaus LIFE PATH	11	6	54%	1	17%
MCC	Mono: 0 Nevada: 3 Colusa: 2	Mono: 0 Nevada: 5 Colusa: 1	Mono: N/A Nevada: 166% Colusa: 50%	Mono: 0 Nevada: 0 Colusa: 0	Mono: 0% Nevada: 0% Colusa: 0%

As described in Table 3, there is quite a bit of variability across programs in the proportion of the program's census that are enrolled in Beehive (mean = 55%, range = 0-166%). Two programs have more clients enrolled in Beehive than currently in their program, indicating they have clients who have been discharged from the program but not Beehive. EPI-CAL point persons continue to work with the sites to make sure they discharge clients from Beehive in a timely manner moving forward. Five of the participating programs meet or exceed the previously defined benchmark of 70% of eligible clients are enrolled. There was also extensive variability in the number of PSPs enrolled in Beehive across the programs as well (mean = 31%, range = 0-100%). Four of the participating programs meet or exceed the previously defined benchmark of 50% of PSPs enrolled in Beehive.

The heterogeneity of enrollment across sites supports the need for the qualitative barriers and facilitators interviews to understand the issues that sites are facing. Future analyses will examine survey data from clients in more detail, and survey data analysis procedures for clustered data (treating early psychosis programs as clusters) will summarize characteristics of enrolled clients who complete enrollment and at least one longitudinal assessment.

5. Submit final data analysis plan for all data

As a reminder, this project contains data collected via three components: program-level data, county-level data, and qualitative data (Figure 1). The county data analysis plan was described in other sections. While we describe some qualitative analysis here, much of the qualitative data analysis was described in prior deliverables.

Outcome Measures and Instruments
The first aim of the project is to determine the feasibility of implementing an LHCN across a diverse, decentralized group of EP programs. To determine if the LHCN has been effectively implemented (Aim 1), we record the total number of eligible service users who enroll in the EP program during the study period, the number that successfully complete the End User Licensing Agreement (EULA)(Tully et al., 2023), the number that agree for their data to be used to support research activities, and the number of service users and support persons that complete at least one survey. We expect that 70% of eligible EP program participants and 50% of their available support persons across the network will enroll and complete baseline surveys based on prior studies within an EP population (T. A. Niendam et al., 2023). To determine this, EP programs will be asked to provide our team with the total program census number annually, which is compared to service users enrolled in Beehive. Service users must have completed their EULA to be considered enrolled. Data on the number of available support persons is available in Beehive, and we can assess whether a primary support person (PSP) has completed enrollment.

We will measure survey completion of any of the surveys available in Beehive's Core Assessment Battery (CAB) in order to further assess implementation success. The CAB includes validated measures for both service users and their primary support person to complete. The initial proposed CAB was developed by selecting relevant measures from the PhenX toolkit (Hamilton et al., 2011), the Mental Health Block Grant (MHBG) minimum dataset, Mental Health Services Act (MHSA) demographic reporting requirements, and existing program evaluation measures. From there, the final measures and domains were reviewed and refined in focus groups with service users, family members, and providers conducted by our team (Savill et al., 2024), and the EPINET workgroup. The EPI-CAL CAB overlaps significantly with the EPINET CAB("EPINET CAB," 2022) (https://nationalepinet.org/core-assessment-battery-cab/) but differs in some domains and administration methods. See Table 4 for a comprehensive list of outcomes assessed by the CAB. In addition to the EPI-CAL CAB, service users will also be able to complete cognitive testing through Beehive annually.

We also conduct semi-structured qualitative interviews with service users and providers to assess barriers and facilitators to implementing the LHCN examining service user-, provider- and program-level barriers to enrollment and completion. Purposive sampling will be used to recruit participants across clinics where Beehive adoption and implementation has been either high or low, and with service users who have and have not received measurement-based care. Service user participants will be recruited either through clinician referral or by the research team directly by contacting individuals who had previously given permission to be contacted for future research opportunities.

To determine if implementation of the LHCN leads to an increase in the delivery of measurement-based care (Aim 2), providers will complete self-report questionnaires in the pre- and post-implementation period of the project. To examine adoption of a new technology in the EP program, we will compare providers with respect to their self-reported use of data to determine treatment choices at two timepoints: prior to Beehive implementation, and then after training in and use of Beehive. Pre- Beehive implementation surveys include Treatment Alliance and Use of Data in Care Planning in reference to specific service users. Providers will also complete the Comfort with Technology survey. The sampling frame for each site will consist of surveys about service users of currently enrolled EP providers, restricted to service users with at least six months under treatment and who had been seen in the preceding month. Beehive training materials will then be implemented consistently across participating EP programs; implementation efforts will highlight the utility of data to identify treatment goals and metrics of improvement during treatment planning and provide guidance on service user-centered ways to collaboratively review data and monitor progress during care. Then, in post-implementation, the same set of surveys are administered to EP programs who have implemented Beehive in their program for at least a year. The survey sampling strategy used in the pre-implementation period to select clinician-service user pairs will be repeated after Beehive has been implemented in the clinic for a full year, to ensure a valid pre/post comparison on this outcome. Due to expected turnover from the clinician side and discharge/exit from the program on the service user side, we will not be able to sample the same group from the pre-implementation period. However, there will most likely be some representation in the post-implementation period from respondents who participated in the first phase of surveys. Therefore, these are not completely independent samples, nor are they completely repeated samples.

To determine the extent to which providers utilize the Beehive platform to deliver measurement-based care (Aim 2), we adopt two different approaches. First, we will examine whether a service user's treatment team lead reviews completed surveys in Beehive, which is recorded by the application. During service user registration in Beehive, EP providers designate the service user's treatment team lead, typically their primary clinician. Once a survey respondent completes a survey in Beehive, the data are immediately available to view in the Beehive dashboard. The Beehive survey reports will include a variable that shows whether or not each survey has been viewed by the service user's treatment team lead (binary yes/no). Research staff will use this data to determine the degree to which providers are actively viewing data collected in Beehive.

To explore how Beehive data are used by those who frequently utilize the application, two types of in-app queries were developed: urgent clinical issues and data-use questions. Urgent clinical issues are a type of notification (in-app and email) in Beehive that encourages EP staff to review service user data. These notifications trigger if, during registration or survey completion, a service user endorses risk-to-self or risk-to-others on the Modified Colorado Symptom Index (MCSI) (Boothroyd & Chen, 2008), the intent to stop taking their medication (Shulman, Buck, Gahm, Reger, & Norr, 2019), or lack of a permanent address. Beehive displays urgent clinical issues on a dashboard widget and to resolve them, users must indicate how they used the data in care. Additionally, an in-app query is presented to the service user's treatment team lead every ten visits to the service user's data page. Data-use questions assess 1) if the data was reviewed during a session with the service user or support persons and, if yes, 2) how the data was used as part of care.

We will then examine whether providers' implementation of measurement-based care is associated with significant improvements in key outcomes (Aim 3). To do this, we will compare adjusted between-groups mean differences in baseline to 12-month change in surveys available in the Beehive CAB, including the MCSI. Groups will be defined by clinician metrics from Beehive described above and assessed during this 12-month period. The MCSI is a 14-item, self-report scale designed to assess the frequency of psychiatric symptoms related to psychosis, mood, desire to hurt oneself and others, cognition and forgetfulness. Each item is scored on a 0-4 Likert-style scale and added together to give a score between 0 and 56, with higher scores indicating greater emotional distress. Reduction in score over time indicates clinical improvement.

Table 4. EPI-CAL Outcomes Collected in Beehive

Domain	**Respondent**	**Measure and/or Source***	**Timepoint**
Demographics & Background	Service user	- EPI-CAL team	Enrollment
Demographics and Background	Service user	- EPI-CAL researchers - California State Required Demographics Reporting - Modification from EPINET version of this question "Are you a veteran?" required question for PEI/INN Reporting - A question measures a risk factor for persistent poverty(Ratcliffe & Kalish, 2017). - An item was created by the EPI-CAL team and assesses factors which put a person at increased risk for homelessness (Grattan et al., 2022) - Part of EPINET CAB("EPINET CAB," 2022) (https://nationalepinet.org/core-assessment-battery-cab/)	Enrollment
Primary Caregiver background	Service user	- EPI-CAL researchers and EPINET CAB("EPINET CAB," 2022)	Enrollment
Traumatic Events and Experiences	Service user	- Pediatric Adverse Childhood Experiences (ACEs) and related life events screener (PEARLS) (Koita et al., 2018)	Enrollment
Demographics and Background	Service user	- A question measures a risk factor for persistent poverty(Ratcliffe & Kalish, 2017). - An item was created by the EPI-CAL team and assesses factors which put a person at increased risk for homelessness, as described in literature (Grattan et al., 2022) - Part of EPINET CAB("EPINET CAB," 2022)	Every 6 months (including Baseline)
Education	Service user	- Homelessness Risk item created by EPI-CAL team derived from literature review (Grattan et al., 2022)	Every 6 months (including Baseline)
Employment and Related Activities	Service user	- EPI-CAL researchers and EPINET CAB("EPINET CAB," 2022)	Every 6 months (including Baseline)
Social Relationships	Service user	- Attachment Item from Social Provisions Scale (Cutrona & Russell, 1987) - EPI-CAL researchers - Distress Disclosure Index (Kahn & Hessling, 2001)	Every 6 months (including Baseline)
Family Functioning	Service user and PSP	- SCORE-15 Index of Family Functioning and Change (Stratton, Bland, Janes, & Lask, 2010)	Every 6 months (including Baseline)
Legal Involvement and Related	Service user	- EPI-CAL researchers and EPINET CAB("EPINET CAB," 2022). Response options were informed from literature (Livingston et al., 2014) and community partner feedback during focus groups(Savill et al., 2024).	Every 6 months (including Baseline)
Substance Use	Service user	- EPINET CAB	Every 6 months (including Baseline)

Domain	Respondent	Measure and/or Source*	Timepoint
Medication, Side Effects, and Treatment Adherence	Service user	- Adherence Estimator - Glasgow Antipsychotic Side-effect Scale (GASS) (Waddell & Taylor, 2008) - Brief Adherence Rating Scale (BARS) (Byerly, Nakonezny, & Rush, 2008) - Additional items derived from focus group feedback and written by EPI-CAL team	Every 6 months (including Baseline)
Intent to Attend and Complete Treatment Scale	Service user	- Intent to Attend and Complete Treatment Scale (Shulman et al., 2019)	Every 6 months (including Baseline)
Symptoms	Service user	- Modified Colorado Symptom Index (MCSI) (Boothroyd & Chen, 2008)	Every 6 months (including Baseline)
Recovery	Service user	- Questionnaire about the Process of Recovery (QPR) (Neil et al., 2009)	Every 6 months (including Baseline)
Life Outlook	Service user	- A question was derived from suggested questions from Nev Jones (personal communication, August 2020) to capture role satisfaction - Question 1 from Personal Wellbeing Index(Group, 2013) - Construct prioritized in outcomes focus groups	Every 6 months (including Baseline)
Hospitalizations	Service user	- EPINET CAB	Every 6 months (including Baseline)
Traumatic Events and Experiences	Service user	-Life Events Checklist (LEC-5) (F. Weathers et al., 2013) and PTSD Checklist for DSM-5 (PCL-5) (F. W. Weathers et al., 2013)	Every 6 months (including Baseline)
Traumatic Events and Experiences	Service user	- Child and Adolescent Trauma Screen (CATS) – Youth Report (Age 7-17) (Sachser et al., 2017)	Every 6 months (including Baseline)
Shared Decision Making and Treatment Satisfaction	Service user	-Shared Decision Making Questionnaire (SDM-Q-9) (Kriston et al., 2010) - Kickstart Satisfaction: domain required for primary aims	Every 6 months (including Baseline)
Pathways to Care	Clinician	- EPINET CAB("EPINET CAB," 2022)	Enrollment
Diagnoses and Duration of Untreated Psychosis (DUP)	Clinician	- EPI-CAL modified this survey from EPINET CAB("EPINET CAB," 2022) to include more specific and exhaustive list of DSM-5 diagnoses	Every 6 months (including Baseline)
Family and/or Support Person Involvement	Clinician	- EPINET CAB("EPINET CAB," 2022)	Every 6 months (including Baseline)
Risk to Self/Others	Clinician	- EPI-CAL researchers modified from EPINET CAB("EPINET CAB," 2022)	Every 6 months (including Baseline)

Domain	**Respondent**	**Measure and/or Source***	**Timepoint**
Health	Clinician	- EPI-CAL researchers modified from EPINET CAB("EPINET CAB," 2022)	Every 6 months (including Baseline)
Medications	Clinician	- EPINET CAB("EPINET CAB," 2022)	Every 6 months (including Baseline)
Service Use	Clinician	- EPI-CAL researchers	Every 6 months (including Baseline)
Functioning	Clinician	- Either Global Functioning: Role(T. Niendam, Bearden, Johnson, & Cannon, 2006) and Global Functioning: Social (Auther, Smith, & Cornblatt, 2006) or MIRECC GAF(Niv, Cohen, Sullivan, & Young, 2007)	Every 6 months (including Baseline)
Symptoms	Clinician	One of: - Brief Psychiatric Rating Scale (BPRS) (Overall & Gorham, 1962) - Positive and Negative Symptoms of Schizophrenia Scale (PANSS-6) (Østergaard, Lemming, Mors, Correll, & Bech, 2016) - COMPASS-10 (Robinson, Miller, Schooler, John, & Kane, 2021)	Every 6 months (including Baseline)
Demographics and Background of Primary Support Person (PSP)	PSP	- A question included to measure exposure to poverty at a young age, which was indicated as a risk factor for persistent poverty(Ratcliffe & Kalish, 2017). - A question derived from ABCD Study("ABCD Study," 2024) (https://abcdstudy.org) and Deanna Barch (Personal Communication, September 2020) - Collateral report for the service user-self report question. Response options were informed from literature(Livingston et al., 2014) and stakeholder feedback during focus groups.	Enrollment
Demographics and Background of Primary Support Person	PSP	- EPI-CAL Researchers	Every 6 months (including Baseline)
Legal Interactions and Related	PSP	- Collateral report for the service user-self report question. Response options were informed from literature(Livingston et al., 2014) and stakeholder feedback during focus groups.	Every 6 months (including Baseline)
Family Impact	PSP	- Burden Assessment Scale (Reinhard, Gubman, Horwitz, & Minsky, 1994)	Every 6 months (including Baseline)
Symptoms	PSP	- Modified by EPI-CAL team for collateral report from original MCSI (Boothroyd & Chen, 2008)	Every 6 months (including Baseline)
Medications	PSP	- Modified by EPI-CAL team for collateral report from original GASS (Waddell & Taylor, 2008)	Every 6 months (including Baseline)

*For measures without a single validated source, our team and other collaborators created the questions based on multiple sources.

Program fidelity

In addition to the program-level data described here, we also collect project data via fidelity assessments, program surveys, and the program level core assessment battery (PL-CAB). Each program has completed a fidelity assessment to determine the components of coordinated specialty care (CSC) provided using the First Episode Psychosis Services Fidelity Scale (FEPS-FS) (Addington, 2021), a standardized measure of fidelity to EP program best practices. Similar to the fidelity assessments, program surveys and the PL-CAB assess various components offered through the CSC program, program census, and staffing. The data from these other sources may also be used to inform the analysis of the program-level data.

Analysis Plan

Prior to analysis, we will complete descriptive summaries for all data collected in Beehive, including service user and clinician demographics, survey completion for each survey at each timepoint, and survey scores for quantitative measures. The distribution and completeness of each analysis variable will be examined to determine appropriateness of different statistical methods. The availability of within-person longitudinal data will be reviewed to determine whether longitudinal or cross-sectional approaches are most appropriate. Descriptive summaries will be generated for each clinic individually, as well as network wide.

To address Aim 1, we will examine whether we achieved adequate enrollment in Beehive by using descriptive statistics to see if at least 70% of eligible participants and 50% of their available support persons across the network were enrolled and completed at least one survey timepoint. To approximate the number of total service users eligible for enrollment, we will pull the total census number from each program annually. Eligible service user participants are defined as those who are determined eligible to receive care at each program. Available support persons are defined and identified by the service user. Service users must have completed their EULA to be considered enrolled. For the analysis, we only consider individuals who have agreed to share data with the University of California, Davis (UCD) as “enrolled”, but service users can decline this option and still use their data within their program for clinical purposes. Just like service users, primary support persons are not considered enrolled unless they have agreed to share data with UCD. Service users and support persons can make different choices regarding their data sharing permissions, i.e., a service user can decline to share their data for research purposes while a support person can opt-in. For the feasibility analysis, we will only examine what proportion of enrolled service users also have an enrolled PSP, acknowledging that there may be more enrolled PSPs whose corresponding service user opted out of data sharing. Survey data analysis procedures for clustered data (treating EP programs as clusters) will summarize characteristics of enrolled service users who complete enrollment and at least one survey. Enrollment rates (with 95% confidence interval) will be computed for 1) all eligible service users and 2) potentially available support persons. For the latter, we will report, for the denominator of eligible service users with available support persons, what proportion of those service users had at least one support person complete a baseline or 6-month survey assessment.

To assess Aim 2, the adoption of Measurement-Based Care (MBC), we will first examine the degree of use of data in care between the pre- and post-implementation periods of the project. Before Beehive implementation in each EP program, providers complete pre-implementation surveys about their demographic information (age, sex, race, ethnicity) and professional characteristics (years of education, degree type) and complete questionnaires on their 1) beliefs about the utility of data in care planning and 2) skills in discussing data with service users. Compared to the pre-implementation period, we hypothesize that providers will report a change in the use of data to determine treatment choices after training and using the app for at least one year. Separate models will be fit for each of the primary and alternative operationalization of Beehive clinician-usage metrics as the exposure variable of interest. Adoption of data in care will also be measured by examination of whether a service user’s treatment team lead examined completed surveys from service users. To determine the degree to which providers are actively viewing data collected in Beehive, research staff will review the Beehive survey reports variable that shows whether or not each survey has been viewed by the service user’s treatment team lead (binary yes/no). We hypothesize that EPI-CAL treatment team leads will have viewed service user data collected through Beehive in at least 50% of cases. Lastly, we will examine whether the clinician reported that Beehive data impacted the treatment plan as assessed by the in-app queries periodically presented to EP provider users.

Through the qualitative work that was completed in the first phase of this project (Savill et al., 2024), a variety of key outcomes were identified by our program, service users, and support person workgroups. Psychiatric symptoms, quality of life, and functioning were prioritized as key outcomes by all types of respondents and our analysis will center on these domains. When examining group-level differences, it is important to note that there is not a “Beehive” and “not Beehive” group of service users; all service users are assigned to the Beehive group and thus no analysis can examine the effect of Beehive use in treatment compared to a typical control group. Instead, to assess the impact of utilizing MBC in an EP LHCN (Aim 3), we will analyze a dataset consisting of one record per service user per follow-up assessment timepoint and outcomes expressed as within-person change scores from baseline (for continuous measures) or as count or binary outcomes. For count or binary outcome data, the corresponding baseline value of the outcome will be included as a person-level covariate, when appropriate. Outcomes will be measured by the MCSI, personal wellbeing index (PWI), and functioning measures (Global Functioning Social and Role Scales (GF:S and GF:R) or Mental Illness Research, Education, and Clinical Center (MIRECC) version of the Global Assessment of Functioning (GAF) scale) for each of the six-monthly assessment timepoints during the first 24 months. Continuous outcomes will be transformed into within-person change scores from the baseline assessment for each follow-up assessment. Data are structured hierarchically; there is nesting of measurements from service users, who are nested within clinicians within EP programs. Therefore, for continuous, binary, and count outcomes, generalized linear mixed models will be used to estimate the adjusted effects of exposures on the key outcomes of interest, adjusting for a parsimonious set of other clinician- and service user-level covariates. Random effects will be specified for sites, with additional effects specified for clinician and service users’ contribution to the model fit, according to the Schwarz Information Criterion.

A key operationalization of the exposure indicator will be based on a composite indicator for any review of the service users’ completed surveys. In particular, this variable will be scored a 1 for a given service user in a given follow-up assessment if the treatment team lead reviewed the service users’ completed survey data. The comparison groups are defined by clinician metrics from Beehive aggregated over the 6-, 12- and 18-month assessment period, and the primary analysis is based on a composite indicator for any review of the service users’ survey data by the treatment team lead. We will also assess timepoint-specific changes in psychotic symptom severity for each of the half-yearly assessment timepoints during the first 24 months, with the primary analysis based on a time-varying indicator for any endorsement of “impact on treatment plan” on the in-app queries as a time-varying independent variable.

Qualitative analyses

Though qualitative data is not be directly linked to Beehive user IDs, we also use interview data to examine service user-, provider- and program-level barriers and facilitators to enrollment and completion via semi-structured qualitative interviews with service users and providers. Service user-, provider- and program-level implementation barriers will be identified utilizing an inductive approach to thematic analysis. Purposive sampling will be used to recruit participants of service users and providers across clinics where Beehive adoption and implementation has been both high and low, and with service users who have and have not received measurement-based care. Multiple coding will be adopted, and where possible, service users and providers will be involved in developing the topic guide and reviewing the data analysis and interpretation.

6. Provide report that summarizes outcomes data collected to date via Beehive,

including client-level data on outcomes of interest

Background
The LHCN focuses on a longitudinal, prospective evaluation of core data elements for early psychosis across the state. The Learning Health Care Network program works with participating EP programs for the purposes of harmonized, statewide outcomes data collection. The EPI-CAL program links these early psychosis clinical service programs into the Learning Health Care Network using a core assessment battery of valid, low burden measures and mHealth technology platform (Beehive) to collect service user-level information as part of standard care, visualize such information via clinician dashboard for treatment planning, and integrate across clinics to provide statewide summaries of outcomes data and mental health metrics from participating programs.

Beehive is a co-designed platform that was created to collect and summarize program level outcomes data across the state of California. The outcomes data collected is our EPI-CAL Core Assessment Battery (CAB) and includes various validated measures for service users, their primary support persons, and their clinical team to complete. The initial proposed CAB was reviewed and refined in focus groups conducted by our team ((Savill et al., 2024); see qualitative section below). The surveys in the CAB are administered through Beehive. Beehive was primarily designed to: 1) collect outcomes data from service users receiving care at an EP program and their support persons (i.e., family or other close individuals who service user choose to involve in their treatment), 2) provide the data for providers on a secure web-based dashboard, a subset of which is visualized and 3) allow data to be used for program or research analysis. The use of Beehive by service users, families, and EP program staff does not require written informed consent, but rather a signed end user license agreement (EULA).Trained EP program staff introduce Beehive to participants who are either shown a video explaining the purpose of the study and how their data are used or be presented with the EULA that they are required to read to make their data sharing choices prior to participation. The EULA was designed with input from service users, family members, and providers to ensure transparent data use ((Tully et al., 2023); see qualitative section below).

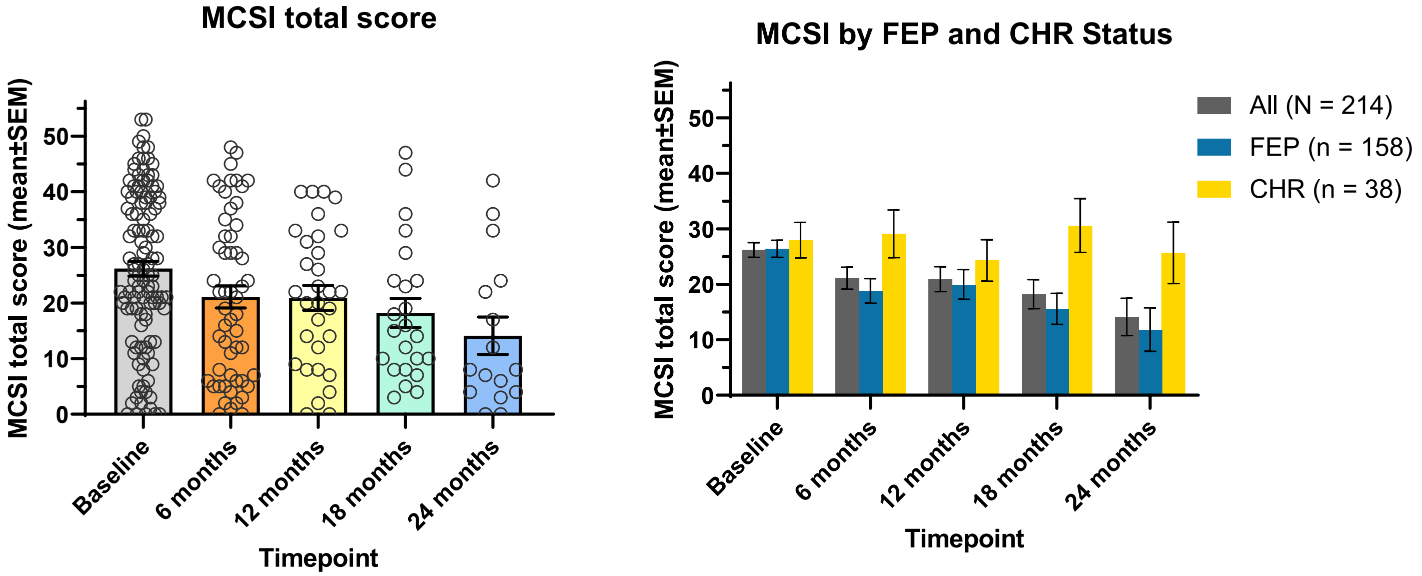
The program level summary of this report focuses primarily on the data collected via Beehive, including client self-report data, data from the primary support person (PSP) for the client, and clinician-rated data. To date, 17 EP programs have completed the full Beehive training series, with a total of 21 completing at least some of the Beehive training series. Once Part 1 Beehive training is completed, programs can initiate enrollment of their clients in Beehive and begin data collection on the outcomes surveys. As of May 30, 2024, those 21 EPI-CAL clinics have registered 1339 clients in Beehive. Of those who have completed their EULA, 83% (n=569) have agreed to share their de-identified data with NIH and 88% percent (n=597) have agreed to share their de-identified data with UCD.

Preliminary Analysis of Outcomes of Interest
Our team has also begun to examine descriptive summaries of specific outcomes data from all EP programs, as well as preliminary analyses examining relationships between specific outcomes. Preliminary analyses are grouped by outcome below. Data is only reported for those users who opted into data sharing for research purposes with UC Davis. Many of the preliminary data summarized in the next section below have been prepared for conference abstracts for wider dissemination.

Client Self-Report Symptoms
The Modified Colorado Symptom Index (MCSI) is 14 items and asks clients to rate the frequency of their symptoms over the past month. Scores range from 0-56 and scores of 16 and above meet “clinical threshold.” This survey is administered to clients in Beehive at baselined and at every 6 months thereafter. In the current

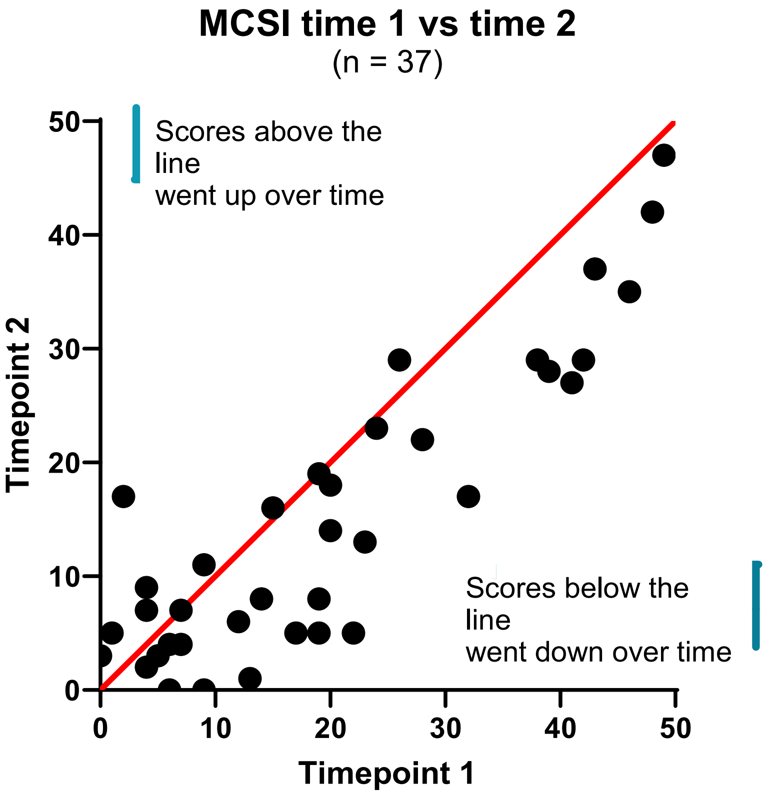
sample, participants completed 326 MCSI surveys across all timepoints. When computing total scores for the MCSI, we excluded surveys that included the response “prefer not to say” (n = 58). In our initial examination, there were 319 complete MCSI surveys from 267 unique individuals across 18 clinics. In that sample, there were 261 surveys with a score for all 14 items from 214 unique individuals.

Figure 4: MCSI total Score Across Time in Program



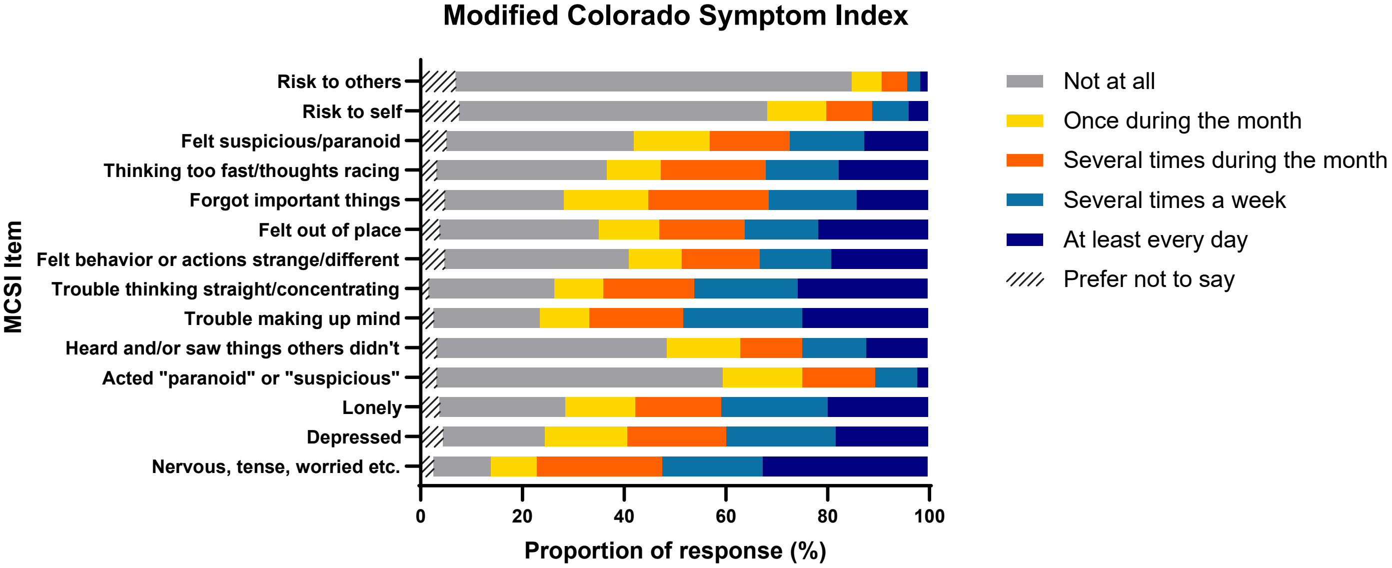
While we did not yet do any formal statistical analysis on MCSI score, we found that there is a pattern of lower scores over time. It is important to note that this is for all participants, even if they have only completed one MCSI survey. We also examined MCSI scores for those who have completed their survey at more than one timepoint. We found that clients who entered data over multiple timepoints tend to have lower scores over time.

Figure 5: MCSI Total Score Across Repeated Timepoints



We also examined responses to each individual MCSI survey question to understand which symptoms clients were endorsing most frequently. We found that clients most frequently endorsed feeling nervous, tense, worried, depressed, trouble making up their mind, and trouble thinking straight and/or concentrating (Figure 15).

Figure 6: Frequency of Symptoms Varies Item to Item



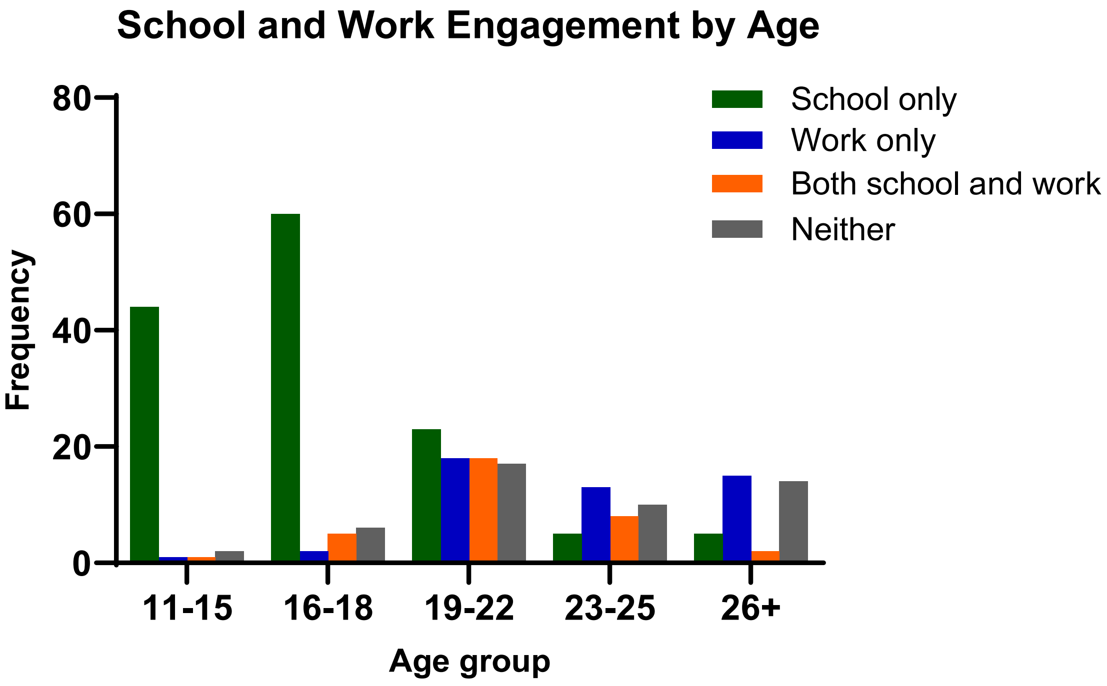
Longitudinal examination of key outcomes is important to understanding how individuals are reporting changes across outcomes of interest over the course of their EP program treatment. This data can offer clinical teams key metrics to track client progress. As data collection continues across EPI-CAL sites, results from an increased sample will be reported.

Client self-reported education, employment, and social activities

We examined outcomes data collected related to service users' self-reported functioning, including survey responses regarding life outlook, social relationships, employment, and education. At the time of the analysis, 287 service users across 20 EPI-CAL clinics have completed surveys on life outlook, education, employment and related activities, and social relationships. In that subset of participants, services users received diagnoses associated with a first episode psychosis (FEP; n = 208, 72%), clinical high risk (CHR; n = 65, 23%), or FEP/CHR status not confirmed (n = 14, 5%). Ages ranged from 11 to 36 (M = 20.01 years, SD = 4.7).

School and work attendance was examined across age groups with 137 individuals (48%) reporting school attendance only (part-time or full-time), 49 individuals (17%) in work only, 34 individuals (12%) in both school and work, and 49 individuals (17%) engaged in neither school nor work. Chi-square analysis was used to examine age group differences between education and employment activities. As expected, there was a significant effect of age on the type of activities that individuals were engaged in ($\chi2(9)=127.75$, $p <0.001$), with younger people proportionally participating in only school to a higher degree than other roles and older adults (26+ years) were engaged in only work or neither work nor school to a higher degree than other age groups (Figure 7).

Figure 7: School and Work Engagement by Age



When asked whether they were engaged in as much work, volunteering, or school as they wanted, 115 (40%) service users either agreed or strongly agreed and 101 (35%) disagreed or strongly disagreed. A linear regression was run to examine the effect of role satisfaction and social relationships on overall life satisfaction as measured by the Personal Wellbeing Index (PWI). Social relationships (belonging to a group of people that share attitudes and beliefs), role satisfaction (feels that current role will help them reach their long-term goals), and participation in education and/or employment activities significantly predicted overall satisfaction with life as a whole (R^2 for overall model 23.1%; $F(5, 238) = 14.27$, $p < .001$).

We found that work and school engagement vary widely across service users in EP programs as the individuals in these programs represent a diverse group that are at different developmental stages in their life. Self-reported social relationship satisfaction, role satisfaction, and work and/or school engagement were significantly related to overall life satisfaction. Therefore, EP service providers must focus on occupational, educational, and social relationship satisfaction as recovery goals for individuals receiving early intervention services.

Medication Taking Behavior

Medication side effects can impact individuals' perceptions of medication efficacy and subsequent medication taking behaviors. In early psychosis intervention (EPI), taking medications as prescribed and having a support person (e.g., family) involved in care are key factors associated with better outcomes. Facilitating communication regarding medication side effects between care providers, support persons, and individuals receiving care may assist in side effect management, shared decision making, and support healthy medication-taking behaviors. As such, it is important to identify whether individuals in care and their primary support person (PSP) report similar patterns of side effects, and whether there are areas for improved communication. The present analysis aimed to investigate whether there are differences in PSP and individual report of medication side effects, characterize any patterns in discordance, and identify areas for potential clinical intervention.

Within the first 6 months of EPI engagement, individuals and their PSPs were asked whether the individual is prescribed any medication. Those who endorsed having at least one prescription medication were administered a modified version of the Glasgow Antipsychotic Side-effect Scale (GASS). We used paired samples T-test examined GASS sum scores to determine whether individuals were systematically reporting more side effects than PSPs. Individual and PSP GASS item level endorsement concordance was evaluated utilizing Cohen’s Kappa. Finally, bivariate correlations were conducted between GASS scores and measures assessing intent to remain in EPI care and taking medication as prescribed. Concordance between PSP, individual, and clinician agreement on medication status was also examined.

In a total sample of 114, agreement of medication prescription status between individuals and PSPs was high ($k = .84$, $p>.001$ at baseline, $k=1.00$, $p>.001$ at 6 months). Individuals who endorsed prescription medication and completed the GASS were examined ($n=54$ at baseline, $n=22$ at 6 months of EPI engagement). At baseline, 80% of individuals ($n=41$) reported taking any medication as prescribed 0-25% of the time; at 6 months, 93% of individuals ($n=14$) reported taking medication as prescribed 0-25% of the time. Paired sample T-test results indicated that individuals and PSPs report similar rates of side effects. However, of the 27 side effect items assessed at baseline, individuals and PSPs showed slight to moderate agreement on 16 items (ranging from $k=.19$ to $k=.47$). At 6 months, only 7 items performed above chance (ranging from $k= .22$ to $k=.48$). GASS scores did not significantly correlate with intent to continue or complete EPI services, medication-taking behaviors, or medication related beliefs. However, individuals’ distress regarding side effects was significantly correlated with concerns that taking medication will do more harm than good ($r=.32$, $p<.05$).

In the present sample, most individuals reported they take medication as prescribed 25% of the time or less. These medication taking behaviors may impact the number of medication side effects individuals experience and reduce overall medication efficacy. Individual and PSP agreement on side effects was moderate to low at baseline and decreased over the course of EPI. Lack of PSP and clinician awareness and communication around individuals’ medication taking behavior may contribute to poor outcomes. Therefore, increased communication between individuals, their support systems, and their care teams is crucial to address individuals’ concerns regarding medication and increase shared decision making.

Adverse Childhood Experiences

Research shows individuals with psychosis often have a history of trauma that contributes to poor outcomes across multiple domains. Trauma is common (Neria et al., 2002; Varese et al., 2012): 6.8% with PTSD in general population vs 23% in first episode psychosis. Up to 80% of youth a clinical high risk for psychosis endorse a lifetime history of traumatic events and victimization during childhood. Trauma is poorly diagnosed in individuals with serious mental illness (Grubaugh et al., 2011). History of trauma exposure in psychosis can lead to more severe symptoms, poorer social relationships, increased substance use, as well as increased risk for hospitalization, homelessness, and suicide (e.g., Grattan et al., 2019).

We examined group differences between individuals who had ACEs Scores of 4+ ("High ACEs Group") as that number of experiences is associated with poorer clinical outcomes. In this preliminary analysis, 302 clients completed the ACEs survey in Beehive at enrollment. In our sample, 17% of individuals reported no history of ACEs, 47% of Individuals reported ACEs in the clinical range, and 26% of individuals reported ACEs levels expected by a 20-year life expectancy decrease (6+).

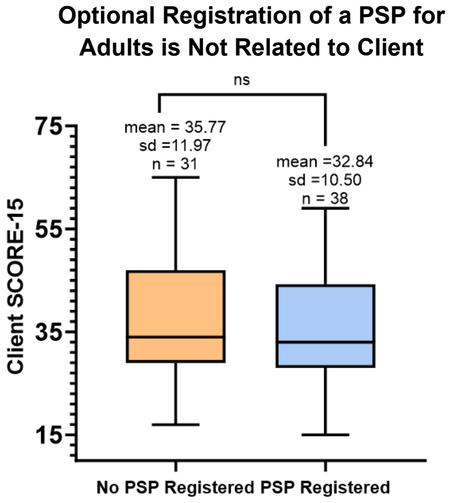
We found that experiences of several adverse childhood experiences (ACEs) in individuals with early psychosis is associated with poorer life outlook, and higher risk of suicidal and homicidal ideation in our preliminary data collected in Beehive. Additionally, individuals with higher ACEs are more likely to have experienced lifetime housing instability and individuals who identify as LGBT are more likely to report higher ACEs. ACEs and other social determinants are likely drivers of poor outcome in early psychosis and should be addressed in treatment.

Adverse Childhood Experiences and Family Functioning

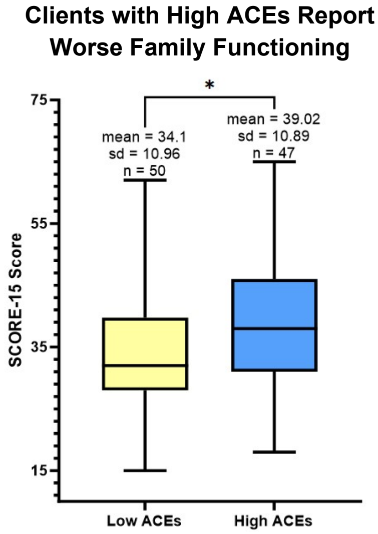
Our qualitative data highlighted how adverse childhood experiences (ACEs) impact the lives of individuals experiencing psychosis. Intensity of traumatic experiences throughout childhood could represent a modulating factor of psychotic symptoms and overall functioning, including family functioning. Beyond psychosis, family functioning can have a moderating effect on the negative impact of ACEs on emotional well-being. This suggests a strong association between ACEs, mental health difficulties, and family functioning, though these relationships have been minimally examined in the context of early psychosis. The current analysis examines the relationships between client ACEs and family functioning as reported by both clients and primary support persons (PSP) in EPI-CAL.

Participants completed the Pediatric ACEs Screening and Related Life-events Screener (PEARLS) and the SCORE-15 in Beehive. In this particular analysis, 217 clients (Ages 12-32, M=19.04, SD=4.28; 71% FEP, 21% CHR, 8% Diagnosis unconfirmed), completed the PEARLS version of the ACEs-10 (M = 3.52, SD = 2.74) at enrollment. They identified as 50.5% female sex at birth; 42% female gender; 73% non-White; 41% Hispanic/Latinx; and 7% were not born in the US. All analyses utilized a subset of items reflective of the original ACEs-10. Adults were asked to rate experiences prior to age 18. ACEs scores of 4+ are considered high risk for poor outcomes. In this sample, 47% respondents had an ACEs score of 4 or higher and are considered high risk for poor outcomes. Clients' self-reported SCORE-15 total scores (n=103, M=33.68) was positively correlated to their ACEs scores (r = 0.295, p=0.002). Conversely, PSP SCORE-15 total (n=71, M=30.13) and subdomain scores were not significantly related to their associated client's ACEs score (r = 0.19, p=0.11). The same pattern was found in each of the three SCORE-15 subdomains (strengths and adaptability, overwhelmed by difficulties, and disrupted communication). Higher SCORE-15 scores indicate worse family functioning. Exploration of matched pairs between client and PSP will be examined as more data is collected.

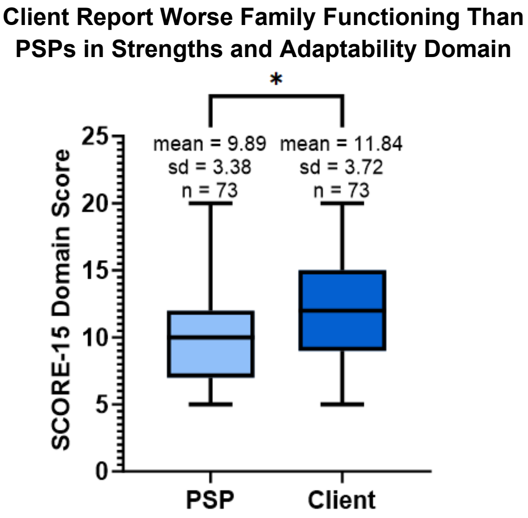
Figure 8: ACEs and Client/PSP Reported Family Functioning (SCORE-15)



Optional Registration of a PSP for Adults is Not Related to Client



Clients with High ACEs Report Worse Family Functioning



Client Report Worse Family Functioning Than PSPs in Strengths and Adaptability Domain

ACEs are common for individuals receiving care in EP programs. These experiences are associated with worse family functioning per client report. Given the importance of family treatments as an evidence-based approach for FEP, and the negative impacts of ACEs on client outcomes, these data suggest that EP programs should identify and treat individuals who experience traumatic events and to target areas of family functioning, with the goal of improving outcomes.

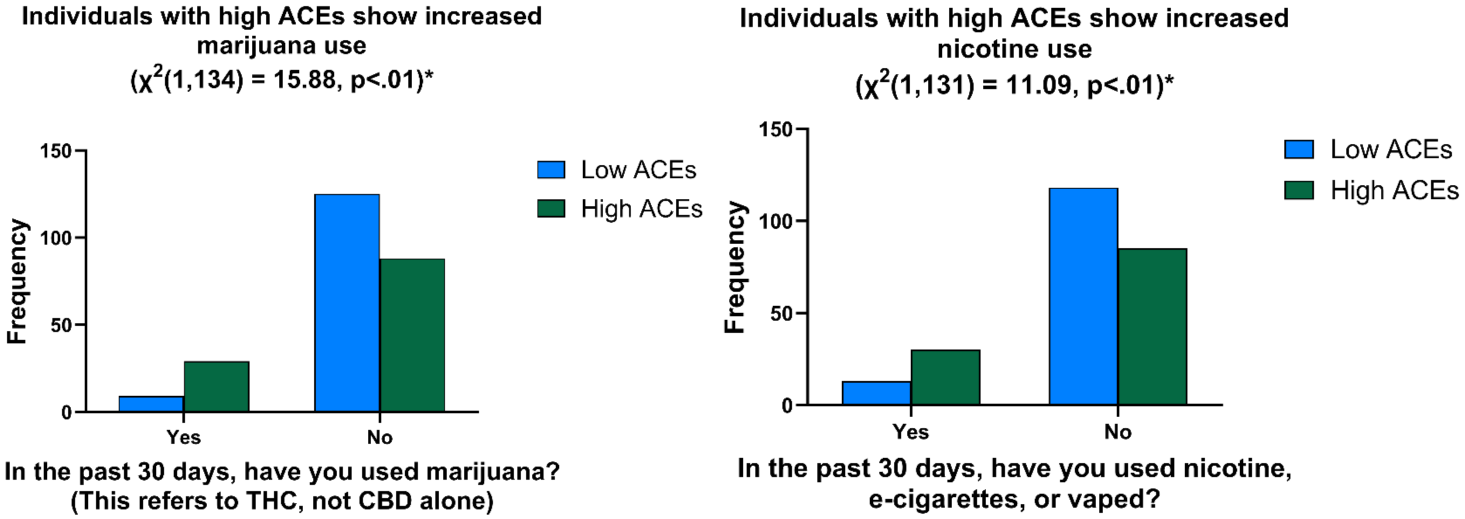
Adverse Childhood Experiences and Substance Use

Higher prevalence of adverse childhood experiences (ACEs) is related to increased rates of psychosis symptoms and substance use (SU) disorders separately. Few studies have jointly examined these factors in the early psychosis (EP) population. We investigated whether individuals in EP programs above clinical threshold for ACEs endorsed SU at higher rates.

Individuals with first episode psychosis (FEP) or at clinical high risk for psychosis (CHR) completed Pediatric ACEs Screening and Related Life-events Screener (PEARLS; adolescent version) and SU surveys. The current analysis used the ACES-10 items and the clinical threshold of ≥4 ACEs. In the SU survey, individuals reported usage of alcohol, marijuana, nicotine, opioids, and stimulants over the past 30 days. 179 clients (ages 12-32) completed the ACEs-10 and SU survey. 86 respondents (48%) had an ACEs score of 4 or higher. 30 clients (16.8%) reported nicotine use, 38 clients (21.2%) reported alcohol use, 27 clients (15.1%) reported marijuana use. Use of opioids and stimulants were minimal in this sample.

Chi-square tests were used to evaluate group differences. Individuals with high ACEs showed increased nicotine and marijuana usage (Figure 9) while there were no significant differences for alcohol usage.

Figure 9: Differences in Substance Use Between High and Low ACEs



Individuals with high ACEs show increased marijuana use ($\chi^2(1,134) = 15.88, p<.01$)*

In the past 30 days, have you used marijuana? (This refers to THC, not CBD alone)

Individuals with high ACEs show increased nicotine use ($\chi^2(1,131) = 11.09, p<.01$)*

In the past 30 days, have you used nicotine, e-cigarettes, or vaped?

We hypothesized individuals with a high number of ACEs would show increased substance use of nicotine, marijuana, alcohol, stimulants, and opioids compared to individuals with a low number of ACEs. There was not enough use of stimulants and opioids to perform analyses (<5). Additionally, we found that individuals who experienced a high number of ACEs showed increased use of nicotine and marijuana only when compared to individuals with low ACEs. Individuals with a high number of ACEs did not show significant differences in alcohol usage when compared to individuals with low ACEs. Highly endorsed questions can help identify specific adverse childhood experiences (ACEs) that are more prevalent among the EP population. Understanding which specific experiences result in increased substance usage can inform targeted interventions and reduce poor outcomes in this population.

Childhood Poverty

Recent studies suggest that CSC is not as effective for individuals with less economic advantage. This is critical, as approximately 37 million, or 12%, Americans, lived in poverty each year between 2020 and 2022. In 2022, 15% of American children lived in poverty, noteworthy because childhood economic disadvantage is predictive of both development of psychosis-spectrum disorders as well as other health problems. To better understand early experiences of poverty of service users in community CSC programs, this current analysis examined experiences of early childhood poverty of EPI-CAL service users and explored how these experiences are related to high-priority clinical outcomes.

CSC service users and their primary support persons (PSP) completed Beehive surveys at EPI-CAL enrollment and every 6 months throughout treatment. PSPs who lived with the service user before they turned five reported subjective poverty indicators experienced in the household during that time. Participants also reported their demographics and clinical outcomes, including symptoms (Modified Colorado Symptom Index (MCSI)), recovery (Questionnaire about the Process of Recovery (QPR)), and quality of life (Personal Wellbeing Index (PWI)). Descriptive analyses summarized demographics and poverty indicators. Independent-samples t-tests were run to determine if there were differences in specific outcomes (MCSI, QPR, and PWI) between service users with and without a history of early poverty, and family-wise error rate was adjusted to correct for multiple comparisons. Chi-square tests were used to examine group differences between specific demographic factors and those with and without childhood poverty experiences.

At enrollment, 165 PSPs (Ages 16-66, M=45.76, SD=9.17) reported on subjective experiences of poverty had by the service user (ages 12-32, M=17.78, SD=3.72; 66% FEP, 27% CHR, 11% Diagnosis Unconfirmed) prior to age five. We found 29 (18%) PSPs who endorsed that the service user had at least one subjective experience of poverty prior to age 5. When examining demographic factors, there was a significant association between race and experience of childhood poverty ($\chi^2(4) = 14.91$, $p < .01$) with African American/Black individuals reporting more childhood poverty experiences than expected. Individuals who had subjective experiences of poverty during childhood reported worse clinical outcomes on the recovery measure at baseline, with individuals without poverty experiences having higher scores on the QPR (M = 34.63, SD = 8.90) than those with poverty experiences (M = 27.94, SD = 11.00; t (49) = 2.31, p = .01, corrected p = .038).

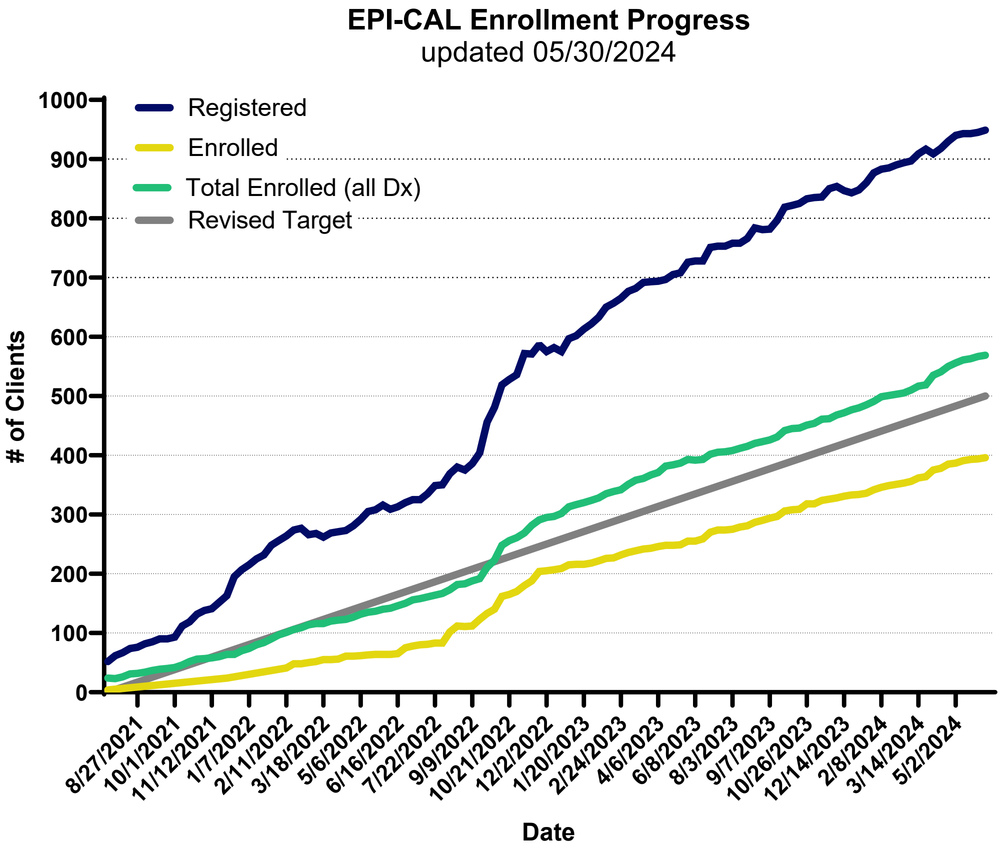
To date, the proportion of individuals with experiences of childhood poverty is higher than the general American population. These experiences of poverty disproportionately affect Black and African American service users. Individuals with these experiences were less likely to agree with statements indicating recovery at their first recorded assessment in CSC. This continues to support that socioeconomic experiences should be considered as a factor contributing to clinical outcomes. Future analyses will examine current socioeconomic status (SES) as a moderator of clinical outcomes at baseline and explore how childhood poverty and current SES may moderate change in clinical outcomes throughout CSC treatment.

7. Submit report on LHCN enrollment and follow up completion rates for LHCN app in all EP programs

LHCN Overview

Figure 10 shows the LHCN Progress towards EPI-CAL Enrollment targets as of May 30, 2024. Service users are considered enrolled if they have completed the Beehive EULA and agreed to share their data with UC Davis for use in research. If service users do not allow their data for use in research but agree to use Beehive as part of clinical care, their data may be used for quality management or quality assurance purposes only. The goal at this point in the project was to have 1364 individuals enrolled (solid dark gray line in figure below). In summer of 2022 we worked with sites to create a revised enrollment target (light gray line) based on observed rates of enrollment up to that point. By this point in the project, the revised goal was to have 498 individuals enrolled. The observed rate of enrollment across the LHCN is 597 service users across all diagnoses (green line in figure below), including 436 service users with a diagnosis that indicates FEP, (the yellow line in figure below). There are an additional 268 service users who are registered by the clinic in Beehive (dark blue line in figure below), but who have not engaged with Beehive by completing the EULA or starting their surveys.

Figure 10: LHCN Progress Towards EPI-CAL Enrollment Targets



Figures 11-12 show a site-by-site breakdown of the proportion of individuals who agreed to data sharing with UC Davis for research purposes as of May 30, 2024. Figure 11 shows all registered service users, regardless of EULA completion status. Hence this figure shows the room for growth if sites support service users to complete their EULA in Beehive if those service users agree to data sharing.

Figure 11: Proportion of Data Sharing with UCD for Research by Site

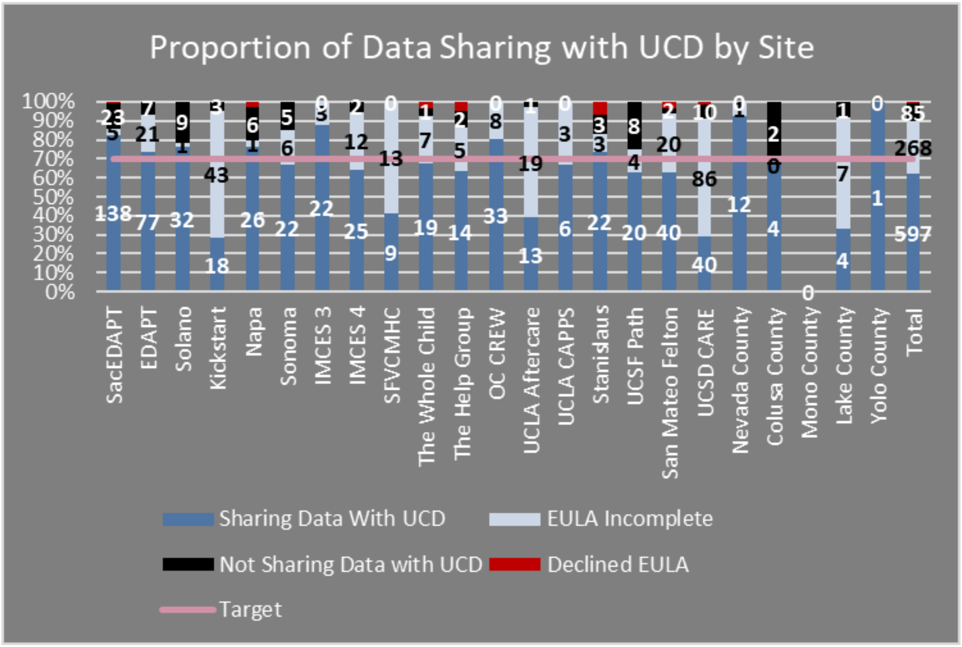
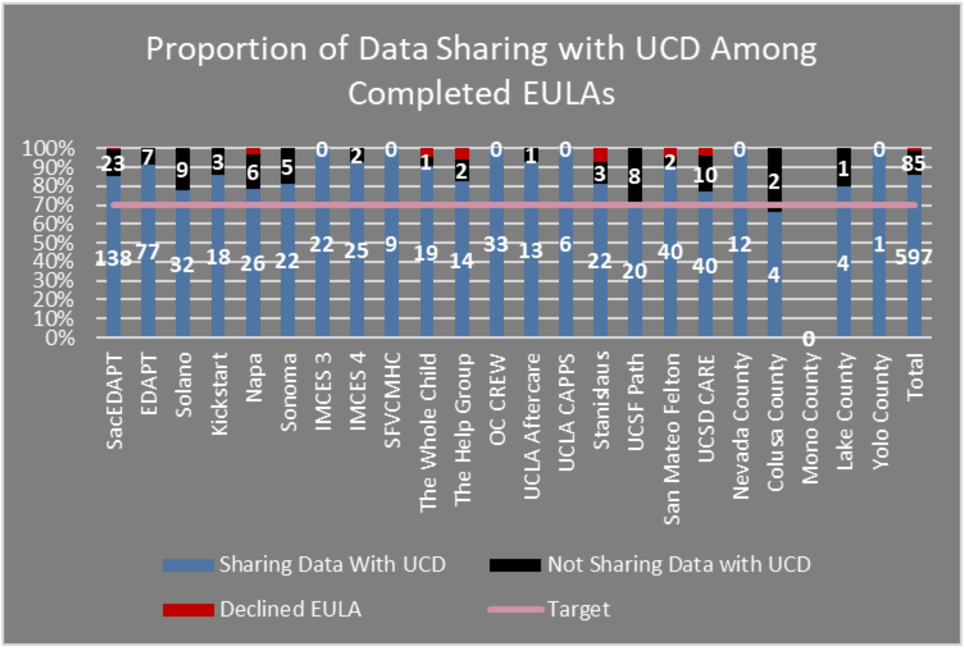


Figure 11 shows the proportion of data sharing choices made by those service users who have completed their EULA in Beehive. We can see that some sites on this graph do not have a bar at all because they do not have any service users who have been registered in Beehive.

Our goal is that 70% of active service users at each site agree to use Beehive and share their data for research purposes. When considering all service users known to EPI-CAL (i.e., all those registered in Beehive), we can see that several sites are meeting this metric. Further, among those individuals who have actually engaged with Beehive and completed the EULA, we are exceeding our target across the network, and at most sites individually as well. When considering all enrolled service users across the LHCN, 88% of service users have agreed to share their data with UC Davis and 83% of service users agreed to share their data with NIH for research purposes.

Figure 12: Proportion of Data Sharing with UCD for Research among Completed EULAs

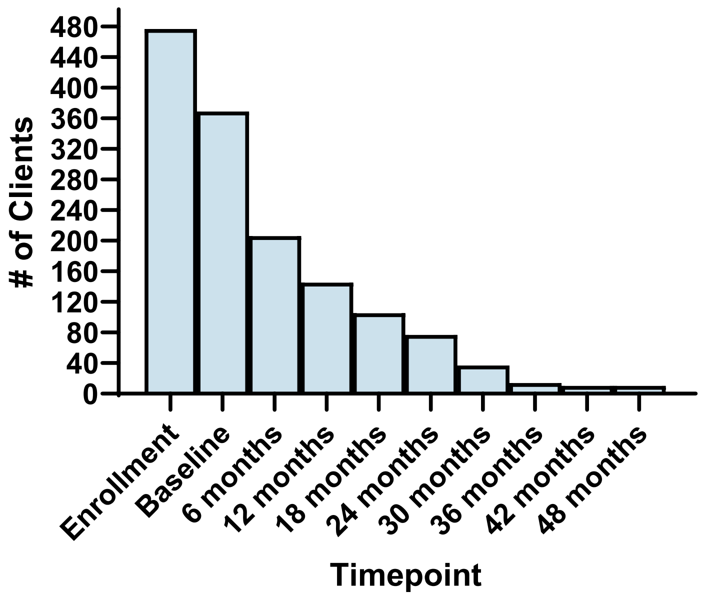


Progress of data collection in all EP programs

As of May 30, 2024, 23 EPI-CAL clinics have registered 1339 service users in Beehive. Of those 1339 service users who have been registered, 51% (n=597) have completed their Beehive EULA and are considered to be enrolled in Beehive. Of those who have completed their EULA, 83% (n=569) have agreed to share their de-identified data with NIH and 88% percent (n=597) have agreed to share their de-identified data with UCD.

Figure 13 shows network-level survey completion rates by time point as of May 30, 2024. Note that all service users are able to complete enrollment surveys regardless of when in their treatment they are enrolled. Service users are not able to complete some survey windows (e.g., baseline) if they are enrolled later in treatment. Some service users have completed surveys at more than one time point. Of the 681 service users who have been enrolled in Beehive, 97% (n=659) have completed at least one survey in Beehive. Of service users who have agreed to share their data with UCD (n = 597), 95% (N = 569) have completed at least one survey. Figure 13 shows survey completion by timepoint for individuals who have agreed to share their data with UCD

Figure 13: Survey Completion Rates Across EPI-CAL Network


Service Users who've completed at least 1 survey by timepoint (out of 597)

Here we report demographic information that is completed at registration, which is a subset of the demographic questions that are asked in Beehive (Table 5). Complete demographic information, including all required PEI fields, are administered via a required service-user-entered Beehive survey. For any cell that has an N less than 5 individuals, this data was masked and both the N and proportion cells were updated with “<5” and “<1%”, respectively. If there were 0 individuals who endorsed a response option in the demographic surveys, the category is not represented on Table 5 (e.g., Genderqueer/gender non-conforming in the gender category); we will continue to add categories to each demographic variable if there are ≥1 individuals in each respective category.

Table 5: Demographic Data from all Participating EPI-CAL Clinics

EPI-CAL Combined Demographics, n = 597 (through 05/30/2024)		
Display Language	**N**	**%**
English	583	98%
Spanish	12	2%
Missing	<5	<1%
Age	**N**	**%**
<12	<5	<1%
12-17	202	34%
18-23	279	47%
≥24	114	19%
Sex at Birth	**N**	**%**

Female	293	50%
Male	293	49%
Intersex	<5	<1%
None of these describe me	<5	<1%
Prefer not to respond	<5	<1%
Gender	**N**	**%**
Female	252	42%
Male	281	47%
Non-binary	24	4%
Transgender	9	2%
Queer	<5	<1%
Questioning or unsure of gender identity	5	1%
Other	7	1%
Prefer not to say	15	3%
Missing	<5	<1%
Pronouns	**N**	**%**
He/Him	253	42%
She/Her	213	36%
They/Them	27	5%
Other	5	1%
Missing	99	17%
Race	**N**	**%**
African/African American/Black	70	12%
Asian	61	10%
American Indian/Alaskan Native	<5	<1%
Hispanic/Latinx Only	192	32%
White/Caucasian	182	30%
More than one race	51	9%
Unsure/Don’t Know	12	2%
Missing	<5	<1%
Ethnicity	**N**	**%**
No - I do not identify as Hispanic/Latinx	215	54%
Yes - I identify as Hispanic/Latinx	321	36%
Unsure/Don’t know	57	10%

Missing	<5	<1%

Additionally, providers are asked to enter a service user's diagnosis when they register individuals in Beehive, which is reported in Table 6. In the same manner as the table above, cells with less than 5 individuals were masked and both the N and proportion cells were updated with "<5" and "<1%", respectively. Diagnoses are grouped according to two classes of early psychosis: 1) individuals who are deemed to be at clinical high risk for psychosis (CHR), and 2) individuals who have experienced psychotic level symptoms (First Episode Psychosis, FEP). There is also a section for those individuals for which their FEP or CHR status is not yet confirmed. This reflects the wide range of psychosis diagnoses that are served by the EP clinics represented in this sample.

Table 6: Client Diagnoses from all Participating EPI-CAL Clinics

EPI-CAL Combined Diagnoses, n = 597 (through 05/30/2024)	**N**	**%**
Clinical High Risk (CHR)		
Attenuated Psychosis Symptoms	35	6%
Genetic Risk and Deterioration Syndrome (GRDS)	<5	<1%
Other	73	12%
First Episode Psychosis (FEP)		
Substance Induced Psychotic Disorder with onset during intoxication	7	1%
Mood disorders with psychotic features	75	13%
Schizoaffective Disorder (Bipolar or Depressive Type Combined)	39	7%
Schizophrenia	86	15%
Schizophreniform Disorder	12	2%
Delusional Disorder	<5	<1%
Brief Psychotic Disorder	<5	<1%
Other Specified Schizophrenia Spectrum Disorder	17	3%
Unspecified Psychosis	74	13%
Other FEP	90	15%
CHR or FEP Status Not Confirmed	61	10%
*Anxiety Disorders**	*17*	*3%*
*Mood Disorders**	*40*	*7%*
*Other Diagnoses**	*26*	*4%*
Not enough Information	<5	<1%
Missing	20	3%

**Individuals may be counted more than once for these diagnoses*

8. Provide report on ongoing issues and suggestions on the app/dashboard from EP program staff and other stakeholders

Over the last project period, we have made changes and improvements to Beehive based on project needs as well as feedback from programs and community partners. Annual penetration testing (pentesting) was conducted in Beehive between May 21, 2024 and June 3, 2024. Any issues documented from this pentesting will be fixed and implemented in the application as soon as possible and before September 2024.

Over this last project period, we have also been revising the Beehive EULA video. Our in-house process for creating the video would not have allowed us to create a video for each California threshold language, as the software we were using could not support all required languages. We have been working with an external vendor, Planet Nutshell, to revise the existing English EULA video, as well as localize across all of the California threshold languages. This new video will also be several minutes shorter than the original video which should address some concerns from community partners. We should receive the English, Spanish, Vietnamese, and Arabic videos by June 30, 2024. EULA videos for additional languages, starting with Armenian, Mandarin, and Cantonese, will be implemented next. Because languages cannot be fully implemented without a corresponding EULA video, we have not been able to launch Armenian or Simplified Chinese in Beehive, even though surveys and Beehive text strings are localized and ready to launch.

Table 7: Updates to Beehive

Date	**Changes to Beehive**
01/25/2024	• Simplified login for all users. If you are an SSO user, Beehive will detect which SSO to use and you will be brought to the appropriate page. If your institution does not use SSO, the Beehive login process will proceed as normal. • Clarified text on password requirements modal (shown when creating a password) to indicate that spaces are not allowed in passwords • Added a “hide/unhide” toggle to password field (regular login only, not applicable to SSO) • Forgot password link expiration time is set to 20 minutes (not applicable to SSO users) • Captcha has been added to the forgot password workflow (not applicable to SSO users) • Removed irrelevant link to reset password for SSO users • Made it easier for a new user to log-in on iOS app after a client or PSP completes surveys. You do not have to force quit the application anymore to sign in as a new user. • Added SSO for Stanford health users • Bug fixes
02/06/2024	• Bug fixes
02/15/2024	• SSO users will no longer be asked to set an irrelevant personal password during registration process • Security upgrade: when changing password, users cannot reuse current or last 2 passwords • “Relationship_other” variable is now available in Support Person Demographics report which makes the free text for “other please specify” available in this report • Bug fixes

02/23/2024	• Bug fixes
03/05/2024	• Re-use of mobile numbers across multiple clients and PSPs is allowed. If the number you are entering matches one that is already assigned to another client or PSP in Beehive, you will see a warning that encourages you to verify you are entering the correct number. But there are no longer any restrictions on re-use of phone numbers for clients and PSPs. • Users can search client list by phone number to find all clients and PSPs associated with a phone number. Note, that if the matching client/PSP belongs to a clinic that you do not have access to, you will see a message indicating as such. • OTP alternative for Clients and PSPs: Now in addition to being able to attempt to re-send the OTP, clients can complete an alternative method of verifying themselves to log into Beehive weblink. They will be asked to enter two fields that are linked to their Beehive profiles (entered by the clinic at registration) such as First name, Last name, Date of Birth, and zipcode (Clients only, since zipcode is not part of PSP registration). They must also complete Captcha. OTP is still the primary way that clients and PSPs will verify their access to Beehive weblink, but now they have a back-up option. • Clients and PSPs can reply “PAUSE” to their SMS weblink in order to suspend SMS weblink without the clinic needing to update the profile. If they do this, it will automatically update their profile page in Beehive to uncheck the “Text” option for weblink and it will show a message including the date that the SMS weblink was turned off. Note that if multiple users are sharing a phone number the user can either turn off weblink for EVERYONE using that number or are instructed to contact the clinic if only one or some individuals using the phone number want to suspend SMS weblink. If users want to turn SMS weblink back on in the future, clinic users can do this by updating the client or PSP profile(s). • Added Armenian as a display language • Bug fixes
03/15/2024	• Bug fixes
3/19/2024	• User-Interface updates to client list based on community partner feedback • User-interface updates to urgent clinical issues list and resolution pop-up based on community partner feedback • Added more filters to client list and urgent clinical issues page • Added sorting to client list and urgent clinical issues page • Bug fixes
03/22/2024	• Bug fixes
03/28/2024	• Bug fixes
04/16/2024	• Added “clinician-entered data” tab to “survey status” page on web app • Workflow updates to client registration workflow to reduce number of clicks & screens seen when entering a new client in order to streamline and reduce time to complete. • Added ability to customize weblink frequency and delivery time for each service user and support person • Added a data submission workflow for data collected outside of Beehive to accommodate workflow of several LHCN sites. • Bug fixes
05/01/2024	• Improvements to survey dropdowns on data visualizations and survey results page based on requests from users

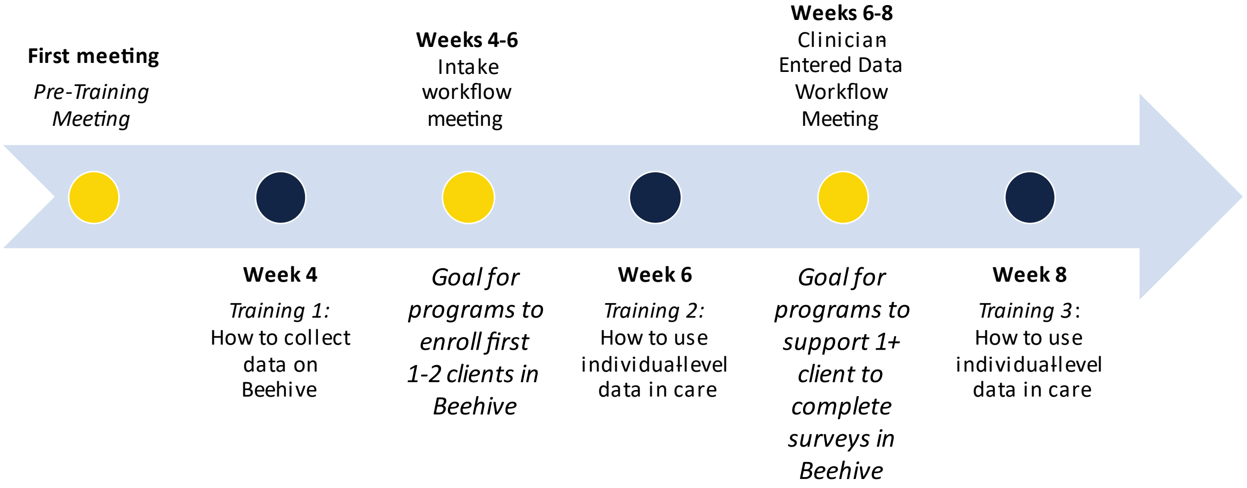
	• Bug fixes
05/07/2024	• Bug fixes
05/14/2024	• Updated the interface for user-control of notifications. In your user-profile, you will now see all of the notification settings grouped together. There is also a new option for clinic and group admin to turn off notifications for clients that aren’t assigned to them. • When relevant, email notifications (for example, “ask for help” or “urgent clinical issue”) now include the GUID of the client or PSP who triggered the notification • On the survey status page for clinician-entered data, changed text from “click to start” to “not started” to clarify that this is informational text (not a button you can select) • Added Simplified Chinese as a display language • Bug fixes
6/5/2024	• Bug fixes
06/12/2024	• Updated the interface for in-app notifications based on user feedback. Added filtering, search bar, and archive options to promote usability. • Added Traditional Chinese as a display language • Bug fixes
06/25/2024 (anticipated)	• Pentesting Fixes • Improvements to reports user-interface

9. Provide training and implementation of outcomes measurement on app in EP programs

The core Beehive training series is provided synchronously and remotely to all participating LHCN programs. The core trainings begin with a pre-training meeting with leadership at the program to discuss which program staff members would be designated as providers, group analysts, or group and clinic admin in Beehive (roles described below), as well as to cover topics around integrating Beehive into their current data collection system. Next, we conduct a training series consisting of three training sessions to introduce Beehive to each program (Part 1, Part 2, and Part 3) with all program staff, and an intake-workflow meeting and clinic-entered data workflow meeting with key clinic staff to understand clinic workflow and brainstorm how to best implement Beehive within their program context (Figure 14).

Figure 14: Beehive Training Schedule

Training Schedule



The first Beehive trainings began with our pilot programs in March 2021. In June 2021, we began to onboard non-pilot programs, starting with the Los Angeles County PIER programs. See table below for all core trainings conducted through December 2023. Note that booster trainings (for entire program or for individuals at the program) have also been conducted in addition to the core trainings and are not included on the table below. We have also added all of the training modules for Beehive trainings part 1 through 3 to a learning management system, Cornerstone. Our team has enrolled all staff and providers from participating programs in Cornerstone so that they can access asynchronous training materials at any time. Individuals who are new to each program may also access Cornerstone training materials.

Table 8: EPI-CAL Site Training Completion

Site	Pre-Training	Training 1	Intake Workflow	Training 2	Training 3
UCD SacEDAPT	3/10/2021	3/22/2021	3/10/2021	4/5/2021	6/14/2021
UCD EDAPT	3/10/2021	3/22/2021	3/10/2021	4/5/2021	6/14/2021
Solano SOAR	3/18/2021	3/22/2021	3/29/2021	4/12/2021	6/7/2021
Napa SOAR	7/23/2021	8/19/2021	10/21/2021	10/14/2021	12/2/2021
Sonoma SOAR	8/24/2021	9/29/2021	10/21/2021	10/14/2021	12/2/2021
Kickstart Pathways	3/24/2021	3/31/2021	6/8/2021	4/14/2021	7/28/2021
LAC- IMCES 3	5/10/2021	6/21/2021	8/11/2021	11/10/2021	12/8/2021
LAC - IMCES 4	5/10/2021	6/21/2021	8/11/2021	11/10/2021	12/8/2021
LAC - SFVCMHC	5/11/2021	6/18/2021	7/19/2021	11/18/2021	12/9/2021

LAC- The Whole Child	5/13/2021	6/17/2021	7/21/2021	11/23/2021	1/25/2022
LAC- The Help Group	5/14/2021	6/14/2021	8/10/2021	11/29/2021	1/5/2022
OC CREW	7/13/2021	8/12/2021	8/23/2021	10/13/2021	12/8/2021
San Mateo Felton	7/14/2021	10/20/2021	12/9/2021	7/13/2022	12/6/2022 & 6/13/2023
UCLA - Aftercare	7/29/21	9/1/2021	2/9/2022	5/20/2022	6/8/2023
UCLA - CAPPS	9/23/2021	11/22/2021	2/1/2022	5/3/2022	TBD
UCSF PATH	9/21/2021	5/6/2022	5/25/2022	10/28/2022	TBD
UCSD CARE	4/7/2022	5/23/2022	7/15/2022	9/30/2022	11/7/2022
Stanislaus LIFE Path	2/23/2022	4/8/2022	5/10/2022	5/31/2022	9/22/2022
Stanford INSPIRE	3/21/2023	4/26/2023	5/23/2023	TBD	TBD
MCC	2/8/2023	3/9/2023 & 3/28/2023	4/7/2023	5/1/2023	6/9/2023
Lake County	4/21/2023	6/23/2023	9/7/2023	11/20/2023	TBD
Totals	**21**	**20**	**21**	**20**	**17**

Pre-Training Meeting

The pre-training meeting is conducted between EPI-CAL staff, including the site's assigned point person, site leadership, and a site IT representative. The purpose of this meeting is to introduce the training schedule and gather information to facilitate the first Beehive training. For example, the site leadership are invited to Beehive to create their accounts and test network compatibility (e.g., ensure that invite emails are not blocked by institution, ensure that program staff can access web application). The IT representative is engaged as needed to resolve technical issues (e.g., add beehive email address to approved senders list). Site leadership complete their account registration ahead of the Part 1 training as they will be inviting all other program staff from their clinic to Beehive.

Part 1 Training

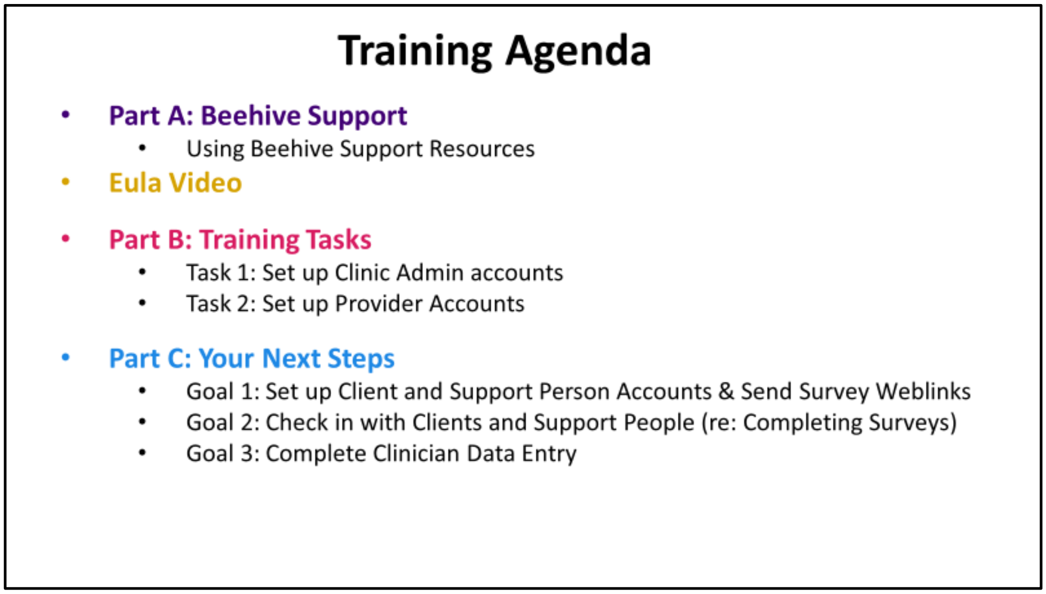
The general outline for the first training is as follows:

1. Re-introduction to the EPI-CAL project, including the overarching purpose and goals of data collection via Beehive
2. Presentation on the value of Beehive and data collection
3. Beehive Application training session (see Figure 14)

Presentation- "The Value of Beehive and Data Collection"

An EPI-CAL team member, Leigh Smith, Ph.D., gives a brief pre-recorded presentation that first focuses on how Beehive was developed using input from stakeholders and providers. Next, she provides a historical example of data collection that led to significant innovation in health care by giving a brief vignette of John Snow's work with the Cholera outbreak in London in 1854. She then draws parallels between Snow's work and how Beehive was designed, focusing on a meaningful connection between providers and stakeholders, a holistic approach to data collection, and prioritization of record keeping through automation and data consolidation. After, she speaks about Beehive's power to facilitate dialogue between providers and consumers, and within/between clinics, through reports provided by the Beehive team or generated within Beehive. Dr. Smith covers the purpose of participating in a Learning Health Care Network (LHCN), and how valuable information collection can be in informing treatment. Finally, she emphasizes the ability of Beehive's data collection in shaping care by illustrating how over a million points of data can be generated if each of the EPI-CAL clinics enrolled 80% of their consumers and completed the baseline and two follow-up surveys in the first year.

Figure 15: Training Agenda



Training Agenda

- **Part A: Beehive Support**
  - Using Beehive Support Resources
- **Eula Video**
- **Part B: Training Tasks**
  - Task 1: Set up Clinic Admin accounts
  - Task 2: Set up Provider Accounts
- **Part C: Your Next Steps**
  - Goal 1: Set up Client and Support Person Accounts & Send Survey Weblinks
  - Goal 2: Check in with Clients and Support People (re: Completing Surveys)
  - Goal 3: Complete Clinician Data Entry

Part A: Using Beehive Support Resources
We provide all EP program staff with the link to our detailed resource guide, accessed here: https://sites.google.com/view/beehiveguide/home

The resource guide was created so that EP program staff may reference, in detail, how to use the Beehive application and complete the tasks reviewed during the training. This includes: Creating Clinic or Group Admin Account & Inviting them to Beehive, Accepting Beehive Invite & Completing Registration, and Adding a Provider and Inviting them to Beehive. The resource guide also provides information on how to complete the "homework" that was assigned during the first training, including Adding a Consumer & Support Person and Completing Clinician Data Entry.

End User License Agreement (EULA) Video
We show the EULA video to all EP program staff for two reasons: 1) to streamline the registration process for staff during the training (as all users watch this video as part of the registration process), and 2) to orient them to what consumers and families also see when they first access the Beehive system. The EULA video can be accessed here: https://youtu.be/3E8hiEkIvSQ. (Spanish: https://youtu.be/UgY7ZUhe-Fk Vietnamese: https://youtu.be/NqdC51TqGc0). We developed the EULA video through focus groups with EPI-CAL community partners (consumers, family members and providers) to ensure that core aspects of Beehive (e.g., security, consent, and data sharing) were clear to users. The EULA video describes what Beehive is and how it is part of the EPI-CAL project, the purpose of Beehive, how data is shared and stored, and users' options for data sharing. Every new user of Beehive will be presented with the EULA video before making their data sharing choices.

Part B: Training Tasks: Setting up Clinic Admin/Provider Accounts and Registering Consumers

There are three main types of accounts in Beehive; each account is associated with the ability to complete certain actions in the Beehive system in line with that person's job duties:

- Group Admin account: For program-level staff members who provide supervision and administrative support across clinics within a particular group – for example, a Group Admin is a person whose position includes oversight of activities at more than one clinic.
- Clinic Admin account: For staff members who provide supervision and administrative support within a specific clinic in a group.
- Provider account: For staff members providing direct services to consumers in a particular clinic, for example therapists, prescribers, and peer support specialists.

There is a general hierarchical structure to the relationship between these account types, such as who can invite new users and who can download data from Beehive.

The first training task is to set up Clinic Admin and Provider accounts in Beehive. For the initial Part 1 trainings, EPI-CAL staff created Group and Clinic Admin accounts prior to the first training meeting and sent those specific users their invitations during the live training (for trainings of non-pilot programs, EPI-CAL staff assist all admin users to register at the pre-training meeting). Once participants with Clinic Admin-level accounts accept their invitations and completed the registration process, EPI-CAL staff guide them through creating provider-level accounts for their staff and inviting those staff to complete registration in Beehive. For programs utilizing a Single Sign-On (SSO) authentication scheme, the EPI-CAL staff also walk them through the process to log in through their institution.

Part C: Next Steps

Once all providers conclude the registration process, EPI-CAL staff demonstrate the process of registering a consumer and their support persons. Next, the survey collection timeline is introduced. Baseline surveys are available for four months after the consumer's intake date. After baseline, follow up surveys are sent, which are due every 6 months from baseline will open two months prior to the due date and close four months after the due date. Next, the process for consumers and primary support persons to complete/request help to complete surveys is shown, along with the steps to manually resend surveys. Participants are then given the goal to register two consumers and their support persons (if applicable) in Beehive, and have the consumers complete their surveys before the next training session (see Figure 16). These consumers can be at any point in treatment when they are enrolled in Beehive. A Beehive consumer introductory script is provided to support the program staff in talking about Beehive to potential participants.

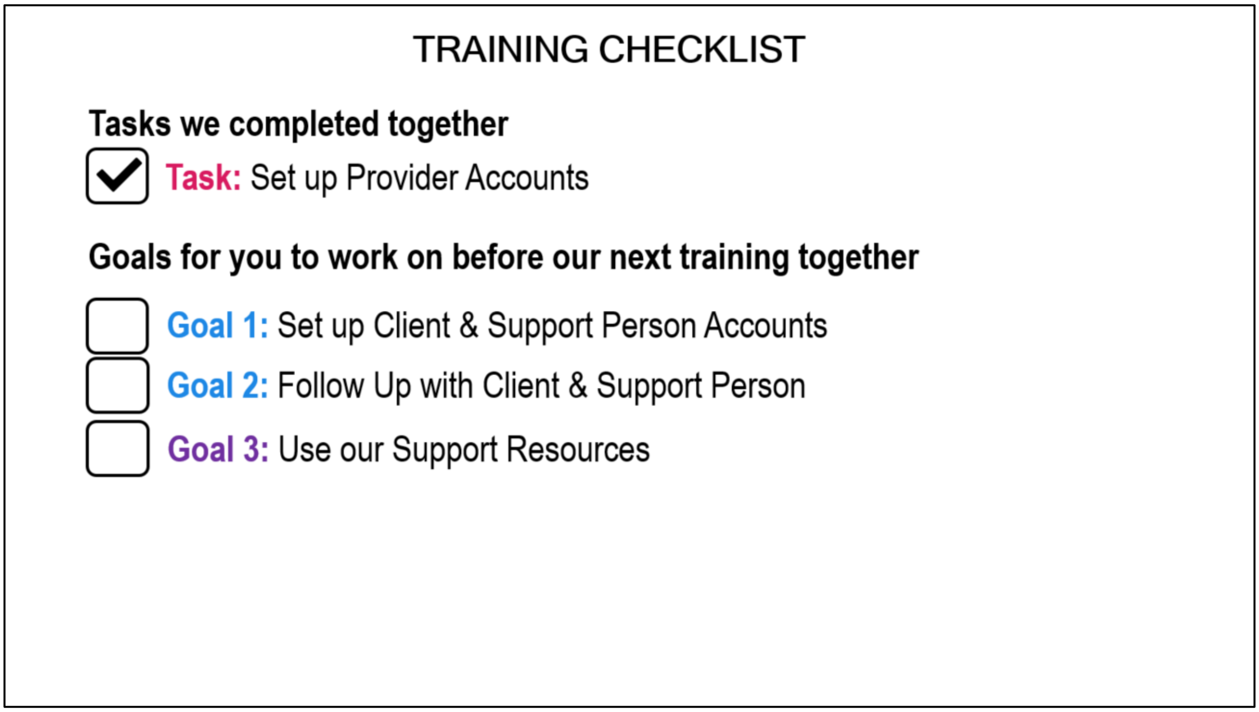


Figure 16: Training Checklist

TRAINING CHECKLIST

Tasks we completed together

☑ **Task:** Set up Provider Accounts

Goals for you to work on before our next training together

☐ **Goal 1:** Set up Client & Support Person Accounts

☐ **Goal 2:** Follow Up with Client & Support Person

☐ **Goal 3:** Use our Support Resources

Intake Workflow Meeting

After the Part 1 Training, EPI-CAL staff, including the program’s point person, meet with the program’s key staff involved in intakes. The purpose of this meeting is to understand the program’s current workflow to facilitate a smooth transition to implementing Beehive. Once EPI-CAL team have a basic understanding of the program’s intake process, they ask questions to operationalize how Beehive will be integrated into this process (e.g., “Who will be responsible for registering clients in Beehive?”). They may offer suggestions or ideas based on what has worked at other programs. The goal of this meeting is to create an initial plan for the program to introduce Beehive into their current workflow.

Part 2 Training

The second Beehive training focuses on how providers can utilize individual level data in care. The Beehive team introduces the EPI-CAL Core Assessment Battery (CAB), including its domains and how these domains were selected from stakeholder input. Next, the trainer presents two surveys from the EPI-CAL CAB: the Modified Colorado Symptom Index (MCSI) and the Questionnaire about the Process of Recovery (QPR). Then, the trainer shows participants where to find consumer data in Beehive. The trainer then demonstrates how to present the data visualizations available in Beehive and asks the group what questions or concerns the sample visualizations elicit from them. Participants then participate in small group exercises focused on example data visualizations of the MCSI with the goals of 1) exercising their data comprehension skills and 2) practicing using data to explore a consumer’s story.

During small group exercises, an example consumer’s MCSI scores are displayed, and participants are prompted to discuss the “story” that could be illustrated by this data set. For example, providers are presented with a graph in which MCSI scores are going up over time (indicating more frequent and/or distressing symptoms; Figure 17A) and then asked to interpret possible situations that could be leading to these data trends for this sample consumer. After providers correctly identify that the example consumer is experiencing an increase in frequency and/or number of symptoms, they are asked how they might use this information in treatment (e.g., modify the consumer’s treatment plan to help reduce the frequency of these symptoms).

Figure 17: MCSI Example Graphs from Beehive

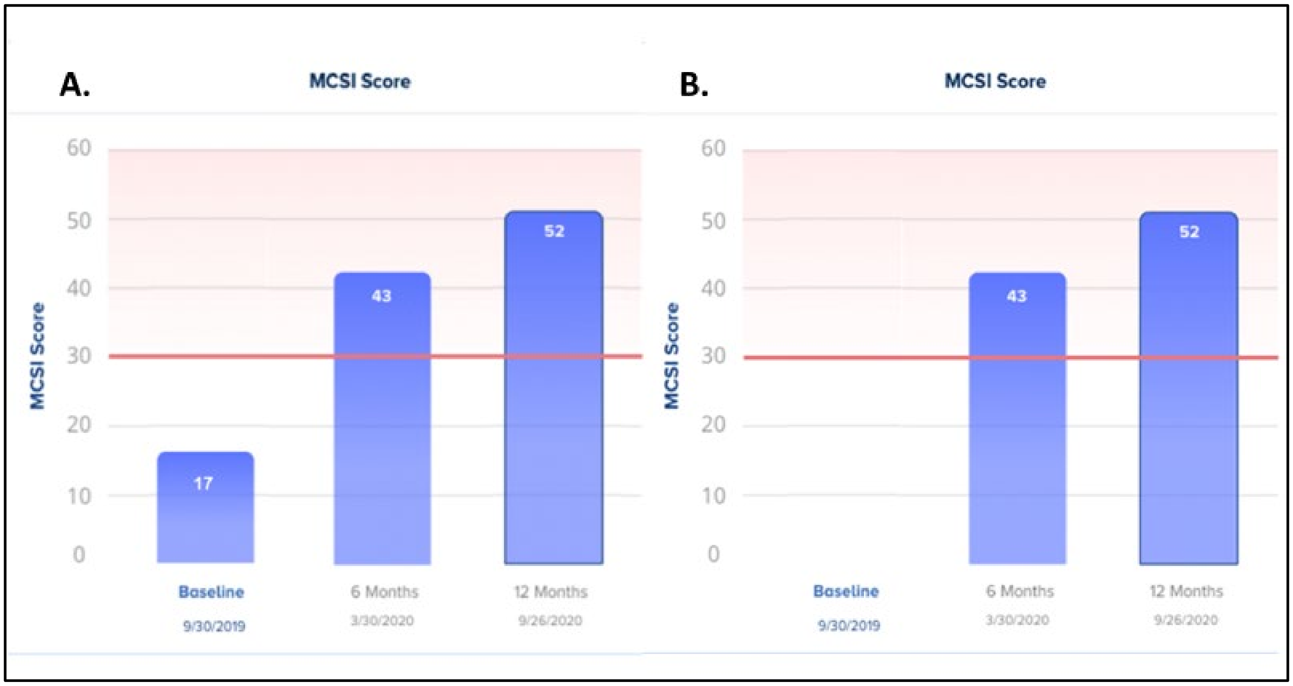


Figure legend: A. Representation of data showing increasing trend in MCSI symptom severity; B. Representation of how missing data (shown here at baseline) impacts the visualization

After these exercises conclude, small groups reconvene back into the larger group, with a member from each group presenting their group's discussion/findings to the rest of the site as a whole. As each small group has different themes and discussions that come up during the exercises, the larger group discussion is meant to help to broaden participants' understanding of data interpretation.

Next, the training details the types of urgent clinical issues that are currently tracked by Beehive, including "Risk to self", "Risk to others", "Risk of homelessness," and "Plan to stop taking medication". These issues were identified during focus groups with EP program stakeholders as critical moments for intervention during treatment. The training team also explains where each one of these alerts can be triggered within the assessment battery. Importantly, we stress that Urgent Clinical Issues in Beehive are not a replacement for each clinic's standard risk management procedures; instead, Beehive can be used as an additional tool to inform their standard risk management approaches. We also cover how to resolve urgent clinical issues using the responses programmed into Beehive (i.e., "Modified treatment plan", "Conducted risk assessment" or "Sent for emergency care") as appropriate for these alerts.

To conclude the training, the trainer introduces the "Data Use in Care" question pop up and its different response options. This pop-up appears intermittently when a user leaves a page on Beehive which displays consumer's data. It asks the user whether they reviewed the data with the consumer or family and then asks them how the data impacted treatment. These response options are the same as the response options programmed into the urgent clinical issues – the training team intentionally takes the approach of presenting these two Beehive features together to help maximize participant comprehension. These data will contribute to a data-driven understanding of Beehive's impact (e.g., whether and how staff use data as part of treatment) on the participating programs of the LHCN.

Data-Entry Workflow Meeting

After the Part 2 Training, EPI-CAL staff, including the program's point person, meet with the program leadership. The purpose of this meeting is to help the program create a reasonably sustainable plan for completing clinic-entered data about each client's clinical outcomes in Beehive. The EPI-CAL team will ask questions to understand whether there is an existing data-entry workflow already in place as well as which roles on the teams are involved in the process. Once the EPI-CAL team has an understanding of the program's existing data-entry workflow, they ask questions to operationalize how Beehive will be integrated into this process (e.g., "Who will be responsible for entering clinic-entered data for clients?"). They may offer suggestions or ideas based on what has worked at other programs. The goal of this meeting is to support the program to create an initial plan to complete clinic-entered surveys about key client outcomes. This should include a plan for which team members will monitor and track completion and which team members will enter the data.

Part 3 Training

Part 3 training revolves around applying and expanding the data interpreting skills gained in Part 2 training, with actual data from consumers that was collected after the last (Part 2) training. During Part 3 training, participants are oriented on how to input and view Clinic-entered data and how to assign additional surveys to consumers, and how to close and re-open client episodes in Beehive.

Part 3 training also familiarizes participants to two more measures included in the Core Assessment Battery: the SCORE-15 and the Burden Assessment Scale (BAS). These measures were selected because they both capture quantifiable scores on domains (family impact and family burden, respectively) that were identified as high priorities by EP community partners during EPI-CAL outcomes focus groups. These measures were chosen for this training as, like the Modified Colorado Symptom Index and Questionnaire on the Process of Recovery covered in Part 2 Training, they are scored measures which are visualized in Beehive.

Next, participants are split into small groups, and given a GUID of a consumer that receives services at their clinic and has completed surveys in Beehive. This is to ensure that each small group has real-world data to interpret. At the beginning of the small group, an EPI-CAL team member orients the group to a worksheet which includes training activities and discussion questions about finding, interpreting, and using consumer data as part of care. As these trainings require participants to examine their consumer's data (i.e., PHI), EPI-CAL training team members are only present for the beginning of the small group exercise to introduce the activity, but they leave prior to any discussion or sharing of PHI. EPI-CAL staff encourage each participant to take an active role within the small group: note taker, screen sharer, delegate to report during large group debrief, etc. Each small group uses the small group worksheet to guide their time in the small group.

After the small group exercise, participants rejoin the larger group to share their findings. After each small group has presented their findings with the rest of the groups as a whole, the EPI-CAL team facilitates a large group discussion which encourages participants to look for trends and assess what they could mean. After examining common patterns in the data, the training team encourages participants to view their consumer's data through this analytical lens and demonstrate how their treatment plans could benefit from this approach.

Implementation Support After Initial Beehive Trainings

Each program has an EPI-CAL staff point person to provide regular check-ins to provide training and implementation support. The point persons are introduced during pre-training and the Beehive training series. Initially, we request weekly meetings or calls with key program staff (as determined by the program). At these meetings, point persons can help programs troubleshoot issues and support staff with accessing resources and learning to use Beehive.

In addition to regular check-ins with key program staff, point persons may also provide booster trainings to individuals at the program or to groups of program staff. These may be conducted remotely via web conferencing or in-person for sites that have resumed in-office operations.

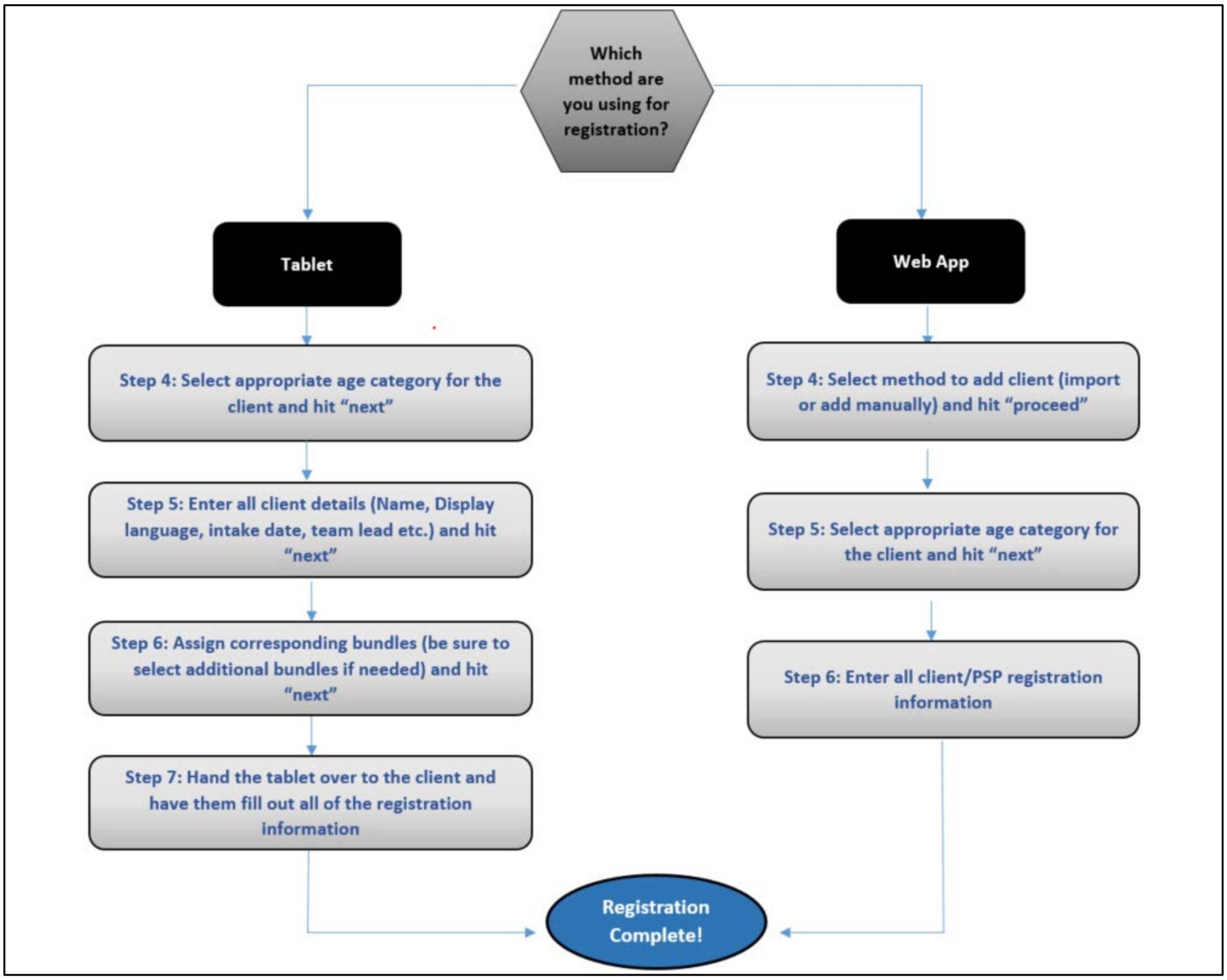
Point persons will also respond to ad hoc requests from the program for technical support and troubleshooting. For example, if a program experiences a bug or glitch while using Beehive, they are told to contact their point person who can help to troubleshoot or escalate this report.

Tablet Training

The Beehive application is available as both a web application and on tablets (i.e., iOS application). The tablet application is intended for clients who are receiving in-person services in the clinic or in the community. Due to the prevalence of telehealth and low incidence of in-person appointments, most sites did not plan to use the tablet application at the time of their initial core trainings. The EPI-CAL team developed a standalone tablet training to offer to sites on-demand whenever needed.

The tablet training covers the differences between registering clients and administering surveys on the iOS app as compared to the web application. It also covers several iOS app specific features such as the client individual check-in and group check-in features.

Figure 18: Diagram showing workflow differences in client registration based on environment



In the past year, only three programs have asked for this tablet training (OC CREW, San Mateo Felton, and Stanislaus LIFE Path). Other sites chose not to schedule a synchronous training, but rather have relied on the training materials and resource guide as they have begun to use the iOS application. We will continue to offer the live tablet training as needed, or refer staff to our asynchronous training materials.

Training Via Cornerstone

The full Beehive training series is also available to anyone in an LHCN-associated learning path on Cornerstone. While our team will continue to offer live synchronous Beehive training series to all new programs joining the LHCN, Beehive training in Cornerstone will be available for new staff at each EP program and will generally take the place of live training for individual new employees. Each employee who uses Cornerstone will be assigned a Beehive curriculum by their EPI-CAL point person. Beehive curricula are based on the users' implementation role rather than their clinical role. They include:

- **Data-User:** Intended for provider-level users whose role focuses solely on viewing data in Beehive and using in care with clients. They will not necessarily need to provide direct support to clients using Beehive, update client profiles, or enter any clinician-entered data. An example of this type of user would be prescribers (including residents).

- **Data-Enterer:** Intended for provider-level users whose role focuses on registering clients, supporting clients to use Beehive, and/or entering clinician-entered data. Examples of this type of user would be clinic coordinators or case managers who support admin implementation of Beehive but will not generally use data as part of care (and are not admin users).

- **Data-User & Data-Enterer:** This is what most users at the provider-level should are assigned. It is the most comprehensive role and will include all of the trainings outlined above and as well as any and all materials covered in our live training series. If program leadership and staff are not sure about what implementation role individuals will have, this is the training that should be assigned to them.

- **Admin:** This is intended for all users who are assigned as group admin or clinic admin users in Beehive. It covers all of the trainings above and has trainings on admin specific features such as adding new users and pulling reports.

Existing employees who have already participated in the live Beehive training series from our team are also welcome, but not required, to use Cornerstone for refresher trainings.

10. Summary of experiences and feedback from all stakeholders, that is responsive to stakeholder feedback on draft report/Provide outline of experiences and feedback from all stakeholders

Provider and Service User Experiences of Using the Beehive Platform in Early Psychosis Care

Implementing measurement-based care in behavioral health settings can come with numerous benefits (Lewis et al., 2019). These can include improvements in service-user provider communication, help in identifying previously undetected needs, and support for service improvement efforts. Furthermore, when data is actively incorporated into care, it can lead to positive treatment outcomes for service users such as improved quality of life. However, implementing measurement-based care can be challenging, both in terms of data collection and utilization (Lewis et al., 2019). Consequently, while there have been more recent efforts to actively incorporate data into early psychosis care delivery, to date this has not been widely implemented. Therefore, as part of the EPI-CAL LHCN we conducted a qualitative interview study to explore provider and service user experiences of utilizing the Beehive platform and adopting measurement-based care in an early psychosis setting. Understanding the potential benefits and challenges to using the Beehive as part of care from the perspective of those that either deliver or receive it is critical to 1) evaluating the impact of utilizing Beehive in care, 2) understanding how Beehive may improve early psychosis care, with the goal of supporting the dissemination of positive practices across the network, and 3) Supporting efforts to refine the Beehive platform to further support positive practices from the perspective of those that delivery or receive care.

Methods

Design

A qualitative interview project is currently being conducted to explore provider and service user experiences of utilizing the Beehive platform and attempting to adopt measure-based care in an early psychosis setting.

Participants

Early psychosis service users and clinic staff across all EPI-CAL programs are eligible to participate. The only additional inclusion criteria require the participants to have actively engaged in utilizing Beehive. For providers, this could include registering clients into Beehive, supporting clients with the EULA process, assisting clients/support persons with data collection either at baseline or at follow-up, integrating Beehive data into the provision of care, and/or supervising those charged with conducting these activities. For service users, this could include navigating the EULA process, entering data into Beehive, and/or knowingly receiving care informed either by the Beehive app, or the data provided.

For both provider and service user interviews, stratified purposive sampling involved recruiting participants across the different EPI-CAL programs to explore potential differences in their experiences of utilizing Beehive. At the provider level, intake coordinators, licensed clinicians, and senior management were actively recruited to ensure that all aspects of using the Beehive application were considered.

Procedures and Data Analysis

Topic guides for provider and service user interviews included questions focusing on overall impressions of the Beehive platform, in addition to their experiences of each step in the Beehive process (training, enrollment, registration, data collection, and use of data in care). Open-ended questions were used to provide an opportunity for providers and service users to describe a wide range of impressions and experiences as they adapted to new challenges and opportunities. All interviews were conducted via video conference. The interviews were audio recorded and transcribed, with any identifying information removed prior to analysis. Prior to the interview starting, all participants signed a consent form. Participants were compensated for their time, as permitted by county policy. All study procedures were reviewed and approved by the UCD IRB, in addition to county offices as required.

After each interview was completed, two qualitative research team members met briefly to discuss possible preliminary themes and refine the interview guides, as appropriate. Thematic analysis of the data was conducted using NVivo 12 qualitative analysis software. In the quotes presented below, some were amended by the authors to anonymize responses, remove crosstalk, and elucidate pronouns. In these instances, the edits were indicated through the use of square brackets (“[ ]”).

Findings

As of 3/31/2024, 32 providers across 16 programs participated in an interview. In addition, 9 interviews with service users have been completed. In total, 20 service user interviews will be conducted, with recruitment taking place over the coming weeks.

Provider and service user participant details are summarized in Table 9. For providers, 4 interviews have been completed with individuals who work in university programs that utilize a range of funding sources including private insurance, research grant funding, and in one case Medi-Cal billing, 20 providers were based in community programs that are funded primarily through Medi-Cal billing and MHBG funding, and 8 providers worked across both types of programs. A broad range of provider roles is represented, including clinicians (n=12), program managers and senior leadership (n=9), intake and program coordinators (n=5), supported education and employment specialists (n=2), and peers, research assistants, case managers, and administrative leads (n=4). In total, 78% of the sample identified as female, and there was a broad range of ethnicities reported, with the largest proportion identifying as Latino/Hispanic. For service users, 2 receive services at a university program, and 7 at a community program. Most respondents thus far are male, and again there is a range of ethnicities. In reporting program impact evidence in the sections below, we have included the program name and county wherever it is possible to do so while maintaining anonymity. Reporting program names was not possible for service users due to the small numbers interviewed at this time.

Table 9: Provider and Service User Participant Demographics

Provider Participant Demographics	N=32	%
Programs		
UCD SacEDAPT	2	6
UCD EDAPT	1	3
UCD SacEDAPT & EDAPT	4	13
UCD EDAPT & MCC	1	3
Aldea SOAR Solano	3	10
Aldea SOAR Sonoma	1	3
Aldea SOAR Napa & Sonoma	3	10
Kickstart Pathways	1	3
IMCES 3 & 4	3	10
SFVCMHC	1	3
The Whole Child	1	3
The Help Group	1	3
OC CREW	2	6
San Mateo Felton re(MIND)	1	3
UCLA – Aftercare	1	3
UCSF PATH	1	3
UCSD CARE	2	6
Stanislaus LIFE Path	3	10
Program Type		
University	6	19
Community	22	69
Both	4	13
Gender		
Male	7	22
Female	25	78
Race/Ethnicity		

Asian	2	6
Black/African American	1	3
Jewish	1	3
Latino/Hispanic	9	28
Middle Eastern	1	3
White	3	10
Two or More	1	3
Missing	14	44
Role		
Clinician Providers	12	38
Managers/ Supervisors	9	28
Coordinators	5	16
SEE Specialists	2	6
Other	4	13
Service User Participant Demographics	**N = 9**	**%**
Program Type		
University	2	22
Community	7	78
Gender		
Male	7	78
Female	2	22
Race/Ethnicity		
Black/African American	1	11
Latino/Hispanic	4	44
Middle Eastern	1	11
Two or more	3	33

Key: IMCES = Institute for Multicultural Counseling & Education Services, MCC = Multi-County Collaborative, OC CREW = Orange County Center for Resiliency, Education, and Wellness), SEE, Supported Employment and Education, SFVCMHC = San Fernando Valley Community Mental Health Center, UCD = University of California, Davis, UCLA = University of California, Los Angeles, UCSD = University of California San Diego.

Positive experience with the Beehive platform was identified as a major theme in the data. A number of subthemes also emerged suggesting several key areas of impact. A summary of these subthemes along with supporting quotes from the transcripts is presented below.

Qualitative Evidence of the Impact of the Beehive Data Collection and Analysis Platform

Many providers described the benefits of using Beehive. Several key areas discussed by providers include providing direct benefits to clinical care, supporting supervision activities, and providing data for external reporting. This report highlights the role of Beehive data in care provision, as this was most commonly reported by providers across the EPI-CAL LHCN.

Interviews with service users are ongoing. Notably, all nine of the first interviewees suggested that Beehive data collection has not been difficult in terms of the time and effort required. Due to the small numbers, it is too early to make generalizations from service user data. In addition, most of the service users did not report knowingly using Beehive data as part of their care, so the positive impacts they discuss in this area are somewhat limited. They are based on what they think would be helpful to them versus actual experience. We have integrated service user comments wherever appropriate in the following sections.

I. Benefits to Clinical Care Across the Learning Health Care Network

Providers frequently describe the ways that Beehive data contributes to care provision. This includes using data to notify clinic staff about urgent safety issues, complete intake assessments, promote psychoeducation efforts, support goal setting and progress monitoring, and support service users' reflection and engagement in care. Beehive is also seen as an important tool to help foster a person-centered approach to care that provides opportunities for shared decision-making. It is important to note that providers reporting the benefits of Beehive data as part of care provision include case management and supported education and employment (SEE) specialists, as well as clinicians.

A. Safety alerts and risk assessment

The Beehive platform includes an alert system that notifies providers when service users have reported thoughts or plans of harm to self or others, plans to stop medications, or risk of homelessness. Many providers highlighted the importance of these alerts and their ability to prompt critical actions to mitigate risk and incorporate this information into a care plan for the service user.

Providers described the important role of alerts at the start of treatment, when planning interventions and modalities of care.

> "I really appreciate the alerts that come through especially if someone's being flagged as high risk… I'm in a position where I train a lot of the other trainee staff, so if I'm sitting with them and we're going through a training moment before we jump in, I don't always have time to log into Beehive preemptively just to see what's on from a clinical standpoint. So I always like that it flags for me if something's clinical high risk because then I immediately know to be mindful of that… I like that it gives those alerts because then I'm not like, 'Oh my gosh, they didn't allude to the fact that they're sitting with suicidality… I think that's really helpful.'" (BF1001, SacEDAPT, Sacramento County)

> "So our CATS, PCL, ACEs, and MCSI [Child and Adolescent Trauma Screen, Posttraumatic Stress Disorder Checklist, Adverse Childhood Experiences, Modified Colorado Symptom Index], I would say [are priorities at intake] because that gets us the risk information and the trauma information, which are often two big things that if they come up during an intake, we often need to pivot and prioritize safety planning or reporting to appropriate agencies. And so, that really is helpful to contextualize where we're going to go from the start… For instance the MCSI with the risk items, we get an urgent clinical notification and everyone's usually really on it. All the admins and the team lead for that client get an email and we have a [Microsoft] Teams page as well for that specific client… I know, definitely, the MCSI has led to safety planning being prioritized." (BF1019, SacEDAPT/EDAPT, Sacramento County)

> "I've had it happen where I'll get notified if any level of suicidality or self-harm is reported… sometimes there can be a couple weeks of time between the assessment and the welcome session, so things can change in between then… Getting that notification gives me the clue of, 'Oh, this is something that's either still happening or is getting worse.' I can compare based on the assessment that we got however many weeks ago, and that clues me in to look at safety." (BF1025, Aldea SOAR, Sonoma and Napa Counties)

Similarly, during the course of the program, clinician and directors are promptly notified of alerts, communicate within the clinic team, and take immediate action to mitigate risk. Again, respondents pointed out the important role of these alerts in care provision. Some providers noted that service users may be more candid about their symptoms and experiences when interacting with the application versus during face-to-face discussions.

> "I did have one participant who got flagged for making suicidal comments on the surveys. So I was able to follow up with that. That's the one that I can think of that pops right to my head. That's happened maybe twice… a lot of our kids ebb and flow with their symptoms. And sometimes they're disorganized.

> And so for whatever reasons we ask them, but they just don't tell us, or they give us a different answer. But then they'll write it on the survey. And then, it gives me an opportunity to go check in with them." (BF1012, OC CREW, Orange County)

> "Well, I'll tell you the most helpful is the clinical risk factors. The alerts that I get are really, really helpful and really important… We take immediate action whenever we get those. It informs our supervision with the clinician. We have to do immediate safety assessments and planning… And some of those, we didn't realize the thoughts of self-harm or harm to others was even happening. One of them filled out the survey on the weekend and we got alerted, and immediately we had to go into action… Those are things that we have to take really seriously. But that was really helpful, because a client was feeling that way and hadn't told anyone, but felt comfortable putting that on Beehive…For the case that I'm thinking of, the clinician was like, 'Whoa, I had a session with her last week and none of that was reported'… I need to know the high-risk clients, always. Those are always in the forefront of my mind - the ones that are in and out of the hospital, the ones that have safety concerns, the ones we're doing high-risk assessments for, the ones that we're doing serious incidents for. So I really appreciate the safety alerts." (BF1010, Kickstart Pathways, San Diego County)

B. Beehive data used to complete intake assessment

In addition to the widespread appreciation for the Beehive alert system, several providers explained other ways that they are using Beehive data to inform clinical decisions about treatment. One area that was frequently mentioned was the relevance of specific measures to help inform assessment and the development of a treatment plan.

> "So from two different angles for the assessment portion of things, I have to directly use all of that data that the clients are entering and pull it to enter it into a client treatment plan, a client safety plan, and also for my comprehensive psychological assessment report… Sometimes, especially if I'm doing data updates… I'll have it pulled up in real time, whether I'm doing a therapeutic session or I'm doing an assessment session… especially if there is a discrepancy in what the client reported on the form and Beehive versus what they're telling me. Whether that be more or less information, I just want to make sure there's cohesion with what they're saying especially if it's a risk element or a diagnostic element." (BF1001, SacEDAPT, Sacramento County)

> "I also typically incorporate information about the family support system, like whether the client feels supported with their mental health challenges by at least one caregiver, like that question, some of the stigma questions… And I mean, I think a lot of it oftentimes is used as a screener to then prompt other questions. So, if that was endorsed in the assessment, then it gets looped in… I was just thinking about the substance use one as it only asked about the past six months, but it gives us a picture of what their current state might be. So, it informs what we already know about them. So, whether we're just confirming that information or getting information, expanding on it." (BF1019, SacEDAPT/EDAPT, Sacramento County)

> "Really my role comes in once the client has been assessed and assigned a clinician to really look at the Beehive surveys, look at what are baselines. What are some of the things that the assessing clinician checked off on in terms of diagnosis, in terms of any history of medications, any trauma. Looking at the CATS, looking at the MCSI, those are things that as a treating clinician I really look for. And so that's the beginning phase in treatment." (BF1028, Aldea SOAR, Sonoma and Napa Counties)

> "That Beehive baseline is so essential for me in my work because it really helps me target my questions and it helps me cut back on that intake. Like, 'Okay, they didn't have any trauma. I'm going to ask one

> question only and if the answer is no, then I'm not even going to touch on it.' And I think sometimes during our clinical intake we get so busy and wrapped up in asking questions that if we forget something, it's already on Beehive for us to go back and follow up. So I think there's a lot of use to it being completed beforehand…" (BF1025, Aldea SOAR, Sonoma and Napa Counties)

Providers described some of the steps needed to assist service users so they can enter Beehive data in a timely way, to be used for baseline assessments. This often involved adjusting clinic intake flows and prioritizing the most critical surveys to make sure they are completed before meeting with their clinicians. Provider comments like those above suggest that, if such adjustments are implemented, Beehive can provide significant benefits during the early treatment phase.

C. Beehive data serves as a clinical aid during ongoing treatment

Many providers discussed the role of Beehive in clinical decision-making over the longer-term course of care. They highlighted Beehive data collection at six-month intervals and how these contribute to the monitoring of symptoms and progress over time. Importantly, they refer to and make use of Beehive data during sessions whether for psychoeducation purposes, to prioritize topics for conversation, or to set goals and review progress. This suggests that in addition to providing data for clinicians' use, Beehive contributes to service users' involvement in clinical conversations and their engagement in goal-setting and decision-making about their treatment.

i. Supporting psychoeducation efforts

Providers stated that Beehive has helped to support psychoeducation approaches. They described a number of ways that Beehive data helps promote service users' understanding and insights concerning symptoms, stressors, and the process of recovery.

> "We have [clients] in our psychoeducation groups. And some of them, the few that do talk, they talk about their milestones. And that's what tracking is, your milestones, your quarterlies, or your yearly, that's your milestones. And some of them before would have no kind of input on it. And it would take a year, year and a half to kind of feel comfortable and they'll say, yeah, before, I never even used the word psychosis or said I had any kind of disorder. And we might say…'Now you've been very consistent in tracking and being on your meds is very consistent. Now look how these last six months have looked for you, you've been very responsive. Now you're looking at getting a job, all those things.'" (BF1005, OC CREW, Orange County)

> "And then also retrospectively for clients who have been doing really well and there's a current stressor and we're just not able to pinpoint the stressor, we're not sure what's going on, I like to pull that up to look at those data like 'Hey, we were doing really well and then here's a change during this time period, let's take a step back to think about what you were doing during that time period.'" (BF1024, SacEDAPT, Sacramento County)

ii. Setting goals and monitoring progress

A key benefit of measurement-based care is the opportunity to use data to track health changes over time, through a systematic assessment of outcomes that can provide important treatment insights. Providers described several examples of how Beehive survey responses are providing more awareness about areas of need, and how this helps shape short- and long-term goals.

> "I would say as far as the planning, that would come up more with the social and role functioning… because once you've done those tools, you're able to talk with them about, 'Hey, so look, you don't have any friends. Are you interested in friends?' Things like that. Or, 'You say you want to work, but we

> don't have you working. Where can we go from there?'" (BF1018, Stanislaus LIFE PATH, Stanislaus County)

> "I use it mostly at the six-month intervals, but it's also been a useful tool if sometimes you feel stuck, and it's nice just to maybe reflect on past answers, but then also use it as... Looking at the baseline, and asking the client, 'Where would you like to work on the next one month or two months?; or creating small little goals out of the data… It's definitely another tool I use if it feels like we don't have a clear direction of where they want to go." (BF1015, Aldea SOAR, Napa and Sonoma Counties)

Providers also discussed using Beehive data to monitor progress toward goals. The fact that Beehive provides the chance for providers and service users to review graphs together and visualize progress and patterns over time was seen by providers as a key benefit.

> "It has been a huge impact on them to kind of see the relationship between maybe some of their psychosis symptoms and mood, because… we talk about it a lot, but it is helpful for them to see the correlations… It's just reinforcing what we talk about in clinical terms, and then also giving them, 'Oh yeah, and also this nice picture.' It's illustrating exactly what we've been talking about for the last few weeks." (BF1015, Aldea SOAR, Napa and Sonoma Counties)

> "From my experience, my clients have been data-driven and so they love that. They love the data and I think it also helps them visually see things where they're at. And so I find that that's helpful." (BF1024, SacEDAPT, Sacramento County)

> "So it's very goal-oriented. All of our groups are goal-oriented. All of our research work is goal-oriented. And so I tell patients, '…Really we don't want you to feel labeled or stigmatized, you don't have to agree with the things that we think or even like taking medication…I think what we have to identify is when you don't do certain things or do certain things, how does that impact your ability to live the life you want to live or the one you were living before?..' So I think that's where the surveys provide an opportunity for them to see growth and change in a more concrete, visual way." (BF1026, UCLA Aftercare)

iii. Facilitating therapeutic conversations

Several clinicians described details about Beehive surveys that they find valuable in their sessions with service users. They discussed the specific Beehive surveys and measures that are most useful, and pointed out how reviewing these measures during sessions can be beneficial in triggering clinical conversations.

> "I really like the questionnaire about the process of recovery. It really gives me an idea of how the client is feeling, without being asked so many clinical questions, more like an overview. I find that really helpful in terms of also tailoring treatment… That's a survey that I feel like sometimes is able to help me guide where the client's at, without having to use so much of the clinical jargon.. We bring the surveys into session… And so I'll say, 'On question 14, you marked 'whatever the answer is.' What did you mean by that? Help me understand a little bit more.' Then it flows with some of our questions in the assessment too. It triggers the conversation to happen." (BF1028, Aldea SOAR, Sonoma and Napa Counties)

> "And even patients will tell me, I'll get an alert and I'll say, 'Hey, are you having some suicidal ideation?' They're like, 'No. But I wanted to be honest. The survey, it asked some questions and it didn't really give me an option to say when this was, but it made me think I should talk more about that.'" (BF1026, UCLA Aftercare)

Service users suggested that Beehive can potentially help discuss important topics with their therapist that might be difficult for them to raise on their own, or that they might forget to discuss. Instead of bringing it up themselves, they suggested that their provider could access the information on Beehive and then ask them about their survey responses.

> "I would say asking about it would be a lot more helpful because it's difficult bringing it up, because sometimes it's super dark or whatever. So I would rather someone ask about it than me just say it." (Service user interview BF2001, Sacramento County)

> "I feel like when I'm recovering… it's hard to figure out what's bothering me and stuff.. There is some stuff that's still bothering me and so Beehive would be really helpful… They could just ask me. I feel like it all comes from me and I just think about what I'm thinking about that day." (Service user interview BF2008, San Mateo County)

D. Beehive data helps promote service users' self-awareness and reflection

Providers described another important benefit of Beehive data collection, stating that filling out surveys has supported service users in their personal reflection. Some areas discussed include service users reflecting on goals for care, becoming more aware of progress they are making, or assessing their own thoughts and emotions.

> "You know you always have patients who say, 'Oh, I've been always like this. There has been no change. The treatment doesn't work.' And then you're able to say, 'Well, actually this is where you were at the beginning and you're here now.'" (BF 1030, UC San Diego CARE)

> "I think it's especially important for me for my clients since I have some clients that are pretty high risk when they feel as though progress hasn't been made or if they feel as though they're stuck, then I like to pull that up to assist them in looking at baseline and where they're at now, even if it's just a little shift, a little move. I think that that's empowering, that gives them hope." (BF1024, SacEDAPT, Sacramento County)

Discussions with service users also focused on this idea of independent reflection that occurs when reporting and reviewing survey responses.

E. Beehive data collection empowers service users and supports a person-centered approach to care

Beehive data collection can be part of a collaborative approach to making decisions about services. Some providers described how they use Beehive in this way, not only to promote discussion but to provide an opportunity for service users to communicate their own perspectives and insights.

> "I think that it's a really nice way to talk with patients about mental health and about how they can have more empowerment over their own mental health and that talking about these things and filling out questionnaires like this makes them more aware. That's what I've noticed. Whenever they fill out a survey, we end up talking about it. And I think that's very powerful."(BF1026, UCLA Aftercare)

A peer specialist commented on a Beehive survey that helps promote the goal of building clients' voice and independence.

> "There was just a really good survey I looked at that had to do with their beliefs about their own recovery, whether they have control over their life and they feeling like they have plans for the future. I felt that was all really relevant to peer support. So yeah, there's definitely some surveys in there that I would be interested in using." (BF1002, SacEDAPT, Sacramento County)

Conclusions

Interviews were conducted with 32 providers and 9 service users across 18 EPI-CAL programs. These conversations explored their experiences using the Beehive platform in early psychosis programs. The qualitative results of the study point to significant positive impacts of Beehive implementation across several components of care. These include mitigating risk; supporting clinical decision-making at intake; improving ongoing care through contributions to psychoeducation, goal setting, and progress monitoring; facilitating communication between providers and service users; promoting service user independent reflection; and fostering a person-centered approach to care.

Going forward we will continue with the recruitment and interviewing of service user participants. These discussions will provide the opportunity to further understand the benefits, as well as challenges, of the Beehive system from the point of view of service users. In particular, it will be helpful to gather more feedback about their experiences using data as part of their care, as well as their insights regarding the ease of use of the Beehive platform.

11. Deliver a plan and timeline for working with counties to support infrastructure to access final round of county-level cost and utilization data for EP and comparator group programs

Overview of Report

As stated above, we've received complete retrospective datasets from Los Angeles, San Diego, Orange, and Solano counties. Napa and Stanislaus are currently working on submitting complete retrospective datasets. Lake and Kern counties are working to submit their prospective only datasets in the next deliverable period.

Prospective Data Analysis

Over the last deliverable period, we held a series of meetings with each county that has already submitted data from the retrospective period (Los Angeles, Orange, San Diego, and Solano) to review the prospective data request. We also held meetings with Kern and Lake counties to review the prospective data request and introduce them to the project. In these meetings, we discussed when claims data would become available for service utilization and estimating costs, as well as time needed for data extraction. Data availability ranged from 4-11 months after the service was billed. We plan to obtain service and cost data for all remaining counties by March 2024, then finish cleaning, harmonizing and integrating data for a preliminary analysis to be completed by June 2024. The process of harmonizing and integrating data for the initial retrospective period has been incredibly useful and will allow us to do the same for the new service period much more quickly.

Further, in our meetings with program and county staff, we discussed any changes to the county EHR or billing and claims systems, changes in data elements collected during the new time period, or any other relevant changes to data availability. We met with Solano County on June 2, 2022; Los Angeles County on May 23, 2022; Orange County on May 19, 2022; San Diego County on May 23, 2022; Lake County on February 21, 2023; Kern County on August 29, 2023; and Napa County on September 7, 2023.

In addition to the preliminary analysis that we did in the December 2022 deliverable, in this project period we have an updated analysis that includes Los Angeles, San Diego, and Orange counties.

Next Steps

We plan to continue analyzing the remaining data for both retrospective and prospective periods of all outstanding counties as they provide us with their datasets. Los Angeles, San Diego, and Orange counties have provided all requested data for retrospective and prospective study periods. We await data from the remaining counties in order to properly complete a multi-county integrated analysis: Solano, Stanislaus, Napa, Lake, and Kern counties.

12. Present preliminary results from second round of analysis for county-level cost and utilization data from all EP/CG programs

Data and Methods

This analysis is based on data provided by Los Angeles, Orange, and San Diego counties. We used administrative data to identify youth aged 12 to 25 years who (1) were enrolled in a specialized early psychosis (EP) program from January 2017 to July 2021, and (2) received a first diagnosis of psychosis (ICD-10 codes F20, F22, F23, F25, F28, F29, F31.2, F31.5, F31.64, F32.3 F33.3) within one year prior to enrollment. We shared lists of EP youth with program staff who confirmed that these were past or current clients who received their first diagnosis of psychosis. We identified a comparison group (CG) of youth with a first diagnosis of psychosis who received at least one outpatient service during the study period, also within one year of receiving their first diagnosis of psychosis. We excluded youth with a diagnosis of psychosis more than two years before starting outpatient services, youth with private insurance, and youth who received a diagnosis of intellectual disability (ICD-10 codes F70-F79, ICD-9 codes 317-319).

We summarized service use and cost for Medi-Cal covered outpatient and inpatient services over the first and second years following the first diagnosis of psychosis. We calculated the number of outpatient mental health visits and the number of inpatient psychiatric days. Outpatient services included case management, crisis intervention, medication management, and mental health services including rehabilitation and therapy. We defined a visit as a unique day receiving services. Inpatient psychiatric days included admissions to psychiatric hospitals and admissions to psychiatric units of acute care hospitals. We also summarized the costs of outpatient and inpatient mental health services.

We estimated the number of outpatient visits and inpatient days during a year using negative binomial regression models. We estimated the probabilities of using outpatient and inpatient services with logistic regression models. We estimated costs using a generalized linear model with a gamma distribution and a log link function. In each model, we included covariates for age, gender, and race/ethnicity. We calculated standardized estimates for each outcome using the estimated coefficients to generate predicted values for each client in the sample as if they were alternately assigned to EP and CG. The standardized mean is the mean of the predicted values across the sample. We calculated standard errors using the non-parametric bootstrap, and significance values using non- parametric permutation.

Results

We identified 238 youth in EP programs (Table 10). Mean age was 17.8 years (SD=2.9 years); 80 (33.6%) were female; 39 (16.4%) were non-Hispanic White, 28 (11.8%) were Black, 16 (6.7%) were Asian, 138 (58.0%) were Latino, 6 (2.5%) were of another race/ethnicity, and 11 (4.6%) had unknown race/ethnicity.

Table 10. Demographic Characteristics of Youth in Early Psychosis Programs

	Overall	Los Angeles	Orange	San Diego
N	238	55	43	140

Age M (SD)	18.0 (2.9)	18.7 (2.9)	16.7 (2.8)	17.8 (2.9)
Age N (%)				
12-17 years	130 (54.6%)	23 (41.8%)	28 (65.1%)	79 (56.4%)
18-21 years	75 (31.5%)	21 (38.2%)	12 (27.9%)	42 (30.0%)
22-25 years	33 (13.9%)	11 (20.0%)	3 (7.0%)	19 (13.6%)
Gender N (%)				
Male	158 (66.4%)	33 (60.0%)	27 (62.8%)	98 (70.0%)
Female	80 (33.6%)	22 (40.0%)	16 (37.2%)	42 (30.0%)
Race/Ethnicity N (%)				
Non-Hispanic White	39 (16.4%)	8 (14.5%)	4 (9.3%)	27 (19.3%)
Black/African American	28 (11.8%)	4 (7.3%)	1 (2.3%)	23 (16.4%)
Asian	16 (6.7%)	1 (1.8%)	10 (23.3%)	5 (3.6%)
Latino	138 (58.0%)	36 (65.5%)	25 (58.1%)	77 (55.0%)
Other/ Unknown	17 (7.1%)	6 (10.9%)	3 (7.0%)	8 (5.7%)

Table 11 shows the demographics of the youth in the EP and CG groups. EP youth were significantly younger than CG youth (M=20.3 years, SD=4.0 years; *t*(25124)=9.59, *p*<.001). The groups also differ significantly in their racial/ethnic composition, χ^2(4, *N*=25126)=36.88, *p*<.001. The EP group was comprised of a higher proportion of Asian (6.7%) and Latino (58.0%) youth compared to the CG group (3.4% and 47.0%, respectively; *p'*s<.05). Gender did not significantly differ between groups, χ^2(4, *N*=25126)=6.63, *p*=.163).

Table 11. Demographic Characteristics of Youth in Early Psychosis Programs and a Comparison Group of Youth Receiving Usual Care

	Overall	EP	CG	P-Value
N	25,126	238	24,888	-
Age M (SD)	20.3 (4.0)	17.8 (2.9)	20.3 (4.0)	<.001
Age N (%)				<.001
12-17 years	6,834 (27.2%)	130 (54.6%)	6,704 (26.9%)	<.05
18-21 years	6,913 (27.5%)	75 (31.5%)	6,838 (27.5%)	*n.s.*
22-25 years	11,379 (45.3%)	33 (13.9%)	11,346 (45.6%)	<.05
Gender N (%)				0.163

Male	14,763 (58.8%)	158 (66.4%)	14,605 (58.7%)	*n.s.*
Female	10,245 (40.8%)	80 (33.6%)	10,165 (40.8%)	*n.s.*
Other/ Unknown	118 (<1%)	-	118 (<1%)	*n.s.*
Race/Ethnicity N (%)				<.001
Non-Hispanic White	3,459 (13.8%)	39 (16.4%)	3,420 (13.7%)	*n.s.*
Black/African American	4,141 (16.5%)	28 (11.8%)	4,113 (16.5%)	*n.s.*
Asian	850 (3.4%)	16 (6.7%)	834 (3.4%)	<.05
Latino	11,824 (47.1%)	138 (58.0%)	11,686 (47.0%)	<.05
Other/ Unknown	4,852 (19.3%)	17 (7.1%)	4,835 (19.4%)	<.05

Table 12 shows standardized estimates of service use in the first and second years following the initial diagnosis of psychosis. In the first year following diagnosis, the mean annual number of outpatient visits was 22.3 greater among EP youth than CG youth: 49.7 vs 27.4 visits per year, *p*<.001. The annual probability of psychiatric inpatient admission was 6.4 percentage points lower among EP youth: 36.3% vs. 42.7% used any inpatient services, *p*=.020. However, there was no significant difference in inpatient days overall between the two groups.

Table 12. Standardized Annual Estimates of Service Use Among Youth Early Psychosis Programs Versus Usual Care in One and Two Years Following Initial Diagnosis of Psychosis

	EP		**CG**		**Difference**		**P-Value**
Year 1	Mean	SE	Mean	SE	Mean	SE	
Outpatient Visits	49.7	2.7	27.4	.2	22.3	2.7	<.001
Probability of Inpatient Use	.363	.030	.427	.003	-.064	.031	.020
Inpatient Days	7.7	1.2	6.5	.1	1.2	1.2	.136
Year 2							
Probability of Outpatient Use	.762	.030	.550	.003	.212	.031	<.001
Outpatient Visits	33.5	2.9	18.4	.2	15.1	2.9	<.001
Probability of Inpatient Use	.197	.030	.149	.002	.048	.030	.226
Inpatient Days	3.6	1.0	3.0	.1	.6	1.1	.437

Table 13 shows costs for outpatient and inpatient mental health services in the first and second years following the initial diagnosis of psychosis. Outpatient costs were significantly greater for EP youth compared to CG youth in both years. Outpatient costs were $6,150 greater for EP youth in the first year following diagnosis and $4,073 greater in the second year following diagnosis (*p*<.001 each). In contrast, there was no significant difference in inpatient costs in either year.

Table 13. Standardized Annual Estimates of Costs Among Youth Early Psychosis Programs Versus Usual Care in One and Two Years Following Initial Diagnosis of Psychosis

	EP		**CG**		**Difference**		**P-Value**
Year 1	Mean	SE	Mean	SE	Mean	SE	
Outpatient Costs	$14,784	$1,012	$8,634	$81	$6,150	$1,017	<.001
Inpatient Costs	$7,457	$1,151	$6,254	$110	$1,203	$1,163	.136
Year 2							
Outpatient Costs	$9,393	$881	$5,320	$76	$4,073	$880	<.001
Inpatient Costs	$3,484	$1,010	$2,893	$100	$591	$1,014	.437

Outpatient visits remained higher among EP youth during the second year following diagnosis. The probability of using outpatient services was 21.2 percentage points greater among EP youth: 76.2% vs. 55.0% used any outpatient services, *p*<.001. The mean annual number of outpatient visits was 15.1 higher among EP youth: 33.5 vs. 18.4, *p*<.001. There was no significant difference in either the probability of inpatient admission or the number of inpatient days between the two groups in the second year following diagnosis.

<u>Los Angeles</u>

Table 14 shows the demographic characteristics of youth enrolled in the Center for the Assessment and Prevention of Prodromal States (CAPPS) EP program and CG youth receiving usual care in Los Angeles County. Similar to the overall sample, EP youth (M=18.7 years, SD=2.9 years) were significantly younger than CG youth (M=20.4 years, SD=4.1 years; *t*(19404)=3.15, *p*=.002). There were also significant differences in their racial/ethnic composition, χ^2(4, *N*=19406)=12.42, *p*=.015. The EP group was comprised of a higher proportion of Latino (65.5%) youth compared to the CG group (45.6%, *p*<.05). As in the overall sample, gender did not significantly differ between groups, χ^2(2, *N*=19406) =0.30, *p*=.862.

Table 14. Demographic Characteristics of Youth in CAPPS Early Psychosis Program and a Comparison Group of Youth Receiving Usual Care in Los Angeles County

	Overall	**EP**	**CG**	**P-Value**
N	19,406	55	19,351	-
Age M (SD)	20.4 (4.1)	18.7 (2.9)	20.4 (4.1)	<.001
Age N (%)				<.001
12-17 years	5,202 (26.8%)	23 (41.8%)	5,179 (26.8%)	*n.s.*
18-21 years	5,185 (26.7%)	21 (38.2%)	5,164 (26.7%)	*n.s.*
22-25 years	9,019 (46.5%)	11 (20.0%)	9,008 (46.6%)	<.05

Gender N (%)				0.862
Male	11,301 (58.2%)	33 (60.0%)	11,268 (58.2%)	*n.s.*
Female	8,019 (41.3%)	22 (40.0%)	7,997 (41.3%)	*n.s.*
Other/ Unknown	86 (<1%)	-	86 (<1%)	*n.s.*
Race/Ethnicity N (%)				0.015
Non-Hispanic White	2,153 (11.1%)	8 (14.5%)	2,145 (11.1%)	*n.s.*
Black/African American	3,625 (18.7%)	4 (7.3%)	3,621 (18.7%)	*n.s.*
Asian	493 (2.5%)	1 (1.8%)	492 (2.5%)	*n.s.*
Latino	8,853 (45.6%)	36 (65.5%)	8,817 (45.6%)	<.05
Other/ Unknown	4,282 (22.1%)	6 (10.9%)	4,276 (22.1%)	*n.s.*

Table 15 shows differences in outpatient service use and costs between youth receiving care from the CAPPS EP program and those receiving usual care in Los Angeles County in the first and second years following the initial diagnosis of psychosis. In the first year following diagnosis, the mean annual number outpatient visits were 17.1 greater among EP youth than CG youth: 46.8 vs 29.8 visits per year, *p*<.001. Outpatient costs were $4,623 greater for EP youth in the first year following diagnosis; however, this difference was not significant, $14,407 vs $9,784, *p*=.145. In the second year following diagnosis, the mean annual number outpatient visits were 4.1 greater among EP youth than CG youth: 24.5 vs 20.2 visits per year, *p*<.001. There was no significant difference in outpatient costs between the groups in year 2: $6,318 vs $6,119, *p*=.404.

Table 15. Standardized Annual Estimates of Outpatient Service Use and Costs Among CAPPS Early Psychosis Program Versus Usual Care in Los Angeles County in One and Two Years Following Initial Diagnosis of Psychosis

	EP		**CG**		**Difference**		**P-Value**
Year 1	Mean	SE	Mean	SE	Mean	SE	
Outpatient Visits	46.8	5.1	29.8	.3	17.1	5.1	<.001
Outpatient Costs	$14,407	$1,732	$9,784	$108	$4,623	$1,732	.145
Year 2							
Outpatient Visits	24.5	4.1	20.2	.3	4.3	4.1	<.001
Outpatient Costs	$6,318	$999	$6,119	$96	$262	$1001	.404

<u>Orange</u>

Table 16 shows the demographic characteristics of youth enrolled in the Orange County Center for Resiliency, Education and Wellness (OC CREW) EP program and CG youth receiving usual care in Orange County. Similar to the overall sample, EP youth (M=16.7 years, SD=2.8 years) were significantly younger than CG youth (M=19.3 years, SD=4.0 years; *t*(3041)=4.20, *p*<.001). There were also significant differences in their racial/ethnic composition, $\chi^2(4, N=3043)=15.28$, *p*=.004. The EP group was comprised of a higher proportion of Asian (23.3%) youth compared to the CG group (8.0%, *p*<.05). As in the overall sample, gender did not significantly differ between groups, $\chi^2(2, N=3043)=0.55$, *p*=.758.

Table 16. Demographic Characteristics of Youth in OC CREW Early Psychosis Program and a Comparison Group of Youth Receiving Usual Care in Orange County

	Overall	**EP**	**CG**	**P-Value**
N	3,043	43	3,000	-
Age M (SD)	19.3 (4.0)	16.7 (2.8)	19.3 (4.0)	<.001
Age N (%)				<.001
12-17 years	1,139 (37.4%)	28 (65.1%)	1,111 (37.0%)	<.05
18-21 years	808 (26.6%)	12 (27.9%)	796 (26.5%)	*n.s.*
22-25 years	1,096 (36.0%)	3 (7.0%)	1,093 (36.4%)	<.05
Gender N (%)				0.758
Male	1,797 (59.1%)	27 (62.8%)	1,770 (59.0%)	*n.s.*
Female	1,221 (40.1%)	16 (37.2%)	1,205 (40.2%)	*n.s.*
Other/ Unknown	25 (<1%)	-	25 (<1%)	*n.s.*
Race/Ethnicity N (%)				0.004
Non-Hispanic White	595 (19.6%)	4 (9.3%)	591 (19.7%)	*n.s.*
Black/African American	143 (4.7%)	1 (2.3%)	142 (4.7%)	*n.s.*
Asian	250 (8.2%)	10 (23.3%)	240 (8.0%)	<.05
Latino	1,751 (57.5%)	25 (58.1%)	1,726 (57.5%)	*n.s.*
Other/ Unknown	304 (10.0%)	3 (7.0%)	301 (10.0%)	*n.s.*

Table 17 shows the differences in outpatient service use and costs between youth receiving care from the OC CREW EP program and those receiving usual care in Orange County in the first and second years following the initial diagnosis of psychosis. In the first year following diagnosis, the mean annual number outpatient visits were 15.2 greater among EP youth than CG youth: 36.5 vs 21.3 visits per year, *p*=.002. Outpatient costs were $3,127 greater for EP youth in the first year following diagnosis: $8,231 vs $5,104, *p*=.001. In the second year following diagnosis, the mean annual number outpatient visits were 7.9 greater among EP youth than CG youth: 21.4 vs 13.5 visits per year, *p*=.110. The difference in outpatient costs between the groups in year 2, $1,711 was marginally significant: $5,305 vs $3,407, *p*=.082.

Table 17. Standardized Annual Estimates of Outpatient Service Use Among OC CREW Early Psychosis Program Versus Usual Care in Orange County in One and Two Years Following Initial Diagnosis of Psychosis

	EP		**CG**		**Difference**		**P-Value**
Year 1	Mean	SE	Mean	SE	Mean	SE	
Outpatient Visits	36.5	5.6	21.3	.5	15.2	5.7	.002
Outpatient Costs	$8,231	$1,214	$5,104	$143	$3,127	$1,216	.001
Year 2							
Outpatient Visits	21.4	6.8	13.5	.6	7.9	6.8	.110
Outpatient Costs	$5,305	$1,707	$3,047	$153	$1,988	$1,711	.082

San Diego

Table 18 shows the demographic characteristics of youth enrolled in the Kickstart EP program and CG youth receiving usual care in San Diego County. Similar to the overall sample, EP youth (M=17.8 years, SD=2.9 years) were significantly younger than CG youth (M=20.9 years, SD=2.2 years; *t*(2675)=10.68, *p*=.022). However, the racial/ethnic composition did not significantly differ between groups, χ^2(4, *N*=2677) =9.20, *p*=.056. As in the overall sample, gender did not significantly differ between groups, χ^2(2, *N*=2677) =4.07, *p*=.131.

Table 18. Demographic Characteristics of Youth in Kickstart Early Psychosis Program and a Comparison Group of Youth Receiving Usual Care in San Diego County

	Overall	**EP**	**CG**	**P-Value**
N	2,677	140	2,537	-
Age M (SD)	20.7 (3.4)	17.8 (2.9)	20.9 (2.2)	.022
Age N (%)				<.001
12-17 years	493 (18.4%)	79 (56.4%)	414 (16.3%)	*n.s.*
18-21 years	920 (34.4%)	42 (30.0%)	878 (34.6%)	*n.s.*
22-25 years	1,264 (47.2%)	19 (13.6%)	1,245 (49.1%)	*n.s.*
Gender N (%)				0.131
Male	1,665 (62.2%)	98 (70.0%)	1,567 (61.8%)	*n.s.*
Female	1,005 (37.5%)	42 (30.0%)	963 (38.0%)	*n.s.*
Other/ Unknown	7 (<1%)	-	7 (<1%)	*n.s.*
Race/Ethnicity N (%)				0.056

Non-Hispanic White	711 (26.6%)	27 (19.3%)	684 (27.0%)	*n.s.*
Black/African American	373 (13.9%)	23 (16.4%)	350 (13.8%)	*n.s.*
Asian	107 (4.0%)	5 (3.6%)	102 (4.0%)	*n.s.*
Latino	1,220 (45.6%)	77 (55.0%)	1,143 (45.1%)	*n.s.*
Other/ Unknown	266 (9.9%)	8 (5.7%)	258 (10.2%)	*n.s.*

Table 19 shows differences in outpatient service use and costs between youth receiving care from the Kickstart EP program and those receiving usual care in San Diego County in the first and second years following the initial diagnosis of psychosis. In the first year following diagnosis, the mean annual number outpatient visits were 22.2 visits greater among Kickstart EP youth than CG youth: 40.5 vs 18.4 visits per year, *p*<.001. Outpatient costs were $5,274 greater for EP youth in the first year following diagnosis: $9,595 vs $4,321, *p*<.001. In the second year following diagnosis, the mean annual number outpatient visits were 18.1 greater among EP youth than CG youth: 29.8 vs 11.7 visits per year, *p*<.001. Outpatient costs were $4,238 greater for EP youth in the second year following diagnosis, $6,773 vs $2,535, *p*<.001.

Table 19. Standardized Annual Estimates of Outpatient Service Use and Costs Among Kickstart Early Psychosis Program Versus Usual Care in San Diego County One and Two Years Following Initial Diagnosis of Psychosis

	EP		**CG**		**Difference**		**P-Value**
Year 1	Mean	SE	Mean	SE	Mean	SE	
Outpatient Visits	40.5	2.5	18.4	.5	22.2	2.6	<.001
Outpatient Costs	$9,595	$771	$4,321	$124	$5,274	$777	<.001
Year 2							
Outpatient Visits	29.8	2.8	11.7	.5	18.1	2.8	<.001
Outpatient Costs	$6,773	$698	$2,535	$113	$4,238	$712	<.001

Table 20 shows differences in the number of inpatient days and the probability of inpatient use between youth receiving care from the Kickstart EP program and those receiving usual care in San Diego County in the first and second years following the initial diagnosis of psychosis. In the first year following diagnosis, there was no significant difference in the probability of inpatient use (48.9% vs 47.1%, *p*=.340), but the overall number of inpatient days were 4.5 higher among EP youth than CG youth; 11.8 vs. 7.2, *p*=.011. In the second year following diagnosis, the probability of inpatient use was significantly greater among EP youth than CG youth: 25.4% vs 15.6%, *p*=.014. However, there was no significant difference in the number of inpatient days, 5.8 vs 3.4 days, *p*=.115.

Table 20. Standardized Annual Estimates of Inpatient Service Use and Costs Among Kickstart Early Psychosis Program Versus Usual Care in San Diego County in One and Two Years Following Initial Diagnosis of

Psychosis

	EP		CG		Difference		P-Value
Year 1	Mean	SE	Mean	SE	Mean	SE	
Probability of Inpatient Use	.489	.045	.471	.010	.018	.046	.340
Inpatient Days	11.8	2.1	7.2	.39	4.5	2.2	.011
Year 2							
Probability of Inpatient Use	.254	.046	.156	.008	.098	.047	.014
Inpatient Days	5.8	1.9	3.4	.4	2.4	2.0	.115

<u>Summary</u>
Youth enrolled in EP programs had a greater number of outpatient mental health visits and higher costs than a comparable group of youth who were receiving services in standard outpatient programs in both the first and second years following the initial diagnosis of psychosis. Youth in EP programs had a lower probability of psychiatric inpatient admission than CG youth in the year following diagnosis. However, there was no significant difference in the number of inpatient days. We did not find significant differences in psychiatric admissions or inpatient days in the second year following diagnosis, nor did we find significant differences in inpatient costs in either year.

13. Report on feasibility of obtaining cost and utilization data from preliminary multi-county integrated evaluation

Our team provided support to the county data analysts and EP program managers regarding the cost and utilization data extraction and integration process through a series of email and phone conversations. The counties submitted their retrospective datasets, which include EP utilization, CG utilization and cost, through the secure web portal on the following dates: Orange County – EP dataset: December 7, 2020, CG dataset: November 30, 2021, cost dataset: June 21, 2021; San Diego County – EP dataset: December 22, 2020, CG dataset: September 9, 2021, cost dataset: January 3, 2022; Solano County – EP dataset: February 2, 2021, CG dataset: September 14, 2021, cost dataset: April 25, 2022; Los Angeles County – EP dataset: February 18, 2021, CG dataset: October 4, 2021, cost dataset: submitted with services data; Napa County – EP dataset: November 17, 2023, they have not submitted CG or cost data yet. Stanislaus County has yet to submit any datasets during the annual report period. Lake and Kern counties are submitting data for the prospective study period only based on overall project analysis timeline as well as the dates these programs were established.

The counties submitted their prospective datasets, which include EP utilization, CG utilization and cost, through the secure web portal on the following dates: Orange County – EP dataset: August 22, 2023, CG dataset: August 23, 2023, cost dataset: August 23, 2023; San Diego County – EP dataset: April 24, 2023, CG dataset: May, 25, 2023, cost dataset: July 25, 2023; Los Angeles County – EP, CG, and cost dataset: July 7, 2023; Napa County – partial EP dataset received: November 17, 2023. We have not yet received prospective data from Kern, Lake, Solano, or Stanislaus counties.

Additionally, we requested a data dictionary from each county in order to accurately identify each variable, and received the data dictionaries from all counties who submitted datasets. For Napa, Stanislaus, Kern, and Lake, please refer to the end of this report section for specific county updates with regards to this request.

The cost data obtained thus far from each county are described in Table 21, below. Los Angeles, Orange, and Solano counties submitted cost rates (i.e., total cost of the service and the service unit). In Los Angeles County, outpatient service costs are standardized per fiscal year for all providers. For Orange, Solano, and San Diego counties, service costs vary across programs. To account for these differences, Orange and Solano counties submitted price lists for services provided by their respective EP program and other programs in the county. In the case that the county was not able to provide certain cost details, we utilized the county specific regional rates sheets to ascertain all cost information. To ensure the most accurate data were received, San Diego County provided final, reconciled costs attached to each Medi-Cal reimbursable service. We also requested that each county provide us with contracts and budgets for their EP programs as a way to account for non-billable activities and other unaccounted-for costs of running the program.

Table 21: Cost data received from each county

County	EP Program Budget	EP Program Contract with County	Outpatient Service Rates	Day/Crisis Stabilization Service Rates	24-hour: Inpatient/Residential Service Rates
Solano	Utilized regional rates sheet	N/A	Costs related to outpatient service use were based on contract service rates. Each outpatient service included a price per unit of service.	Costs related to day services/crisis stabilization were based on contract service rates. Each service included a price per unit of service.	Costs related to 24-hour services were based on regional rate sheets. Each service included a price per unit of service.
Orange	Received county dates	N/A	Costs related to outpatient service use were based on contract service rates. Each outpatient service included a service unit rate and number of service units (in minutes)	Costs related to day services/crisis stabilization were based on contract service rates which included a service unit rate and number of service units (in minutes)	Costs related to 24-hour services were day rates which varied by contract. Inpatient/hospital stays include negotiated bed day rate for each HCA contracted acute inpatient facility. These rates are different from the general regional rates set by DHCS. Skilled Nursing Facility (SNF)/IMD rates were averaged and include a bed day rate. Crisis Residential rates include a day rate and charge for the medical services by the minute
Los Angeles	Monthly expenditures for the three CAPPS program clinics from 2017-2019.	N/A	Costs rates were attached to each service and included all service types. For outpatient services, each cost rate was the total cost of the service and the service unit (recorded in minutes).	Costs related to day services included total cost of the service and the service unit (recorded in minutes)	Costs related to 24-hour services include inpatient county hospitals, Fee-for-Service hospitals and County contracted providers. These costs include total cost of the service and cost per service unit (recorded in days). This information was extracted from the regional and state rates sheet.

San Diego	Budgets calculated through annual allocation amounts	Received	County interim cost rates for outpatient services per service unit (15 minutes, bill in one-minute increments). Published reimbursable cost rates and actual reimbursable cost rates for EP community services, including case management, mental health services, medication support, and crisis intervention	County interim rates for day services/crisis stabilization per service unit (in hours)	County interim rates per service unit (in days) for inpatient/hospital stays, crisis residential, and therapeutic foster care. Contracted inpatient hospital rates for adult and adolescent services, effective February 1, 2020. Regional rate, effective July 1, 2021, for non-contracted inpatient hospitals
Stanislaus	TBD	TBD	TBD	TBD	TBD
Napa	TBD	TBD	TBD	TBD	TBD
Lake	TBD	TBD	TBD	TBD	TBD
Kern	TBD	TBD	TBD	TBD	TBD

Description of submitted data

The number of individual clients in each county’s EP dataset is indicated in Table 22 below. All counties serve first episode psychosis (FEP) clients and some counties also serve clients at clinical high risk (CHR) for psychosis. These totals represent the number of individuals enrolled and served by the EP programs for the retrospective three-year period January 1, 2017 – December 31, 2019. We also received data on clients who were assessed for program eligibility but referred elsewhere.

Table 22: Summary of clients for all counties- retrospective data pull

County	FEP served	CHR served	Total Number of Clients in EP Group
Orange	Y	N	87
San Diego	Y	Y	353
Solano	Y	Y	78
Los Angeles	Y	Y	91
Napa	Y	Y	TBD
Stanislaus	Y	Y	TBD
Lake	Y	Y	TBD
Kern	Y	N	TBD

As anticipated, there is some variation in the data elements available for each county, which are summarized here and listed in Table 23 below.

Table 23. Client and utilization data elements summary for all counties retrospective data

Data Type	Data Element	Source	County Availability
Non-identifying ID	Identifying client ID removed and new ID assigned	County	Available: Orange, LA, San Diego, Solano, Stanislaus TBD: Napa
Program Name	Program Name	County	Available: Orange, LA, San Diego, Solano, Stanislaus TBD: Napa
Psychosis – category	1) Clinical High Risk (CHR) and enrolled in treatment 2) First Episode Psychosis (FEP) and enrolled in treatment 3) Assessed and referred out during Jan. 1, 2017 – Dec. 31, 2019 (add reason, if possible) 4) Other and reason (e.g., incorrectly assigned to EP program)	Program	Data elements # 1 and # 2 available: Orange, LA, San Diego, Solano, Stanislaus Data element # 3 available: Solano; Stanislaus N/A: Orange, LA, San Diego Data element # 4 available: Solano, San Diego; Stanislaus N/A: LA, Orange All data elements TBD: Napa
Assessed and referred out - open ended	Assessed and referred out – reason	Program	Available: Solano, LA; N/A: Orange, San Diego TBD: Napa, Stanislaus
Other and reason - open ended	Other – reason	Program	Available: Solano, LA; N/A: Orange, San Diego TBD: Napa, Stanislaus
Diagnoses associated with the episode of care	Diagnosis – Psychiatric	County	Available: Orange, LA, San Diego, Solano, Stanislaus TBD: Napa
	Diagnosis – Substance use	County	Available: Orange, LA, San Diego, Solano, Stanislaus

			TBD: Napa
	Diagnosis – Physical health	County	Available: Orange, LA, San Diego, Solano, Stanislaus TBD: Napa
Date of birth	Year & month of birth (not date)	County/Program	Available: Orange, LA, San Diego, Solano, Stanislaus TBD: Napa
Location (client zip code)	Zip code (as of first EP service)	County/Program	Available: Orange, LA, San Diego, Solano, Stanislaus TBD: Napa
Demographics **(as of first EP service)**	Race	County	Available: Orange, LA, San Diego, Solano, Stanislaus TBD: Napa
	Ethnicity	County	Available: Orange, LA, San Diego, Solano, Stanislaus TBD: Napa
	Gender	County	Available: Orange, LA, San Diego, Solano TBD: Napa
	Education level	County	Available: LA, San Diego, Solano, Stanislaus; N/A: Orange TBD: Napa
	Marital status	County	Available: LA, San Diego, Solano, Stanislaus; N/A: Orange TBD: Napa
	Preferred language	County	Available: Orange, LA, San Diego, Solano, Stanislaus TBD: Napa
	Insurance status (i.e., insurance type)	County	Available: Orange, LA, San Diego, Solano, Stanislaus TBD: Napa
	Employment status	County	Available: LA, San Diego, Solano, Stanislaus;

			N/A: Orange TBD: Napa
	Living arrangement (housing status)	County	Available: Orange, San Diego, Solano, Stanislaus; N/A: LA TBD: Napa
	Sex assigned at birth	Program	Available: Orange, San Diego, Solano, Stanislaus; N/A: LA TBD: Napa
	Gender identity	Program	Available: Orange, San Diego, Solano, Stanislaus; N/A: LA TBD: Napa
	Sexual orientation	County	Available: Orange, San Diego, Solano, Stanislaus; N/A: LA TBD: Napa
	Military service / Veteran status	County	Available: Orange, San Diego, Solano, Stanislaus; N/A: LA TBD: Napa
	Foster care / Adoption	County	Available: San Diego, Solano; N/A: LA, Orange TBD: Napa, Stanislaus
Outpatient mental health services in EP program between Jan. 1, 2017 – Dec. 31, 2019	Date	County	Available: Orange, LA, San Diego, Solano, Stanislaus TBD: Napa
	Duration	County	Available: Orange, LA, San Diego, Solano, Stanislaus TBD: Napa
	Service / procedure code	County	Available: Orange, LA, San Diego, Solano, Stanislaus TBD: Napa

	Funded plan (original pay sources, subunit)	County	Available: Orange, LA, San Diego, Solano, Stanislaus TBD: Napa
	Service location code	County	Available: Orange, LA, San Diego, Solano, Stanislaus TBD: Napa
	Facility code	County	Available: Orange, LA, San Diego, Solano, Stanislaus TBD: Napa
	Evidence Based Practices (EBP) / supported service code	County	Available: Solano, LA; N/A: Solano, Orange, San Diego, Stanislaus TBD: Napa
	Medi-Cal beneficiary	County	Available: Orange, Solano, Stanislaus; N/A: LA, San Diego TBD: Napa (claims person will have information on private insurance)
All other mental health services utilized by clients that started services between Jan. 1, 2017 – Dec. 31, 2019	Service / procedure code	County	Available: Orange, LA, San Diego, Solano, Stanislaus TBD: Napa
	Location code	County	Available: Orange, LA, San Diego, Solano, Stanislaus TBD: Napa
	Facility code	County	Available: Orange, LA, San Diego, Solano, Stanislaus TBD: Napa
	Service Date	County	Available: Orange, LA, San Diego, Solano, Stanislaus TBD: Napa
	Evidence Based Practices (EBP) / supported service code	County	Available: LA; N/A: Solano, Orange, San Diego, Stanislaus TBD: Napa
	Service – Inpatient	County	Available: Orange, LA, San Diego, Solano, Stanislaus

			TBD: Napa (Inpatient hospitals: Crestwood BH, state hospital, Bella House (12 bed psychiatric transitional program), (Crestwood may serve minors))
	Service – Crisis residential	County	Available: Orange, LA, San Diego, Solano, Stanislaus TBD: Napa (Progress Place is the name of the crisis residential service in Napa County)
	Service – Crisis stabilization	County	Available: Orange, LA, San Diego, Solano, Stanislaus TBD: Napa (Crisis stabilization unit for Napa County is operated by Crestwood and serves both youth and adults)
	Service – Urgent care	County	Available: Orange, LA, San Diego, Solano, Stanislaus May be available: Napa
	Service – Long-term care	County	Available: Orange, LA, San Diego, Solano, Stanislaus TBD: Napa
	Service – Forensic services and jail services	County/Program	N/A: San Diego, Orange, LA, Solano TBD: Napa. Stanislaus
	Service – Referrals	Program	Available: Stanislaus; N/A: Solano, Orange, LA, San Diego TBD: Napa
	Service – Law enforcement contacts	Program	Available: Stanislaus; N/A: Orange, Solano, San Diego, LA TBD: Napa
	Service – Justice system involvement	Program	Available: San Diego, Stanislaus; N/A: Orange, LA, Solano TBD: Napa

	Service – Regional center involvement (any developmental issues)	Program	Available: San Diego, Stanislaus; N/A: Orange, LA, Solano TBD: Napa
	Service – Substance use services	County	Available: Orange, Stanislaus; N/A: Solano, San Diego, LA TBD: Napa

Over the past and current reporting periods, we have held a series of follow-up meetings with each EP program's staff and County staff to address questions and gaps in the data submitted to us. This iterative process reflects significant effort contributed by the EP programs, County staff, and our team. As a result, we are confident that we have received/will receive all relevant data that is possibly available for this analysis.

On September 7, 2023, we met with Napa County to review the retrospective data request and check in on progress in accomplishing the request. We discussed the need of Napa County to involve their IT department in order to access their old EHR to access the data being requested. They submitted their EP data for the retrospective period on November 17, 2023, but the CG and cost data are still outstanding along with the prospective dataset. Our team is currently awaiting the data dictionary and the cost data from Napa, and they are set to deliver those items during the next reporting period.

On October 25, 2023, we met with Lake County to review the details of the prospective data request and answer any questions Lake County had about depositing the data. Lake should be able to deposit their datasets during the next reporting period.

As for Kern County, we met with them on August 29, 2023, to review the details of the prospective data request and answer any questions Kern County had about the request. We met again to answer some follow up questions regarding logistics about the data pull on October 20, 2023, and then again on December 13, 2023 to discuss data privacy and consenting questions raised by Kern County. We are in the process of resolving those concerns and then plan to proceed with the data request which should be received in the next reporting period.

Stanislaus County has not made progress in this current reporting period due to vacancies at the county level. Data gathering is on pause while the staffing barrier at the county level is being worked on.

14. Collaborate with counties and programs to disseminate findings through multi-media work products

Our team is working with counties and programs, as well as internally, to disseminate findings from the LHCN through multi-media work products. The first is by disseminating the draft summary report described in the section below to all participating programs for feedback by the end of the fiscal year (June, 30, 2024). The draft was submitted to our EP program and county partners on May 12, 2024. In that dissemination, our team also prepared an executive summary report that was a shorter version of the report that only included an introduction, executive summaries of each component of the project, and a general project summary as we recognized the longer version of the report is quite extensive. We also encouraged our partners to share the report with any community partners they thought may be interested, such as service users, their family members, or other program staff.

Our team has also worked on ensuring that results from the EPI-CAL Learning Health Care Network project are disseminated on our website and updated regularly: https://epical.ucdavis.edu/. We are also working with an outside vendor to create a visual representation of the project by creating a comic. We hope to have the LHCN comic ready for wider dissemination in early 2025.

15. Submit a final report detailing all program- level, county-level outcomes data collected summarizing experiences and feedback from all stakeholders that is responsive to stakeholder feedback on the draft report.

This 23/24 fiscal year was the last project year for many of the counties and programs that were part of the original multi-county collaborative innovation plan and therefore our team prepared a report that summarizes the overall progress of the LHCN to date. This report included a summary of qualitative data that has been collected over the course of the project, outcomes data collected via Beehive, and a multi-county integrated analysis of cost and utilization data. The report was prepared for review by our county and program partners, and aimed to have community partners provide feedback on the overall success and challenges of implementing a Learning Health Care Network of EP Programs in California. Our team has prepared a draft report providing an overall summary of progress and accomplishments of the Learning Health Care Network since project activities commenced in Spring of 2019. While each participating county may be on slightly different timelines, the draft summary report summarizes the overall progress of the EPI-CAL team and all participating counties. Since there are three main components to the data collected for the LHCN, County Level, Program Level, and Qualitative data (Figure 1), the summary report has broken down progress into three sections for each component. The summary report is prepared in a separate document from the report and was submitted to our EP program and county partners on May 12, 2024.

Discussion and Next Steps

Discussion

Over the last fiscal year, the team has continued to meet each of the goals that were set to out for the original the multi-county Innovation project, which has grown to include other funding streams and additional counties over the years. The LHCN represents one of the first collaborative university-county partnerships between the University of California, Davis, San Diego and San Francisco with multiple California counties to implement and expand an integrated Innovation project. Through this endeavor, all parties hope to have a larger impact on mental health services than any one county can create on their own. The team feels confident that we have made excellent progress in the implementation of an innovative mental health strategy.

We have completed Beehive training with all the original LHCN counties as well as several recent additions. We are continuing to collect data on the core outcomes battery for the EPI-CAL project with 23 programs. Over the past project period, two programs registered and enrolled their first clients (UCLA CAPPS and Yolo County). Based on feedback from users in these programs, we have continued to work with Beehive developers to make modifications to the application, such as extending survey windows, printing survey results to PDF, accessing the Beehive resource guide in the application, as well as modify our training approach based on constructive feedback from programs, including creating a testimonials slide from users of Beehive that describe the benefits of using Beehive thus far from real clinic users. We are in the process of workshopping additional changes to the application, including the ability for clinics to edit data after survey completion as well as creating additional visualizations for more surveys for both client and clinic entered data. We are also in the process of adding additional threshold languages and are in the final stages of adding Chinese languages (Arabic, Armenian, English, Spanish, and Vietnamese have been in Beehive in previous project periods).

As noted previously, we were able to successfully complete our preliminary multi-county integrated county data analysis and provide preliminary results on service utilization and costs associated with those services across counties. However, we are still gathering additional data to inform a final analysis, which we expect to complete by Spring 2024 and are in the process of procuring the final datasets in order to complete the integrated cost and utilization data for all counties.

Next Steps

At the time of this report, the Learning Health Care Network is an actively expanding network that continues to allow new programs to join the existing infrastructure. While at this stage programs will not be able to have input on the battery of outcomes to be collected or the initial design of the application, there are benefits to joining the project at this later stage. For example, counties joining at this later stage are joining at a time where the application for data collection, Beehive, has already been developed and data collection is active and ongoing. Therefore, new LHCN programs are able to hit the ground running with data collection and do not have to wait for the development stage of the project to transpire. In addition, our training approach to implementing Beehive in EP programs is well-established. We have refined our training approach over the years from continuous feedback on what works and what doesn't, and now administer both synchronous and asynchronous training materials to programs so that all staff members have an opportunity to participate in the LHCN data collection. Our team is starting detailed analysis on outcomes and what components of care influence client outcomes, and new programs joining the LHCN will be able to benefit from that information from the large statewide dataset to inform clinical practice in their own clinics. In summary, counties and their EP programs joining at a later stage of the project are benefitting from an established infrastructure.

In addition to the benefits to the program to joining an established Learning Health Care Network, the LHCN itself benefits from additional programs joining. There are more programs contributing data to the harmonized dataset, and the clients in each of the programs are unique to their region of California.

As implementation of Beehive continues, we will elicit feedback from EP programs on how to improve both the training process and Beehive itself via feedback surveys, regular check-ins from point people, and qualitative interviews. Our goal is to continue to improve Beehive in an iterative process and to incorporate community partner feedback so that Beehive be a useful data collection and visualization tool for the programs using it. We are also working with sites to understand why enrollments are not matching the original projections and to support them to increase the degree to which they are integrating Beehive into their standard practice. We are collecting informal data on these factors via regular check-in meetings with programs, as well as wrapping up our qualitative research approach by examining barriers and facilitators to Beehive implementation through interviews with EP program participants.

While this is the last annual report for several of the participating counties through the innovation funding mechanism, the LHCN work is ongoing and will continue into the next year. Over the next fiscal year, the LHCN team expects to continue analysis for the cost and utilization as additional datasets are being sent to our team, complete qualitative interviews on barriers and facilitators to implementing Beehive, continue Beehive data collection, and onboard additional programs into the LHCN.

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