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ORIGINAL PAPER

Scaling out a Digital-First Behavioral Health Care Model to Primary Care

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Abstract

There is an established supply/demand problem in addressing behavioral health needs. A proposed solution is to have primary care providers respond to patients' behavioral health challenges directly. The current study describes the adaptation and evaluation process of Precision Behavioral Health (PBH), a digital-first behavioral health care model with provider-referral to an ecosystem of digital interventions. User-centered design strategies used to adapt the PBH program included applying process to system-level behaviors, defining target users and their needs, defining workflows, rapid prototyping cycles, and a complimentary mixed-methods iterative development phase with a pilot trial. Twenty-one primary care providers, 164 medical assistants and check out staff, and 45 nursing staff were trained as part of the pilot. The RE-AIM implementation framework was used for evaluation. Fourteen primary care providers participated in a semi-structured interview to provide feedback on their experience. The adapted PBH program reached 39.54% of primary care patients seen by the pilot providers during the timeframe. Providers offered PBH to 76.63% of the patients reached, and 26.10% accepted the PBH referral. Out of the accepted patients, 78.15% registered, 73.95% activated their digital intervention, and 59.09% showed clinical improvement in outcomes. Nineteen (90.48%) pilot providers adopted PBH and referred a median of 2 patients each week. Medical assistants/check out staff scheduled 5% of digital care navigator appointments and 84.03% of provider follow up appointments. Primary care providers used the program's clinical decision support tool to aid their discussion and referral process with 95.33% of patients that accepted PBH and selected one of the top 3 recommended tools 95% of the time. Qualitative results identified six broad content categories: Overall PBH referral experience, PBH training, PBH eligibility flag, PBH follow-up appointment workflow, impacts of PBH program on providers, and future modifications. Providers described a positive experience with PBH elements, low burden, positive impact on their jobs, and PBH enhancing treatment options for their patients. Primary care providers identified several adaptations, such as expanding PBH to other types of visits (e.g., sick visits), and optimizing workflow for check-out staff when booking follow-up appointments. Primary care providers are willing and able to successfully refer patients to behavioral health digital interventions with minimal training time for onboarding. Patients referred through primary care demonstrate high acceptance rates, and comparable rates of improvement to those that are referred by licensed behavioral health providers. The results have the potential to impact public health, by increasing behavioral health access for patients without adding burden to providers, and providing healthcare organizations an alternative pathway to address increasing needs without having to increase personnel or introduce major organizational changes.

Keywords User-centered design · Digital interventions · Implementation · Primary care providers · Scale out

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There is an ever-growing behavioral health need globally (World Health Organization, 2020). However, it is well established that the field will never have enough trained mental health providers to adequately address this increasing need (Endale et al., 2020). Thus, we need to re-think who is the added workforce best poised to support patients' behavioral health needs. Primary care providers (PCPs) already play a large role in mental healthcare delivery, providing a range of services including screening, diagnosis, and medication management (Poghosyan et al., 2019). For example, 70% of primary care visits include behavioral health related discussions (Hunter et al., 2009). Furthermore, 60% of mental health care visits to PCPs and psychiatrists that resulted in mental health diagnoses were made by a PCP, rather than a psychiatrist, while 75% of all psychotropic medication prescriptions were written by PCPs (Kroenke & Unutzer, 2017; Olfson et al., 2014). Despite the growing role of PCPs in mental health care delivery, they often report feeling underprepared for this task (Clatney et al., 2008; Loeb et al., 2012), and a lack of institutional support, resources, and time to effectively care for the mental health of their patients (Kroenke & Unutzer, 2017; Loeb et al., 2012). This reality has left providers feeling overwhelmed, frustrated, and burnt out (Agency for Healthcare Research and Quality, 2023; Shanafelt et al., 2022). Furthermore, PCPs report additional challenges in delivering cohesive patient care due to communication obstacles with mental health specialists in fragmented healthcare systems (Loeb et al., 2012).

To adequately support PCPs as a new workforce poised to address the growing behavioral health needs of patients, they need the proper knowledge and system-level structures and supports. To achieve this goal, we describe the development and evaluation process of scaling out (Aarons et al., 2017) Precision Behavioral Health (PBH), a digital-first behavioral health care model that matches patients to digital interventions, to a new delivery setting, primary care. In this paper, we describe (1) the user-centered adaptation process engaged to maintain the core elements of PBH while adapting the program components to match primary care's existing clinical workflows and procedures, (2) the pilot project that integrated the adapted-PBH program into primary care, (3) the implementation and effectiveness outcomes of the pilot, (4) qualitative results from user feedback interviews that were conducted towards the end of the pilot timeframe for continued iteration of the PBH program in primary care, and (5) report on the finalized scaled out version of the PBH program to primary care.

Precision Behavioral Health

Precision Behavioral Health is a digital-first care model that matches patients to an ecosystem of digital mental health interventions and assists them using strategically placed human support. For a detailed description of PBH please see Youn and colleagues (2023b). Briefly, PBH was developed with the goal of addressing the access to care problem in behavioral health mentioned above. PBH was developed and deployed as routine care within the Behavioral Health Department at Reliant Medical Group, a large multispecialty primary care practice in Massachusetts.

PBH has several key programmatic and clinical flow components. Figure 1 includes the PBH program elements. First, a licensed Behavioral Health clinician conducts a triage assessment with a patient who has been referred to the Behavioral Health department for services. In this visit, the provider uses electronic health record information,

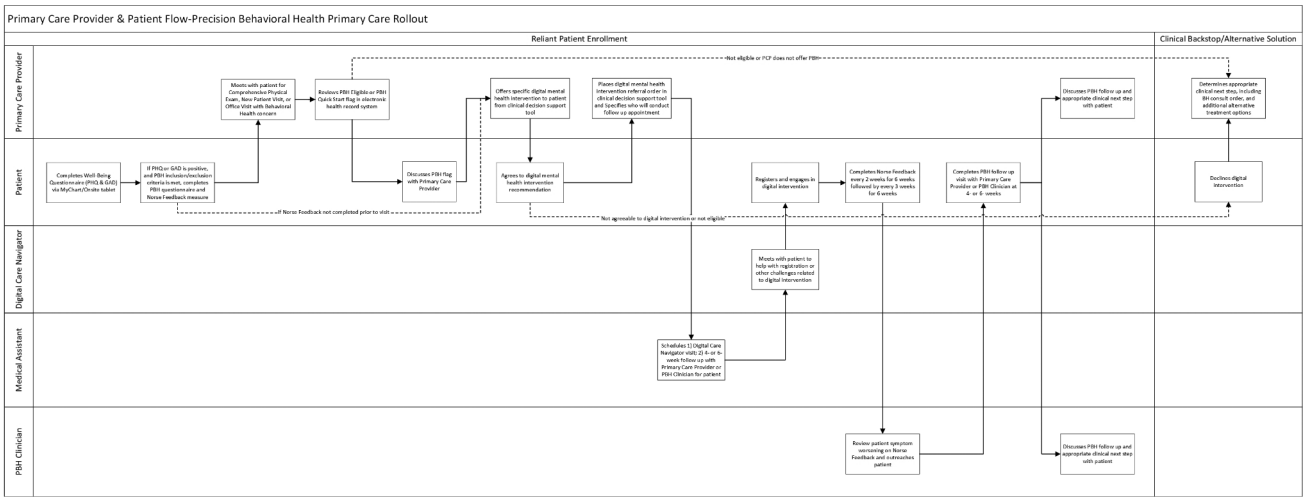

Fig. 1 Adapted precision behavioral health provider and patient flow for pilot in primary care. *Note*. Grayed out elements are PBH program components that are in the Behavioral Health referral process (Youn et al., 2023b) but were adapted and removed for the pilot PBH launch in primary care. PHQ = Patient Healthcare Questionnaire. GAD = Generalized Anxiety Disorder-Scale. PBH = Precision Behavioral Health. BH = Behavioral Health. PCP = Primary Care Provider. DCN = Digital Care Navigator

responses to a multidimensional patient reported outcome measure, and their clinical judgment to determine and refer patients to a personalized and appropriate treatment option, which includes short-term goal-oriented therapy, long-term therapy, or PBH.

Second, for patients deemed appropriate for PBH, providers can select which previously rigorously vetted digital intervention to refer patients to, and order directly through a clinical decision support tool embedded within the electronic health record system.

Third, the program includes strategically placed human support to aid the patients' technical and clinical experience. Patients who accept the PBH referral are scheduled for two follow up visits. The first is with a digital care navigator within 24–48 h of referral to aid the patient's registration and onboarding process with the digital intervention. Attending this visit the day of the referral has been shown to increase registration likelihood to 96%, more than twice the likelihood if they connect 5-days post-referral (Jaso-Yim et al., 2024). The second follow up visit is with the behavioral health clinician 4–6 weeks after referral to evaluate the clinical disposition of the patient and adjust treatment as appropriate.

Fourth, there is ongoing monitoring of patient progress. Patients complete a multidimensional outcome measure every 2 weeks for the first 6 weeks, and every 3 weeks for the second 6 weeks. If a patient's score indicates clinical worsening, they are immediately outreached by the behavioral health clinician who will make clinical determinations based on patient status.

Fifth, the PBH program has been purposefully designed to be embedded within behavioral health existing clinical workflows and the electronic health record system to enhance provider adoption. Implementation and clinical effectiveness evaluation of PBH (Nordberg et al., 2024) showed high registration rates (80%) and high activation rates among patients who were referred to the program (77%). Provider adoption was also high, with each clinician averaging 4 patient referrals each month. PBH's clinical effectiveness assessment showed that 74% of patients demonstrated clinical improvement on their pre-post patient reported outcomes, and only 3.5% of patients met clinical deterioration criteria. Thus, the PBH program's overall impact was demonstrated across multiple outcomes.

Scaling Out PBH to Primary Care: Adaptation Process Applying User-Centered Design

Consistent with the practice-oriented research principles that guide PBH (Castonguay et al., 2021; Youn et al., 2023a), a clinical need within the primary care department at Reliant Medical Group led to a leadership discussion on the possibility of scaling out PBH from behavioral health into primary care in May 2023. Internal data showed increased behavioral health needs identified and discussed in primary care visits, highlighting an unmet patient need that could potentially be addressed by having primary care providers refer patients directly to PBH.

Scaling out of PBH was conceptualized as a type I scaling initiative (Aarons et al., 2017), where the targeted mild-moderate symptom patient population remained the same, but would be reached through a different delivery system, namely primary care providers. In alignment with primary care leadership needs, the goal of scaling out PBH was to develop and quickly evaluate the implementation outcomes and effectiveness of this adapted program for subsequent rapid implementation within all primary care at Reliant.

User-Centered Design Process of Adapting PBH for Primary Care

User-centered design has been widely applied to product development contexts and it involves gathering information about and from the people that will use the product to enhance its acceptability and usability (e.g., Courage & Baxter, 2005; Lyon & Koerner, 2016). With these goals, we describe how we leveraged specific user-centered design principles to purposefully adapt PBH to fit within primary care clinical workflows and have patients referred directly to PBH by primary care providers (instead of behavioral health clinicians).

In July 2023, the PBH team worked with primary care leadership to identify champion primary care providers located at different sites within Reliant to co-develop the adapted PBH program. The use of provider-champions is an implementation strategy that has been shown to enhance outcomes (Bunce et al., 2020; Powell et al., 2015). Leadership was asked to select champion providers that had six key attributes of champions (Bonawitz et al., 2020): informal authority influence and institutional savviness as viewed by their colleagues, ownership of the success of PBH as it aligned with their interest in addressing behavioral health concerns within their patients, being physically located at primary care sites within Reliant, demonstrated grit by the champions' involvement with past initiatives or solving problems at their sites, skilled communicators and viewed as persuasive by their colleagues, and a participative leadership style to help facilitate collaboration during the co-development sessions as well as later during the implementation phase.

Two champion primary care providers were identified and met for weekly hour-long meetings with a core adaptation

PBH team (implementation scientist, clinical lead, operations lead, and IT lead) for three months (August-October). The champions were compensated $250/hour for their time. The amount was determined by organizational leadership to be commensurate with the experience and level of effort requested from the champions. The meetings leveraged *user-centered design strategies* with the goal of adapting the PBH program to embed implementation strategies that would allow for a larger scale out: workflow integration within the existing electronic health record system (Flanagan et al., 2009; Staras et al., 2021), maximize provider usability (Lyon & Koerner, 2016), and enhance provider training (Powell et al., 2015). The team first *applied process maps to system-level behaviors* (Dopp et al., 2018) relevant to PBH. This involved working with the primary care champions to understand and delineate all the patient-provider interactions as part of routine primary care. These discussions identified patients' pre-visit activities to prepare them for their appointments such as patient reported outcome measures completion, the specific visit types that could be used to integrate PBH into (i.e., annual physical exams, new patient visits), the providers' use of the information displayed in the electronic health record platform, and the roles and interactions that the medical assistants and check out staff had with the patients. The adaptation team continued to *define the target users and their needs* (Dopp et al., 2018). For PBH, the target users were conceptualized as the PCPs, who would be doing the direct referral to PBH, and their patients, and differential needs were specified for each of the users. For PCPs, we identified the necessity for a PBH eligibility flag embedded within the electronic health record system that would aid providers' clinical decision-making process to identify patients appropriate for PBH. For detailed description on the development of the eligibility flag refer to supplemental material 1. An additional need identified for providers was to give them the option to decide who should be conducting the PBH follow up visit with patients: themselves or a behavioral health clinician. For patients, we specified the need for scheduling the digital care navigator and provider follow up visits as a pre-existing step in their appointment visit clinical flow to minimize additional calls or outreaches. The adaptation process continued to *define the workflows* (Dopp et al., 2018) for each of the providers and staff that would be involved in the patient's experience, including PCPs, medical assistant/check out staff, nursing staff, digital care navigators, and PBH clinicians. Once the main components of the PBH adapted program were established using the strategies delineated above, the weekly sessions were devoted to conducting *rapid prototyping cycles* (Dopp et al., 2018). The PBH team brought prototypes of the various program EPIC components to obtain feedback from the champions during the weekly meetings and iterate. Various prototypes of training content, slides, and delivery modes were also discussed with the goals of increasing provider self-efficacy (Zhang et al., 2017) in having a PBH referral discussion with patients.

Figure 1 depicts the adapted PBH program swimlane for primary care. Prior to attending a comprehensive physical exam or a new patient visit, patients are asked to complete patient reported outcome measures, such as the nine-item Patient Health Questionnaire (Kroenke et al., 2001) and the seven-item Generalized Anxiety Disorder Scale (Spitzer et al., 2006), as part of routine clinical care at Reliant. If patients' scores are positive in either of these two measures (defined as a score above 1 on either of the measures), and the patient meets inclusion and exclusion criteria (for detailed description on the PBH eligibility flag development, see Supplemental Material 1), then they are given the Norse Feedback measure to complete (see below). Primary care providers then see the PBH eligibility flag as a best practice alert within the electronic health record system, which includes the link to the clinical decision support tool. For patients that the provider deems appropriate based on their clinical judgment, the providers click on the clinical decision support tool to generate the top 3 digital intervention recommendations and offers the patients PBH and a specific digital intervention. The top 3 recommendations are based on the patient's Norse Feedback measure responses at the time of the visit. Providers ultimately choose which digital intervention to refer to the patient based on their clinical judgment. Patients have the option to accept the referral, think about it, or decline it. Providers are asked to document the outcome related to PBH (i.e., PBH offered, PBH declined, PBH not offered) within the electronic health record system. For patients that accept the referral, providers are asked to specify who should conduct the follow up visit (themselves or a PBH clinician), and the electronic health record system prompts the medical assistant/check out staff to schedule the digital care navigator visit as well as the follow up visit for the patient. Patients meet with a digital care navigator to complete registration with the digital intervention, and then can start using the digital intervention. Patients are also asked to complete the Norse Feedback measure every 2 weeks for the first 6 weeks, and every 3 weeks for an additional 6 weeks for ongoing outcome monitoring. If any clinical worsening is detected, the electronic health record system notifies nursing staff to outreach the patients.

As highlighted in Fig. 1, key adapted changes to the PBH program include the PBH eligibility flag integration within the electronic health record system to be displayed at the time of the provider's visit, PCPs selecting who should meet with the patient to conduct the PBH follow up visit, medical assistants and check out staff supporting the scheduling of

the follow up visit, and nursing staff doing overall clinical monitoring and outreaching of patients that were flagged as having worsened based on their post-patient reported outcomes measure scores.

Adapted PBH Program Pilot Trial within Primary Care

Once the adapted PBH elements were specified, we engaged in an *iterative development phase* (Dopp et al., 2018) by conducting a pilot trial to evaluate the program's implementation and effectiveness outcomes prior to the larger implementation scale up (Powell et al., 2015). We developed three training materials for the various providers and staff involved in the patient's PBH experience within primary care: PCPs, nursing staff, and medical assistants/check out support staff.

We first worked with leadership and champions to identify 10–15 PCPs across different sites within the organization to participate in a pilot trial from October 2023 – January 2024. We r*ecruited pilot participants* (Dopp et al., 2018) using a snowball sampling method (Naderifar et al., 2017), in which primary care leadership and the two champions were asked to identify potential providers, who were invited via email by the PBH team to be a part of the pilot trial. Participation involved attending a live 1-hour virtual training session to learn about the adapted PBH program, and one 30-minute individual follow-up interview session with the PBH team members to provide feedback on their experience with PBH to be scheduled 4–6 weeks after their onboarding training. The provider training content included the reasoning for bringing PBH to primary care, main components of the PBH program, introduction to the digital interventions in the ecosystem, and electronic health record clinical workflows related to PBH. To minimize disruption in the organization's day-to-day operations, training sessions were conducted outside of clinical hours (e.g., before 8am, or after 5pm). Participants were compensated $250/hour for attending the training sessions and $125 for the 30-minute follow-up interview meeting. Once providers attended the 1-hour training, they went "live" within the PBH program the next business day, which entailed giving them access to PBH components within the electronic health record system.

Once providers were identified, we worked with the site administrative leadership to identify the nursing staff, medical assistants, and the checkout support staff that worked with the pilot providers. For the medical assistants and check out support staff, the PBH team worked with the administrative leadership at each site to help distribute a training link via email for them to complete asynchronously a week prior to the provider's go-live date. The asynchronous training's content focused on workflows related to scheduling the digital care navigator visit and the PBH follow up visit, for both PCPs and PBH clinicians. Staff were asked to complete a 3-question knowledge quiz. If staff did not correctly answer all questions, they were asked to re-take the asynchronous training and complete the quiz as many times needed. The training and quiz took 10 min, and staff were compensated $50 for their time. Nursing staff training was also conducted asynchronously. The PBH team worked with the clinical leadership at each site to help distribute a training link via email for nursing staff to complete asynchronously the week of the provider's go-live date. The asynchronous training focused on the PBH program goals and main components, and the workflows related to outreaching patients that showed clinically significant levels of worsening based on their post- patient reported outcome measure change. Staff were asked to complete a 3-question knowledge quiz and repeat the training and quiz until all questions were answered correctly. The training and quiz together took 15 min, and staff were compensated $50 for their time.

The pilot participants included 21 PCPs (seven medical doctors, eight nurse practitioners, and six physician assistants), from five sites at Reliant. Starting October 3, 2023, providers were trained on a rolling basis based on their availability, and the last group of providers were trained on January 19, 2024. Additionally, 164 medical assistants and check out staff, and 45 nursing staff were trained as part of the pilot program.

Iterative Development of the PBH Pilot Program within Primary Care

As part of the *iterative development phase* (Dopp et al., 2018), we used a complementarity mixed-methods design (Palinkas et al., 2011) to answer related questions for evaluation (quantitative data) and elaboration (qualitative data) purposes. Specifically, in the present study, the quantitative data were used to evaluate the PBH pilot program's implementation and effectiveness outcomes (e.g., Youn et al., 2023b; Nordberg et al., 2024) and the qualitative data were used to collect feedback from participants to continue adapting the program. Quantitative and qualitative data collection and analysis were conducted simultaneously, and no priority was assigned to either quantitative data or qualitative data. Given that data were collected as part of routine care as part of the implementation of PBH within primary care, the implementation and evaluation of PBH was determined to be an exempt quality improvement project by the Institutional Review Board (IRB) at the Office of Human Research Affairs in United Health Group prior to data collection.

Implementation and Effectiveness Outcome Evaluation

The goal of the quantitative evaluation was to assess the adapted PBH program's implementation and effectiveness outcomes. Consistent with prior evaluations of the program (Youn et al., 2023b; Nordberg et al., 2024), we used the RE-AIM framework (*What is Re-AIM?*, n.d.).

Data Collection

Electronic Health Record System Data

Data were extracted for all patients who attended a new patient or comprehensive physical exam visit with a PBH onboarded PCP from October 4, 2023 through January 19, 2024 (duration of the pilot program). Given the rolling onboarding process described above for PCPs, some providers had a shorter window to refer patients to PBH. Data were captured within the electronic medical record system as part of routine clinical care. The system recorded the date of the primary care appointment, the type of appointment, the PCP that met with the patient, whether the PBH eligibility flag was shown to the provider, PBH related outcomes of the appointment (i.e., patients referred to PBH, patient declined the referral, patient considering the PBH referral, PBH referral accepted, PBH not offered to patient), patient demographic information, and the Norse Feedback measure results (see below).

Norse Feedback

The Norse Feedback measure is a multidimensional patient-adapted self-report measure (McAleavey et al., 2021). The Norse Feedback items were developed using item response theory using both clinical and non-clinical samples (McAleavey et al., 2021). The Norse Feedback subscales consist of common symptoms of mental/behavioral conditions (e.g., Sad Affect, Physical Anxiety), treatment-relevant chronic problem-maintaining processes (e.g., Urges, Hopelessness), personal consequences of mental illness (e.g., Cognitive Problems, General Functioning), personal resources (e.g., Social Support, Self-Compassion), treatment-related scales (i.e., Alliance and Therapy Preferences), items related to social determinants of health, and several single-item indicators, including medication concerns, quality of life, sexuality/sex functioning, physical health, sleep, and self-harm. Patients are asked to rate each question using a 7-point Likert scale ranging from 1 "*This is not at all true for me*" to 7 "*This is completely true for me*". Each domain includes a "trigger item", a single item that represents the subscale. If patients score above a threshold on that trigger item, the remaining questions in the subscale are offered to the patient for completion. Due to the dynamic nature of the questionnaire, the items in the Norse Feedback can range from 27 to 96 questions. Each subscale is treated separately and a total score is not calculated for the Norse Feedback.

For the PBH adapted program, only the trigger items were administered to patients. This decision was made in order to fit easily within primary care time constraints by asking the minimum required questions while retaining the benefits of the multidimensional Norse Feedback measure. The Norse Feedback trigger items administered as part of the primary care adapted program include Anger, Physical Anxiety, Readiness for Change, Cognitive Problems, Self-Compassion, Self-Contempt, Restrictive Eating, General Functioning, Hopelessness, Internal Avoidance, Traumatic Memories, Pain, Sad Affect, Social Avoidance, Substance Use, Social Support, Urges, and Worry. Single item indicators administered along with the trigger items were: Physical Health, Sexuality/ Sex Life, Self-Harm, and Sleep.

Digital Mental Health Intervention Vendor Data

As described elsewhere (Youn et al., 2023b; Nordberg et al., 2024), PBH and each of the digital mental health intervention vendors had a business relationship that specified systematic vendor data collection and sharing. Vendors shared data pertaining to the patient's date of registration, date of activation (i.e. the first meaningful interaction with the digital mental health intervention content), and dates of utilization. The PBH team calculated each patient's engagement with the digital intervention as the number of interactions the patient had with the tool per week. Vendors shared data de-identified daily using a secure web-based file transfer application.

Data Analysis

Reach was evaluated as the proportion of patients that accepted the referral to PBH made by their PCP. To further understand the reach population, we summarize and compare the demographic characteristics of patients that attended a comprehensive physical exam or new patient visit with the PCPs during their pilot participation, patients who completed a screening measure as part of routine care, those that were flagged as eligible for PBH, those that were referred to the program by their PCP, patients that accepted the referral and those that declined.

PBH clinical effectiveness was assessed by (1) summarizing the patients' engagement with their digital mental health intervention, including registration rates, activation rates (i.e., patients who engaged at least once with the digital mental health intervention after registration, and retention

rates (defined as percentage of patients that engaged at least once weekly / activated patients) at 15- and 30-days as described in the field (Baumel et al., 2019); (2) evaluating patient response rate as defined by the percentage of patients classified as having clinically improved, clinically worsened or shown no change (Hiller et al., 2011) in the Norse Feedback measure at 6 weeks (or closest measurement point). For detailed description of change calculation please refer to Supplemental Material 2.

Adoption was defined as the proportion of PCPs that had at least one PBH referral conversation with their patients, and we report on the median and range of referrals made by each provider weekly. To characterize providers' adoption, generalized linear regression models were used to evaluate provider level differences in (1) weekly proportions of flagged patients, (2) weekly proportions of patients offered PBH, and (3) weekly proportions of patients' accepting PBH. The response variables of interest -- namely weekly proportions of patients (1) seen by providers (those that entered screening questionnaires) that were flagged as PBH eligible, (2) that were offered PBH, and (3) offered PBH that accepted the referral – varied between 0 and 1 so a binomial distribution of errors was assumed, with a binomial link function. Estimated marginal means (EMmeans), confidence intervals and significant differences between means with multiple comparison adjustments (Bonferonni method) were estimated for all three models.

Implementation of PBH was evaluated by examining two PBH program components. First, we evaluated medical assistants/check out staff adherence to scheduling the two PBH program visits. We assessed the proportion of patients that were scheduled for a digital care navigator appointment, a follow up appointment with the PCP, and a follow up appointment with a PBH clinician out of those that accepted the PBH referral. Second, we evaluated PCPs' adherence to the clinical decision support tool top 3 digital mental health intervention recommendations. Specifically, we first identified which digital intervention the providers have ordered and whether this ordered digital intervention matches any of the top 3 recommendations. Among all the patients, we then counted the number of patients whose ordered digital interventions match any of the top 3 recommended digital interventions (i.e., matched patients). The adherence was operationalized as the percentage of the number of matched patients over the total number of patients who were ordered a digital intervention.

Results

Reach. Table 1 includes patient demographic information. During the pilot timeframe, 6,224 patients were seen by PBH-referring PCPs for a comprehensive physical exam or new patient visit. Out of these patients, 1,353 (21.74%)[1] completed the pre-visit screening measures as part of routine clinical care, and thus, were evaluated for PBH eligibility (see supplemental material 1). The PBH eligibility criteria flagged 535 patients (39.54%) as eligible for the program to providers within the electronic health record system. Of those flagged as eligible, 533 (99.63% of total flagged) were seen for a comprehensive physical exam, and 2 (0.37% of total flagged) attended a new patient visit. Primary care providers offered the PBH program to 410 patients (76.63%/flagged patients), and 125 (23.36%/flagged patients) were not offered either because providers deemed them clinically ineligible for the program (64, 11.96% per flagged patients) or because the provider did not discuss the program during the appointment for other reasons (61, 11.40% per flagged patient). Of those who were offered PBH, 107 (26.10%) accepted the referral, 45 (10.97%) asked for more time to consider the referral, and 258 (62.93%) declined the referral. An additional 12 patients were referred to the PBH program manually by the PCP, meaning that the providers made the clinical decision to offer PBH even if they were not flagged as eligible. For effectiveness and implementation evaluations below, the 12 patients were included in the accepted PBH referral group.

To evaluate whether there were meaningful differences in patient demographic characteristics across the patient groups, one-way ANOVA and Chi square tests were conducted. Results indicate significant differences for age $F(9, 9252)=26.96$, $p<0.001$; legal sex χ^2 $(18, N=9261)=68.43$, $p<0.01$; and ethnicity χ^2 $(18, N=9262)=519.22$, $p<0.01$. There were no significant differences for race χ^2 $(45, N=9262)=47.11$, $p=0.39$.

Tukey's HSD was used to investigate post-hoc age differences. Results showed that the overall patient group's age was significantly higher (i.e. patients were older) compared to those who were screened ($p<0.001$), flagged ($p<0.001$), offered PBH ($p<0.001$), not eligible/not offered ($p<0.001$), accepted ($p<0.001$), declined ($p<0.01$), considering ($p<0.01$), registered ($p<0.001$), and activated ($p<0.001$). Those who were screened were older in age from those who were flagged ($p<0.001$), offered ($p<0.001$), not eligible/not offered ($p<0.001$), accepted ($p<0.001$), registered ($p<0.05$), and activated ($p<0.05$). No other groups were identified as significantly different from each other in age.

A logistic regression with estimated marginal means was used to further investigate the differences between the groups for legal sex. Results indicate that, compared with the overall group, female to male ratio of patients seen by PCPs was significantly higher in the flagged (OR = 1.54, 95% CI [1.11, 2.14]), offered (OR = 1.60, 95% CI [1.11, 2.32], and

[1] Screening percent is comparable to Reliant's screening rates across all primary care sites and providers.

Table 1 Primary care adapted PBH Pilot patient demographic characteristics

	Overall	Screened	Flagged	Offered	Not eligible/Not offered	Accepted	Declined	Considering	Registered	Activated
Total N	6224	1353	535	422	125	119	258	45	93	88
Age, Mean (SD)	52.27 (18.51)	49.74 (17.03)	44.99 (16.74)	45.46 (16.68)	42.66 (16.42)	42.45 (12.94)	47.54 (17.77)	42.51 (17.46)	42.92 (13.03)	42.99 (13.21)
Legal Sex, *n* (%)										
Female	4135 (66.44)	923(86.22)	403 (75.33)	321 (76.07)	93 (74.40)	98 (82.35)	189 (73.26)	34 (75.56)	76 (81.72)	73 (82.95)
Male	2086 (33.52)	430 (31.78)	132 (24.67)	101 (23.93)	32 (25.60)	21 (17.65)	69 (26.74)	11 (24.44)	17 (18.28)	15 (17.05)
Nonbinary	3 (0.05)	0	0	0	0	0	0	0	0	0
Race, *n* (%)										
White	4436 (71.27)	1012 (74.80)	404 (75.51)	328 (77.73)	86 (68.80)	93 (78.15)	203 (78.68)	32 (71.11)	72 (77.42)	69 (78.41)
Black/African American	306 (4.92)	55 (4.07)	16 (2.99)	10 (2.37)	7 (5.60)	3 (2.52)	5 (1.94)	2 (4.44)	1 (1.08)	1 (1.14)
Asian	214 (3.44)	47 (3.47)	14 (2.62)	10 (2.37)	4 (3.20)	2 (1.68)	7 (2.71)	1 (2.22)	2 (2.15)	2 (2.27)
Native American	63 (1.01)	9 (0.67)	5 (0.93)	5 (1.18)	0	1 (0.84)	3 (1.16)	1 (2.22)	1 (1.08)	1 (1.14)
Pacific Islander	6 (0.10)	1 (0.07)	1 (0.19)	1 (0.24)	0	0	1 (0.39)	0	0	0
Unknown	1199 (19.27)	229 (16.92)	95 (17.76)	68 (16.11)	28 (22.40)	20 (16.81)	39 (15.12)	9 (20.00)	17 (18.28)	15 (17.05)
Ethnicity, *n* (%)										
Non-Hispanic/Latino	4273 (68.65)	982 (72.58)	380 (71.03)	300 (71.09)	90 (72.00)	86 (72.27)	188 (72.87)	26 (57.78)	67 (72.04)	66 (75.00)
Hispanic/Latino	458 (7.36)	306 (22.62)	28 (5.23)	26 (6.16)	3 (2.40)	8 (6.72)	14 (5.43)	4 (8.89)	6 (6.45)	5 (5.68)
Unknown	1493 (23.99)	65 (4.80)	127 (23.75)	96 (22.75)	32 (25.60)	25 (21.01)	56 (21.71)	15 (21.71)	20 (21.51)	17 (19.32)

Note. PBH = Precision Behavioral Health

Overall = Patients attending a comprehensive physical exam or new patient appointment by primary care provider that was onboarded to PBH during the pilot time period (October 4, 2023 – January 19, 2024); Screened = Patients who completed the patient reported outcomes measures administered as part of routine care; Flagged = Patients who were flagged as PBH eligible; Offered = Patients who were flagged as PBH eligible and who were offered PBH as a treatment option by primary care providers; Not Eligible/Not Offered = Patient that were deemed ineligible or did not offer PBH to the patient by their primary care providers, despite having been flagged as being PBH eligible; Accepted = Patients who accepted the PBH program; Declined = Patients who declined the PBH program after being offered by their primary care provider; Considering = Patients who decided to think about the PBH program after they were referred by their primary care providers; Registered = Patients who registered for their referred digital mental health intervention as part of the PBH program; Activated = Patients who activated their digital mental health intervention, defined as having engaged in the intervention at least once

accepted (OR = 2.35, 95% CI [1, 5.06] groups. Compared to the overall group, female to male ratio of patients seen by PCPs was trending towards significance in the activated group (OR = 2.46, 95% CI [0.99, 6.04].

A logistic regression with estimated marginal means was used to further evaluate the ethnicity differences among the groups. Compared with the ratio of Non-Hispanic/Non-Latino to Hispanic/Latino ratio in patients who were screened, the corresponding ratio was higher in the overall sample (OR = 2.91, 95% CI [2.24, 3.77], flagged (OR = 4.23, 95% CI [2.20, 8.13], not-eligible or not offered PBH (OR = 9.35, 95% CI [1.44, 60.55], offered (OR = 3.60, 95% CI [1.82, 7.09], declined (OR = 4.19, 95% CI [1.70, 10.30]), and accepted (OR = 3.35, 95% CI [1.02, 10.98].

Effectiveness

Engagement-wise, out of the 119 patients who accepted the PBH referral, 93 (78.15%) proceeded to register with their referred digital mental health intervention, and 88 (73.95%) activated. Of the 88 patients that activated, 30 (34.09%) patients engaged with their digital intervention at least once weekly for 2 weeks, and 16 (18.18%) patients for 4 weeks[2].

To evaluate clinical effectiveness, of the 88 patients that activated, 17 patients had to be removed because they did not have a baseline and/or a post Patient Reported Outcome data to estimate clinical change, and an additional 5 were removed because their baseline scores were sub-clinical and therefore a change score could not be calculated. Out of the 66 remaining patients, 39 (59.09%) patients demonstrated clinical improvement, 4 (6.06%) patients demonstrated clinical worsening, and 23 (34.85%) patients showed no change in symptoms.

Adoption

Twenty-one providers were trained and onboarded to PBH from October 4th 2023 to January 19th 2024. Of these, 19 (90.48%) providers had at least one PBH referral conversation with their patients during the pilot length. A median of 2 patients were referred by each provider each week, with a range of 1 to 8. As shown in Fig. 2, there were statistically significant differences between providers' caseloads as it relates to patients flagged as PBH eligible. For example, one provider had as high as 66.7% (95% CI: 43.400–83.90%) of patients flagging weekly compared to another provider who had only 29.80% (95% CI: 22.60–38.20%) weekly patient flagging. As shown in Fig. 3, there were statistically significant differences between providers in terms of weekly proportion of patients that were offered PBH. The highest weekly rate of PBH being offered was 96.43% (95% CI: 88.42 to 98.96%) and the lowest was 50.00% (95% CI: 36.15–63.86%). Figure 4 results show that there were significant provider differences in weekly rate of patient acceptance to PBH, ranging from 7.14% (95% CI: 2.08–21.80%) to 70.00% (95% CI: 41.02–88.67%).

Implementation

Out of the 119 patients that accepted the PBH referral, 6 (5.04%) were scheduled for a Digital Care Navigator visit by the medical assistant/check-staff. Of the remaining 113 patients that hadn't been scheduled a visit with the Digital Care Navigator, the navigator reached out to all of them and was able to talk with 81 (71.68%) to aid their registration process.

Out of the 119 patients that accepted the PBH referral, 100 (84.03%) were scheduled for a PBH provider follow up visit by the medical assistant/check-out staff, with 91 of these (91.00%) scheduled with their referring PCP, and 9 (9.00%) with a PBH clinician. Of the 100 with scheduled appointments, 60 (60.00%) completed their follow-up and 40 (40.00%) either cancelled their appointment or were no-shows.

Over the study period, the clinical decision support tool was accessed by PCPs 273 times. Specifically, the PCPs used the tool during the visits with 119 of patients that accepted PBH (100%), 31 of patients that reported wanting to consider the PBH program (68.89%), and 77 of the patients that declined PBH (29.85%). For patients that accepted the referral, PCPs chose a digital mental health intervention that was recommended as the first choice 59% of the time or as one of the top 3 options 96% of the time.

Pilot Participants Feedback for Ongoing Adaptation

In addition to the implementation and effectiveness evaluation, the pilot program included a purposeful feedback collection period from pilot participants. Participants were asked to meet with PBH team members for a 30-minute individual interview 6-weeks after they had been onboarded to PBH. The goal of the interview was to collect feedback regarding the various PBH implementation and program elements to inform additional adaptations prior to the staged scale out process (Powell et al., 2015). Given that the qualitative interviews were gathered in the context of continued evaluation of the program, the data collection and analyses were deemed exempt quality improvement project by the Institutional Review Board (IRB) at the Office of Human Research Affairs in United Health Group prior to data collection.

[2] Patients that had activated but could not have engaged for 2- or 4-weeks due to their activation date were still included in the denominator.

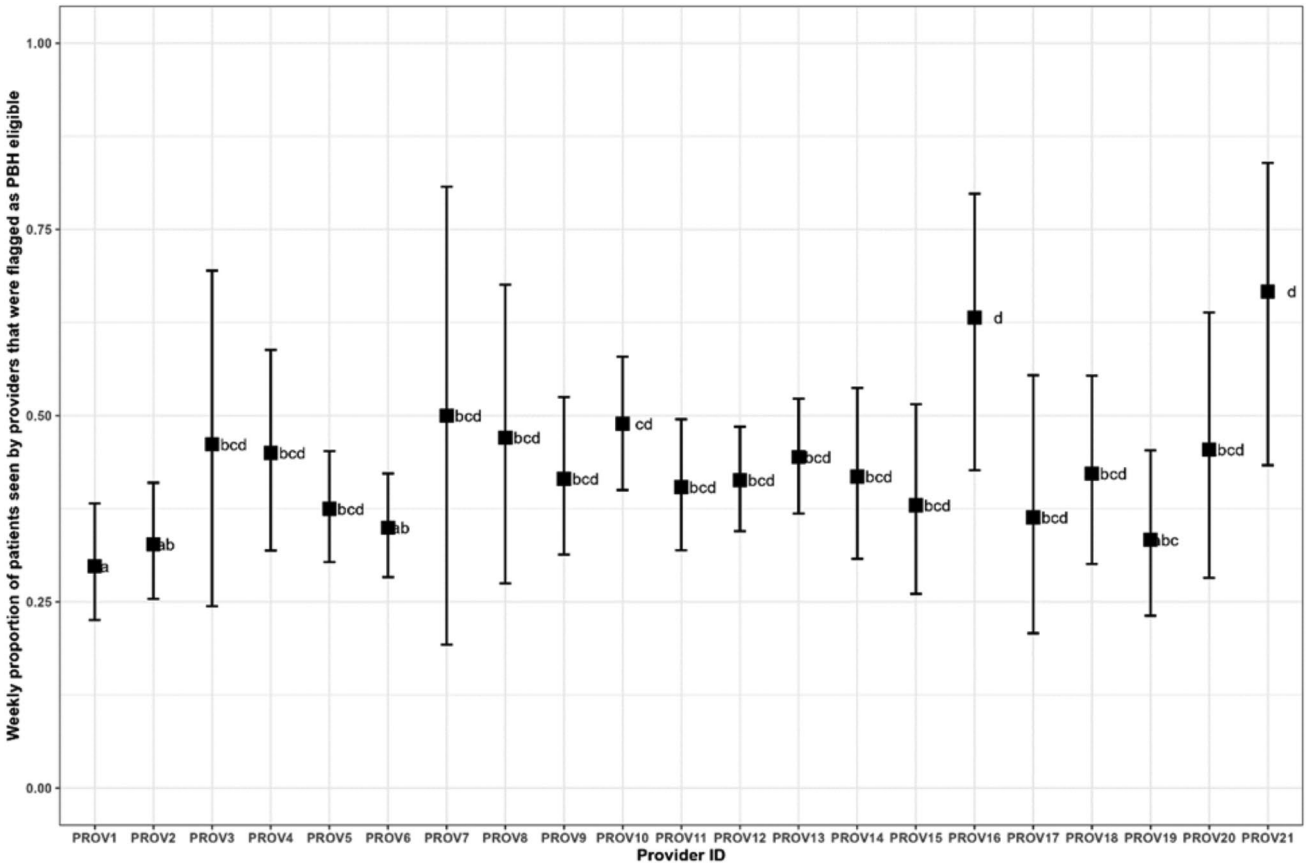

Fig. 2 Primary care provider differences in weekly proportion of patients flagged as PBH eligible. *Note*. Error bars represent confidence intervals. Different letters indicate statistically significant differences among providers. ($p < 0.05$), tested by estimated marginal means (EMMeans) *post hoc* test with multiple comparison adjustments (Bonferroni method). Provider names were masked and assigned a random ID. PBH = Precision Behavioral Health

Qualitative Data Collection and Analysis

Participants included 14 out of the 21 pilot PCPs, identified as female (100%) and consisted of four MDs, three physician assistants, and seven nurse practitioners. The remaining 7 pilot PCPs were not interviewed due to their onboarding dates being later than the timeframe when feedback was collected. Each participant was interviewed using a semi-structured interview guide developed specifically to gather feedback regarding providers' experience with PBH overall, training experience, process of referring patients to PBH, and impact of PBH on their job responsibilities (see Appendix A for interview questions). The interviews were conducted virtually from late November to early December 2023 by a female PhD-level clinical psychologist with expertise in qualitative research and the PBH operations lead who oversaw the technical and operational aspects of the PBH adaptation to primary care. Each interview was audio-recorded, lasted an average of 20 min (ranged from 15 to 30-minutes), transcribed automatically and manually checked for accuracy. After reviewing the interview transcripts and starting to prepare for the data analysis, we determined that saturation had been reached and therefore, no follow-up data collection and participant recruitment was needed (Saunders et al., 2018). A female PhD-level experimental psychologist with extensive mixed-methods expertise conducted the analyses. She used a rapid coding analysis (Gale et al., 2019) to account for the fact that only one analyst conducted the data coding process. Rapid coding has been shown to be as rigorous as in-depth analytic methods while being less resource-intensive and allowing for timely dissemination of the findings, which aligned with the goals of the qualitative feedback collection.

Qualitative data were analyzed using content analysis (Drisko & Maschi, 2016). In the preparation phase of data analysis, she reviewed interview transcripts to ensure their accuracy and corrected any transcription errors (e.g., missing a word in a sentence, deleted repeated words). She elected to use all interviews as the unit of analysis and to analyze only the manifest content (Graneheim & Lundman, 2004). Prior to starting the data analysis process, she read through interview transcripts multiple

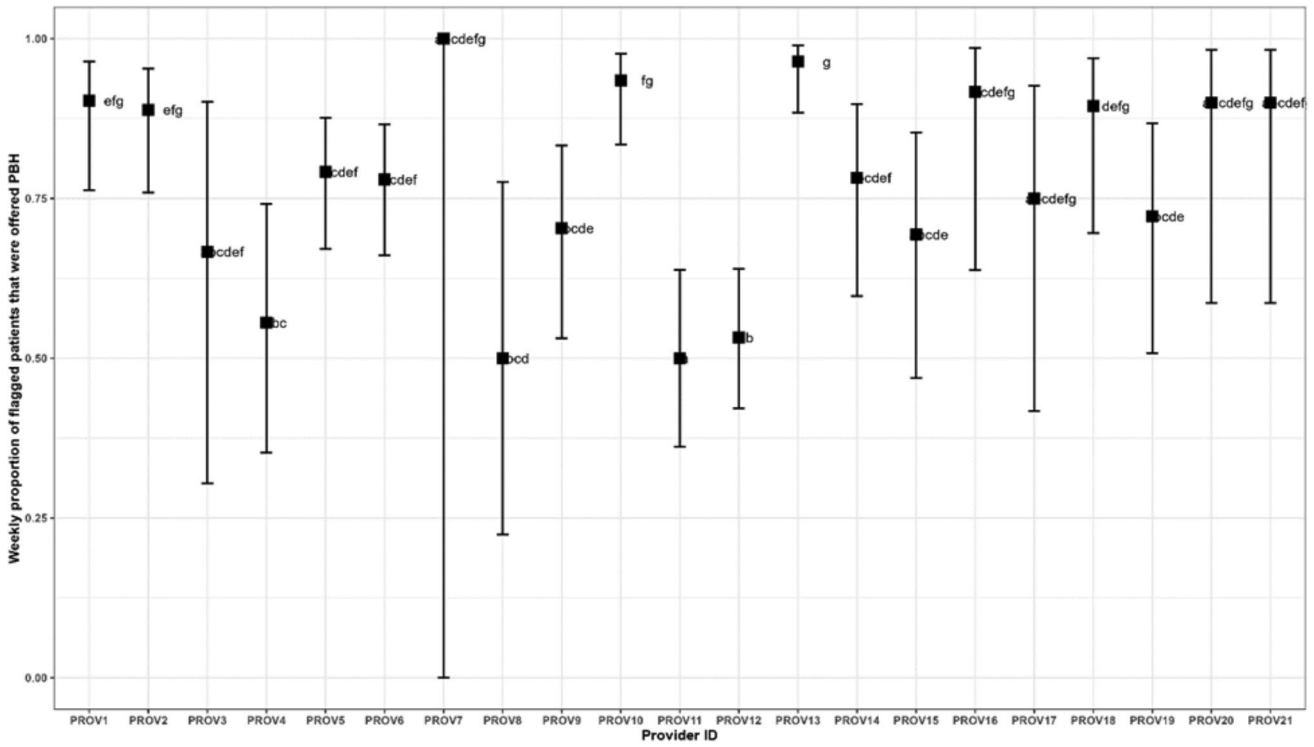

Fig. 3 Provider level differences in weekly proportion of patients that were offered PBH out of those that were flagged as PBH eligible. *Note*. Error bars represent confidence intervals. Different letters indicate statistically significant differences among providers ($p < 0.05$), tested by estimated marginal means (EMMeans) post hoc test with multiple comparison adjustments (Bonferroni method). Provider names were masked and assigned a random ID. PBH = Precision Behavioral Health

times to immerse herself in and get familiar with the data. Subsequently, the analysis was done using an inductive approach (Dey, 2003; Elo & Kyngäs, 2008). She started with open coding by reading through all the interview transcripts multiple times, coding as she completed the readings. The codes were then collected and transferred to coding sheets, and categories were generated freely. These categories were then grouped by collapsing into the ones with similar broader categories used to describe the findings and generate knowledge. In qualitative research, it is important to intentionally ensure the credibility of the data (Elo et al., 2014). As such, she constantly engaged in self-reflection to ensure that her biases did not interfere with the data analysis process (Barrett et al., 2020). We present our qualitative results with a rich description and provide direct quotes from participants to authenticate their experiences and perceptions (Patton, 2014).

Qualitative Results

Six broad content categories were identified from the data: Overall PBH referral experience, PBH training, PBH eligibility flag and clinical decision support tool, PBH follow-up appointment workflow, impacts of PBH program on providers, and future modifications.

Overall PBH Referral Experience

Most providers had a positive PBH referral experience. The reasons contributing to the positive referral experience included the availability of the PBH eligibility flag, ease of documentation, and having PBH as an alternative treatment option to offer to patients. Specifically, providers reported that the PBH eligibility flag was user-friendly. Moreover, they also liked the fact that the PBH eligibility flag showed up automatically in a patient's chart when the patient is eligible, which made it easy for providers to quickly know if the patient was eligible. Furthermore, the top 3 digital interventions recommendations included in the clinical support decision tool as part of the PBH eligibility flag were helpful and reportedly saved time for providers, as they did not have to figure out which digital interventions to offer. Regarding documentation, providers reported that it was straightforward and easy. Being able to offer PBH program as an alternative treatment option to patients also contributed to providers' positive PBH experience. Specifically, providers highlighted the PBH program's immediate accessibility and impact for patients as a significant benefit. Illustrative quotes include:

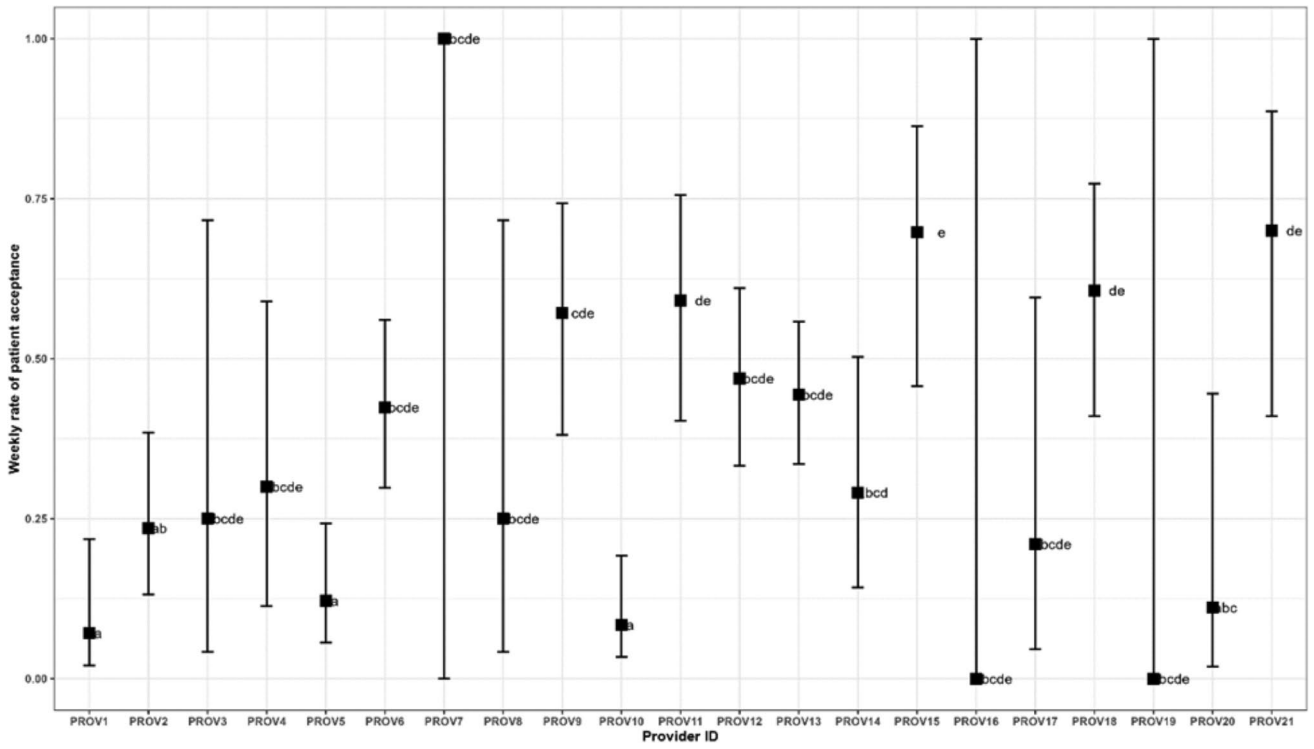

Fig. 4 Provider level differences in weekly rate of patient acceptance to PBH. Note. Error bars represent confidence intervals. Different letters indicate statistically significant differences among providers ($p < 0.05$), tested by estimated marginal means (EMMeans) post hoc test with multiple comparison adjustments (Bonferroni method). Provider names were masked and assigned a random ID. PBH = Precision Behavioral Health

Quote 1:

It sometimes feels like it doesn't feel good to tell someone who is dealing with mental health issues like you need to continue to call and follow up and you need to keep that. […] gosh, that's for patients with severe depression making a phone call repeatedly, no, his that doesn't feel like doable. So, I think these digital options are awesome.

Quote 2:

Sometimes by the time people get to you for a BH concern, they're so far past where it's easy to help them. And so you're just like, gosh, I wish there was something we could do, something we could offer that they felt like we were doing something right. And this does answer that much easier and quicker even than medication, right? Because if I put patient on a medication, you may get lucky and you may feel something after five days, but for the most part, you're going to four to six weeks at the earliest journey and a lot of people give up.

Additionally, providers noted different patient-groups that they perceived would benefit from PBH, such as patients who were reluctant to engage in therapy, patients who did not realize that there is an extensive waiting period for a therapist, and patients who did not want to take medications. One strategy that providers reported helpful in the referral process is using a laminated "PBH cheat sheet," a 1-pager that includes all digital interventions in the PBH ecosystem, to aid their conversation with the patients. They stated that the "cheat sheet" allowed patients to read relevant information about the digital interventions that were recommended and helped their joint decision making.

Although most providers had a positive referral experience from the beginning, other providers described phases in their experience, with some expected uncertainty during the first few referrals given the novelty of the PBH referring process, but quick comfort soon-after. The following quote further illustrates this changing experience:

So, I think in the beginning, you know the first right after […] that (PBH) went live. I was kind of like, oh my gosh, I don't know if I was like, prepared enough for whatever reasons. I reviewed the slides. I actually printed out the little sheet that's got all the options just so I could carry it with me. Have it in my exam room

> just to reference it, even though I know it comes up on the left hand side and talks to you about it, but I just wanted to become more familiar with it and so I would say the first, you know, couple of weeks I was kind of like, I don't know, I don't know if I feel comfortable enough like I don't know if patients feel that I know enough about it to, you know, make it sound like something they want to do. But now I feel like I've done it so often or talked about, you know, the different options so often that I feel really comfortable with it.

The PBH referral reportedly did not add any additional burden to providers and their workflow. The conversation with patients about the PBH program on average took about 5 minutes. However, this conversation could take longer (up to 10 minutes), depending on patients' questions about the PBH program, or if providers had safety concerns about the patients (e.g., patients were at risk for suicide or self-harm). In terms of effort, having a conversation with patients about PBH was on par with conversations about medication or therapy. Providers also stated that since they were not familiar with each digital intervention in the PBH ecosystem yet, they experienced difficulties describing the time commitment or unique features of each digital intervention to patients. See following for an illustrating quote.

> It's definitely not anything that's like been taking up, like too much time in an exam. I would say it's because it's most of the time if people are screening positive on certain things, I'm having a conversation with them about options for, you know, addressing symptoms anyway. So, I would say not very long. I'm able to kind of go through and I like that in the chart when we're in the visit, it'll pop up like the few ones specifically that they're eligible for and it kind of has those breakdowns on what each of those programs are. So, it makes it a little bit easier as we're still kind of getting familiar with all of the different options when it does that in the chart, you know to kind of go through, OK, this one you know can do you know as needed recordings of counseling sessions and be able to explain that to patients that that helps with that process. So, I would say only you know, maybe 5 minutes or so I've been spending you know, addressing it and getting a sense of if patients are interested in in the program or not.

Providers noticed patients with certain characteristics, such as younger patients or patients who were tech-savvy, were more likely to accept digital interventions. Reasons providers shared contributed to patients declining PBH included not feeling comfortable about electronic aspects of digital interventions, not interested in using any behavioral health related services, not having enough time to commit, preferring in-person therapy or a human therapist, and already being in therapy. Based on the feedback received by providers, patients also had positive experiences with PBH. Specifically, patients who accepted PBH were engaged with referred digital interventions. They also have been providing great feedback about their PBH experience to providers and telling their friends about the digital interventions. See the following quote illustrating patient experience.

> I think it's been great. I think that some of the patients that I've been able to kind of refer for some of these therapies have really taken it and done what they're supposed to do with it. And the ones that do not, they have great feedback and they say they want their friends to be able to do it and they, you know, they've been telling people about it. So I think it's, I think it's a great, great thing that we have going.

Providers identified several challenges related to the PBH referral process. First were procedural difficulties. For example, they reported uncertainty regarding steps to follow up with patients who were considering the digital options discussed but not ready to accept during the appointment. Similarly, some providers described not knowing the procedures for discontinuing patients' digital interventions. Providers also stated that their support staff did not have a comprehensive understanding of the checkout workflow related to PBH referrals which made scheduling follow-up appointments challenging. Providers also were not sure if patients needed to pay a copay for their PBH follow-up appointments, and whether patients could have joint PBH and counseling at the same time.

Given that the feedback interviews were conducted 4-weeks post-training, the PBH program and digital interventions in the PBH ecosystem were still new to providers, which they described emerging difficulties in articulating about the digital interventions to patients. Specifically, they were not able to explain how digital interventions work to help patients and features of the digital interventions succinctly. Thus, providers were concerned that they were not adequately describing the PBH program and opportunity to patients. They also shared challenges in explaining the reasoning behind why patients were being offered digital interventions and specifying that the program was not replacing in-person care if clinically appropriate.

Moreover, providers found that some patients who had screened positive for behavioral health symptoms, such as anxiety, did not endorse subjective clinical levels of symptoms during the visit. Other challenges included patients not

always completing the Norse Feedback measure, providers not knowing how to interpret certain Norse Feedback item responses, delays in the clinical decision support tool loading its recommendations, and difficulties placing a PBH order. Despite these challenges, providers were overall positive about the PBH program, and were willing and wanting to continue to refer patients.

PBH Training

Most providers reported that the training they received prior to PBH going live in primary care was helpful and they felt good after the training. It was particularly helpful to see some of the PBH elements, such as the PBH eligibility flag, in patients' chart shortly after the training. Below is an illustrating quote.

> I feel like once I was able to and I think it was actually the next day that I saw on one of my physicals that it has, that it popped up. So, it's like pretty quick. It wasn't like I was just, like, hanging around, waiting for it to pop up. So, I could see it in action, but I feel like it was helpful. Being able to see it like in the setting of a patient's chart and actually do those clicks myself was it was easy enough to pick up on.

However, other providers reported that the initial training was very crowded and not long enough to increase providers sense of comfort and clinical knowledge around the different digital interventions in the PBH ecosystem. The time between training and starting to refer patients to PBH felt short and expressed desire for more time in-between.

> I'm not going to lie. When we first had the meeting, we went live. The next day, I think most of us were feeling like that was tough to like all of a sudden it changes the next day. So, I guess in hindsight it might have been, you know, probably more beneficial to roll it out in a little bit different manner. I guess you know like a little more.

PBH Eligibility Flag and Clinical Decision Support Tool

Providers thought the PBH eligibility flag, including the top three recommended digital interventions, contained enough information to aid clinical judgment and the referral process, and that it was helpful and beneficial to both providers and patients. For providers, the PBH eligibility flag was perceived as being inclusive of all relevant clinical and PBH information within one best practice alert within the electronic health record platform, which removed the need for providers to search elsewhere for more information. The PBH eligibility flag reportedly contained enough information to help providers decide whether to move forward with the referral or not, without disrupting clinical workflow. Additionally, the PBH eligibility helped providers have a PBH related conversation with patients and to gauge their interests in digital interventions. Even for patients who may not be open to receive behavioral health services, they stated appreciating the conversation about digital interventions as a potential option. Moreover, the information in the eligibility flag included answers to questions that patients may ask, which was welcomed by providers. Importantly, with the information in the PBH eligibility flag, providers felt confident in making digital intervention recommendations to patients.

> I think that it it's like a good amount of information because it also is pretty much consolidated into that one window. So, it's not like I'm like having to really go or I don't find myself going and trying to like search out for the information. And like I said, that window where it breaks down like the top three, where they're the top three that they would qualify for. I've definitely like brought that up and like shown patients and then like these are the programs and been able to have that information to like be able to go over with them. I think that's helpful.

However, for some providers, the information included was not enough to increase the providers self-efficacy in making an informed referral or choosing a digital intervention for the patients. Some providers also reported "pop-up fatigue" since the flag was shown as a pop-up window within the electronic health record system. Providers also shared feedback regarding the clinical content of the flag, stating that the flag was missing possible patients that they clinically deemed appropriate, firing for inappropriate patients, or providers feeling uncertain as to why the patients had been flagged as eligible.

PBH Follow-Up Appointment Workflow

The preference for who conducts the follow-up appointment varied greatly and appeared to be based on the providers' clinical judgment related to what the patients needed. For the majority, they enjoyed having the follow-up appointments with patients themselves because they wanted to remain involved in the patient's care. Some providers reported having had follow-up appointments with patients at the time of the interview. They shared that these follow up appointments had been a great opportunity to receive patient feedback regarding the digital interventions and the

PBH program, and thus, were wanting to continue to do the appointments themselves.

> I think I've had some of the follow up visits and some of the patients will say ohh I really like it but it hasn't been helpful because I haven't been using it as much as I should or something like that. So, it kind of helps create a little more of a relationship where we can say, hey, OK, so you like it a lot. That's great. Let's try to do it a couple more times a week instead of once a week, or once every couple of weeks or whatever they're doing.

For some providers, they preferred to schedule patients' follow-up visit with a PBH clinician or at least have the option of having the patient follow up with a PBH clinician depending on the patient. For example, if providers already had an established relationship with patients, they preferred to follow up with them directly, whereas if it was a new or not yet established relationship, they reported that it might be better to have the patients follow up with a PBH clinician.

> For those patients where I don't really have a personal relationship with them, I don't think they would care if it was me who reached out to follow up or it was someone else, just as long as someone checking in (with them). For those patients who I do know really well, they might be potentially offended a little bit if it was somebody else reaching out.

Impacts of PBH Program on PCPs

Two main positive impacts were reported by the providers. First, some providers described feeling comfortable making PBH referrals even without the top three digital intervention recommendations. They stated they reached this level of comfort from doing PBH referrals for a while and getting familiar with the digital interventions in the PBH ecosystem.

> Yeah, I think as time goes on, I'll be more and more comfortable with it because at the very beginning, I was like, yeah, I don't really know exactly what all of these are. So let me go through them with you. But now that I've gone through them so many times, I'm becoming more and more aware of where people might fall. And you know, I'll be like, oh, that's strange that this one popped up. Let me see why. Ohh OK and now I have something else in my brain. Why a certain therapy might be better for someone, so I'm kind of in the middle. I'm not like super, super confident, but I'm also I feel like I'm getting better as the time goes on.

Second, providers reported that the PBH program helps them do their job better in many different ways. The PBH program provides them with an alternative treatment option for patients who do not want medications or are therapy resistant or have difficulties accessing behavioral health services given the access-care problems. Providers also shared that the PBH program allows them to involve patients in their care journey. Specifically, providers often prefer patients to receive as much support for their behavioral health concerns as possible. However, given the time and resource constraints faced by many patients, this is not often possible. Given the digital nature of the interventions within the PBH ecosystem, providers felt that patients had resources and programs available whenever and as often as they needed them, thus allowing them to be actively involved in their own behavioral health journey.

Quote 1:

> I think it's been a positive thing. I don't think it's been negative to my everyday work. I think if anything it's helped me too because you know, you get so caught up in the day to day that you forget that. OK, there is all these other options that patients can do. Therapy is not the only thing and medications is not the only thing, and I think it helps patient realize, OK, yeah, there are other things that I can be doing. I tell patients to meditate. I tell patients to do this, but when there is a program for them to follow or deep breathing exercises, it just helps so much more. So, I think it's been helpful even for like my learning and my like education to patients.

Quote 2:

> Tremendously, especially with these, with you know we have such limited access with therapy right now and with behavioral health. And we have such a community that really is like I don't have time to go on to a meeting and I don't have time to go to a visit and I don't have time to schedule every other week at their convenience. So, it's really has been beneficial for that like you can do this on your own time. You know when it's convenient for you and a lot of people like that.

Future Modifications

Providers also suggested possible ways to change the PBH program. For example, a unanimous suggestion was to expand the PBH program's offering beyond the comprehensive exam or new patient visits and to also include

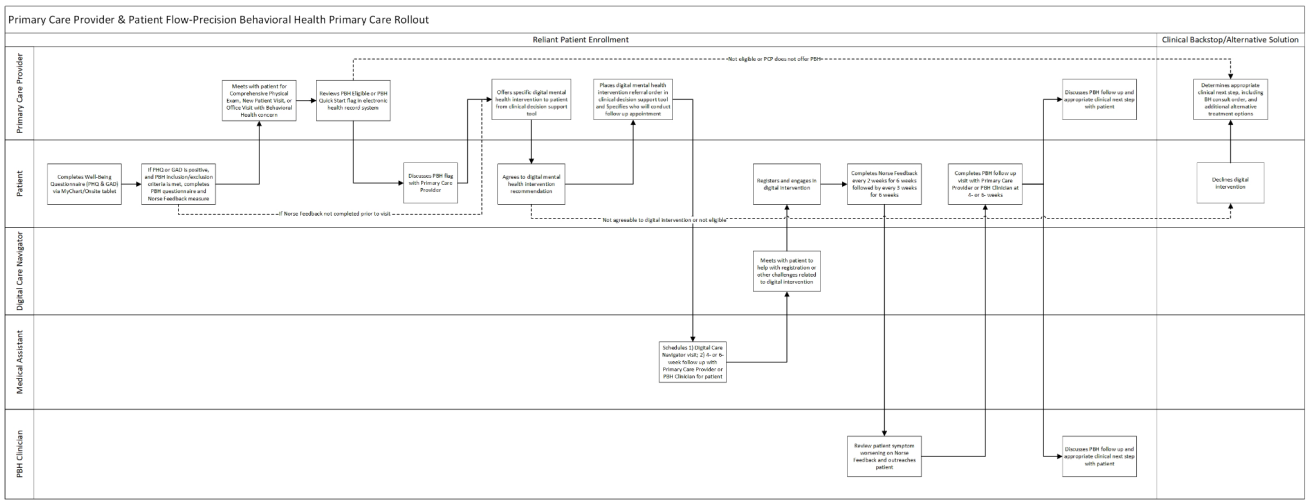

Fig. 5 Final primary care precision behavioral health program for larger scale out. *Note*. PBH = Precision Behavioral Health. PHQ = Patient Health Questionnaire. GAD = Generalized Anxiety Disorder Scale. PCP = Primary Care Provider

office visits that included a behavioral health component to them. Providers listed three benefits for expanding the program to office visits. First, an office visit would allow them more time to discuss behavioral health concerns, and thus, they would be able to have an expanded conversation with patients about the PBH program and digital interventions to get patients excited. Second, since patients often have an extensive list of concerns they want to discuss with providers during their comprehensive physical exam visits, addressing behavioral health concerns may not be on the top of the list for either provider or patients, and it can also be challenging within the limited time. Third, providers shared that they have noted an increase in patients coming in for behavioral health concerns, and that these patients would be good candidates for the PBH program.

> So I think personally if in the future we're able to, you know, if we have a mood visit or a mood follow up or anything kind of surrounding mood, anxiety, depression and that kind of stuff, if they could fill out the questionnaire beforehand, if there was a way to get that to happen, I think that would be so helpful because we do have more time in a designated visit specifically for this. So, I feel like for those patients, we'd be able to get more in detail and tell them more about it and kind of get them a little more excited than in a physical where it's like, OK, we have to talk about blood pressure and your heart and all this other stuff. But also, like, try therapy. So, I think in a visit where you know it's centered around mood, I think that would be really, really helpful.

Some providers also suggested additional visit types to for PBH, including visits where patients come in for non-specific complaints (e.g., fatigue) or visits about medication management. Offering PBH in these types of visits could serve remind providers to have a more specific conversation about behavioral health in relation to these concerns and offer the PBH program as an alternative resource available to patients, especially for those patients that have traditionally declined in-person behavioral health services.

Other modifications suggestions included having a designated follow-up note specific to PBH that allows providers to document patient feedback and experiences with their digital interventions, the ability to offer digital interventions to patients without having them complete the Norse Feedback measure, having a physical document that contains information for all the digital interventions in the PBH ecosystem, and having a printout version of the three top recommended digital interventions so patients can see the options too. In terms of additional ways to enhance providers comfort and knowledge about digital interventions, providers shared a preference for having one-to-one support with demonstrations of the digital interventions and highlighting the unique features of each digital intervention.

Final PBH Program Ready for Scale out

After completing the implementation/effectiveness evaluation and gathering the qualitative feedback from providers, we made the following modifications to the PBH program at primary care prior to larger scale out. Figure 5 includes the swimlane of the final PBH program.

- Patient inclusion criteria refinement: Providers' feedback included patients declining PBH due to being in concurrent therapy, and thus, actually not being eligible

for the program. Thus, in addition to using the electronic health record information to determine whether the patient was in concurrent individual or group therapy (which was part of original adapted program deployment), we added a question asking patients whether they were currently working with a therapist in individual or group therapy as part of the series of questions asked prior to routine care visits. If patients answered yes to this question, they were not administered the Norse Feedback, even if they had met all inclusion/exclusion criteria for the program, and patients were not flagged as eligible for the PBH program.

- Expanding PBH offering to other visits: For office visits that were identified to address a behavioral health related concern, patients were screened to determine their eligibility for PBH. If they met criteria, providers were shown the PBH eligibility flag so they could clinically determine whether to make the PBH referral.
- PBH Quick Start development: We added a "PBH Quick Start" flag to the electronic health record system. Patients were flagged as such if they did not have any exclusion criteria, met all inclusion criteria, but did not have a Norse Feedback measure completed, and thus, the top three recommendations would not be available for providers. Providers were shown the PBH Quick Start as part of their patient dashboard instead of as a pop-up best practice alert. If they deemed the patient clinically adequate, and they felt confident in selecting a digital intervention for patients, they could use the Quick Start to order the digital tool easily.
- Removed Nursing involvement: Discussions with leadership led us to remove nursing staff involvement. Given the ease of reach-out to patients, and low incidents for such reach-out, PBH clinicians absorbed this PBH step.
- Training improvements: We streamlined the training content for providers to reduce the sense of overwhelm reported by some pilot participants. We pre-recorded demonstrations of the electronic health record flow of PBH and showed the recording at the trainings, instead of using PowerPoint slides.
- Improved check-out experience for medical assistants/check out staff: We leveraged a new electronic health record feature to pre-populate all PBH related components for check out staff. Thus, instead of having to manually specify the information needed to schedule the two PBH related visits (i.e., the DCN appointment and the follow-up visit with providers), the system pre-populated all the information for check out staff to ease their workflow.
- Documentation enhancements: Instead of relying on providers to manually document the outcome of the conversations with patients (e.g., patients accepted PBH, patients considering the PBH program, patient declined PBH, etc.), we added smart buttons within the best practice alert so that providers could "click" on the outcome of the conversation as they were having it.

Discussion

The current study describes the process of adapting a digital-first behavioral health care model to be scaled out into primary care. The goal of this scale out process is to equip PCPs with the individual- and system-level support needed to help them in addressing patients' growing behavioral health needs. In this paper, we described how we leveraged user-centered design strategies for the PBH program's adaptation process, and to optimize implementation strategies for the larger scale out of the adapted program.

The program's mixed methods evaluation of its implementation and clinical effectiveness showed positive impact on both providers and patients. The adapted PBH program for primary care demonstrated comparable patient reach (39.54%), registration (78.15%) and activation (73.95%) rates, and clinical effectiveness (59.09%) as the behavioral health focused PBH program (Nordberg et al., 2024). Primary care provider adoption was also high, with 90% of providers having had at least 1 PBH conversation with patients, and a median of 2 patient referrals per provider per week, which are also comparable to behavioral health provider adoption rates (Youn et al., 2023b; Nordberg et al., 2024). The results also show that the clinical decision support tool was used by PCPs, with 100% of PBH referrals occurring through the clinical decision support tool, and providers choosing one of the top 3 recommended digital intervention 96% of the time. Based on provider feedback, the high adherence rate may be due to the tool being accessible within the electronic health record system, and providing patient-specific recommendations (Sutton et al., 2020; Van de Velde et al., 2018).

Qualitative feedback from pilot participants highlighted how the adapted components were additive to these positive overall experiences. Providers talked about various PBH program elements that contributed to their sense of overall receptivity to the program and enhanced adoption, including the PBH eligibility flag, ease of referral to the program, and having it embedded within clinical workflows and the electronic health record system. These specifically related to adaptations made based on feedback and suggestions from the primary care champions. Thus, the results emphasize two aspects of the adaptation process. First, consistent with knowledge from the field, the inclusion of relevant stakeholders in the development process of a program (in our case, adaptation process of PBH) is an impactful strategy in enhancing implementation outcomes (Triplett et al., 2022).

Second, the qualitative feedback underscores how provider ease was a key driving factor in promoting adoption. We believe that this is the first study that systematically applied user-centered design to prioritize usability (Lyon & Koerner, 2016) in the adaptation and iterative development of a program with the end-goal of scaling out. Thus, we hope the study can serve as a starting point for others who would find this process helpful as well.

One noteworthy highlight is the higher proportion of PCP follow up visits compared to PBH clinicians. Despite PCPs having limited availability and being under increasing time and resource constraints, they were more likely to select having the patients follow up with themselves than with a PBH clinician, even when one was available. PCPs reported valuing the feedback they received from patients related to the PBH program during these visits as it gave them an opportunity to both be involved with the clinical care of their patients, as well as learn more about the program itself. This created a feedback loop for providers in that the added feedback continued to increase their self-efficacy in this referral source.

It is interesting to note the significant demographic differences in the patient groups defined within the program's reach. Compared to the overall group of patients that came in for a comprehensive physical exam or a new patient visit, providers offered PBH to patients who were younger. This is consistent with results suggesting that digital intervention programs, such as PBH, are more likely to be acceptable for younger individuals (Borghouts et al., 2021). Additionally, female patients were comparatively more likely to get flagged, offered and accepted PBH. These are comparable to other studies that have found females more likely to engage in behavioral health services than males, including digital interventions (Garrido et al., 2019). Interestingly, the qualitative feedback from providers highlighted that the PBH program was capturing a new group of patients, namely those that had been traditionally reluctant to try psychotherapy, such as male patients (Galdas et al., 2005). Providers hypothesized that programs such as PBH may be more appealing to male patients in addressing their behavioral health needs using a digital intervention, as it may reduce stigma and other related barriers in this population (Rodríguez-Rivas et al., 2022). Future studies should continue to evaluate the differences in legal sex related to PBH and digital interventions' reach of male patients.

Despite the strengths of the program and successful adaptation process, there were limitations and challenges to be noted. The implementation of embedding the scheduling of the two PBH visits (digital care navigator and provider follow up visit) within the medical assistant/check-out staff workflow was uneven. Only 5% of digital care navigator appointments were scheduled by the medical assistant/check-check out staff, while they scheduled 84% provider follow up visits. This discrepancy is significant and may be due to training limitations. There is evidence to suggest that asynchronous learning alone is not enough to promote changes in behavior (Herschell et al., 2010). This is particularly relevant for this result as the staff were more likely to follow through with the provider follow up visits, but missed a new type of visit, such as with a digital care navigator. Thus, future efforts should enhance the knowledge-based training with additional strategies to promote the workflow changes needed in the check-out staff, such as providing consultation time with operations leads to troubleshoot or aligning the workflow completion with relevant organizational metrics (Powell et al., 2015). Given that the implementation and effectiveness data were collected as part of an iterative process time-limited pilot trial, the overall sample sizes for providers and patients were small. Thus, this limitation should be considered when interpreting results, especially the patient engagement and clinical effectiveness results. Furthermore, even though the pilot participants were purposefully selected to represent different sites, the adaptation process and evaluation were conducted within one organization. Thus, the generalizability of the results as well as future expansion initiatives should take into consideration how PBH could be further adapted to take into consideration other organizations'' factors, such as internal structures, culture, context, patient composition and availability of resources. Finally, it should be noted that the qualitative interviews were conducted by PBH team members, which may have impacted the responses from the providers due to factors such as social desirability bias (Bergen & Labonté, 2020).

Given the significant rise in behavioral health related needs, primary care is well-poised to address this growing demand for services. To adequately support providers, it is important to equip them with the skills and institutional support to do so. A recent systematic review conducted by Albarracin and colleagues (2024) emphasized contextual or structural interventions to be more impactful in promoting individual level change. Our results show that both organizational- and individual-level interventions are needed, and they have to be aligned. Providers need to have the knowledge necessary to increase their self-efficacy related to behavioral health clinical referral conversations with patients. To promote their taking the step of having this discussion and putting in an order for a digital intervention, providers need to have system-level changes that have been adapted to purposefully remove barriers and include facilitators, such as usability, in promoting such behavior. We believe that this alignment between the two different groups of interventions will lead to long-term sustained

change within individuals and systems and thus, impactfully address the access to care problem in behavioral health.

Appendix A Qualitative interview guide for pilot primary care provider feedback collection

How has your experience been thus far with PBH? *Referring patients to BH – feeling self efficacious? Concerns?* *Referring patients from a physical or yearly check up visit?* *Increase in self efficacy in 1) having BH related conversations?; 2) having PBH specific conversations with patients?*
How was the PBH training? *Training enough to increase in self efficacy in (1) having BH related conversations?; (2) having PBH specific conversations with patients?*
How has the process of referring to PBH been? *Ease in workflow process?* *Is the scripting provided enough?* *Is the CDS workflow and the information on it enough?* *How are the documentation workflows*
How long do the conversations take on average with patients? *Yes patients vs. no patients* *When in the conversation do you notice patients agree to PBH vs. declines?* *Before DMHI convo? After?*
What would be helpful if done differently? *Add to BH visits/sick visits vs. wellness visits?*
How is PBH helping your job as a PCP?

Note.

PBH = Precision Behavioral Health

BH = Behavioral Health

CDS = clinical decision support

DMHI = digital mental health intervention

PCP = primary care provider

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Declarations

Conflict of Interest Samuel S. Nordberg has a financial relationship with Mental Health Informatics, which owns the Norse Feedback measure, a measurement-based care tool that has been integrated within routine care at Reliant Medical Group as part of the Precision Behavioral Health initiative described in this paper. Samuel S. Nordberg declares a potential conflict of interest. Dr. Nordberg has a plan in place with OptumCare and Reliant Medical Group to monitor that the potential conflict of interest does not impact methods, results, and publications related to the Norse Feedback measure or Precision Behavioral Health. No other authors have a conflict of interest to disclose.

References

Aarons, G. A., Sklar, M., Mustanski, B., Benbow, N., & Brown, C. H. (2017). Scaling-out evidence-based interventions to new populations or new health care delivery systems. *Implement Sci*, *12*(1), 111. https://doi.org/10.1186/s13012-017-0640-6

Baumel, A., Muench, F., Edan, S., & Kane, J. M. (2019). Objective user engagement with mental health apps: systematic search and panel-based usage analysis. Journal of medical Internet research, 21(9), e14567 https://doi.org/10.2196/14567

Agency for Healthcare Research and Quality (2023). *Burnout in primary care: Assessing and addressing it in your practice*. https://www.ahrq.gov/sites/default/files/wysiwyg/evidencenow/tools-and-materials/burnout-in-primary-care.pdf

Albarracín, D., Fayaz-Farkhad, B., & Granados Samayoa, J. A. (2024). Determinants of behaviour and their efficacy as targets of behavioural change interventions. *Nature Reviews Psychology*. https://doi.org/10.1038/s44159-024-00305-0

Barrett, A., Kajamaa, A., & Johnston, J. (2020). How to… be reflexive when conducting qualitative research. *The Clinical Teacher*, *17*(1), 9–12.

Bergen, N., & Labonté, R. (2020). Everything is perfect, and we have no problems: Detecting and limiting social desirability bias in qualitative research. *Qualitative Health Research*, *30*(5), 783–792.

Bonawitz, K., Wetmore, M., Heisler, M., Dalton, V. K., Damschroder, L. J., Forman, J., Allan, K. R., & Moniz, M. H. (2020). Champions in context: Which attributes matter for change efforts in healthcare? *Implement Sci*, *15*(1), 62. https://doi.org/10.1186/s13012-020-01024-9

Borghouts, J., Eikey, E., Mark, G., De Leon, C., Schueller, S. M., Schneider, M., Stadnick, N., Zheng, K., Mukamel, D., & Sorkin, D. H. (2021). Barriers to and facilitators of user Engagement with Digital Mental Health Interventions: Systematic review. *Journal of Medical Internet Research*, *23*(3), e24387. https://doi.org/10.2196/24387

Bunce, A. E., Gruss, I., Davis, J. V., Cowburn, S., Cohen, D., Oakley, J., & Gold, R. (2020). Lessons learned about the effective operationalization of champions as an implementation strategy: Results from a qualitative process evaluation of a pragmatic trial. *Implement Sci*, *15*(1), 87. https://doi.org/10.1186/s13012-020-01048-1

Castonguay, L. G., Barkham, M., Youn, S. J., & Page, A. C. (2021). Practice-based evidence—findings from routine clinical settings. *Bergin and Garfield's Handbook of Psychotherapy and Behavior Change*, *7*, 191–222.

Clatney, L., MacDonald, H., & Shah, S. M. (2008). Mental health care in the primary care setting. *Canadian Family Physician*, *54*, 884–889.

Courage, C., & Baxter, K. (2005). *Understanding your users: A practical guide to user requirements methods, tools, and techniques*. Gulf Professional Publishing.

Dey, I. (2003). *Qualitative data analysis: A user friendly guide for social scientists*. Routledge.

Dopp, A. R., Parisi, K. E., Munson, S. A., & Lyon, A. R. (2018). A glossary of user-centered design strategies for implementation experts. *Transl Behav Med*, *9*(6), 1057–1064. https://doi.org/10.1093/tbm/iby119

Drisko, J. W., & Maschi, T. (2016). *Content analysis*. Oxford University Press.

Elo, S., & Kyngäs, H. (2008). The qualitative content analysis process. *Journal of Advanced Nursing*, *62*(1), 107–115.

Elo, S., Kääriäinen, M., Kanste, O., Pölkki, T., Utriainen, K., & Kyngäs, H. (2014). Qualitative content analysis: A focus on trustworthiness. *SAGE open*, *4*(1), 2158244014522633.

Endale, T., Qureshi, O., Ryan, G. K., Esponda, G. M., Verhey, R., Eaton, J., De Silva, M., & Murphy, J. (2020). Barriers and drivers to capacity-building in global mental health projects. *Int J Ment Health Syst*, *14*(1), 89. https://doi.org/10.1186/s13033-020-00420-4

Flanagan, M. E., Ramanujam, R., & Doebbeling, B. N. (2009). The effect of provider- and workflow-focused strategies for guideline implementation on provider acceptance. *Implement Sci*, *4*, 71. https://doi.org/10.1186/1748-5908-4-71

Galdas, P. M., Cheater, F., & Marshall, P. (2005). Men and health help-seeking behaviour: Literature review. *Journal of Advanced Nursing*, *49*(6), 616–623.

Gale, R. C., Wu, J., Erhardt, T., Bounthavong, M., Reardon, C. M., Damschroder, L. J., & Midboe, A. M. (2019). Comparison of rapid vs in-depth qualitative analytic methods from a process evaluation of academic detailing in the Veterans Health Administration. *Implement Sci*, *14*(1), 11. https://doi.org/10.1186/s13012-019-0853-y

Garrido, S., Millington, C., Cheers, D., Boydell, K., Schubert, E., Meade, T., & Nguyen, Q. V. (2019). What works and what doesn't work? A systematic review of digital mental health interventions for depression and anxiety in young people. *Frontiers in Psychiatry*, *10*, 759.

Graneheim, U. H., & Lundman, B. (2004). Qualitative content analysis in nursing research: Concepts, procedures and measures to achieve trustworthiness. *Nurse Education Today*, *24*(2), 105–112.

Herschell, A. D., Kolko, D. J., Baumann, B. L., & Davis, A. C. (2010). The role of therapist training in the implementation of psychosocial treatments: A review and critique with recommendations. *Clinical Psychology Review*, *30*(4), 448–466.

Hiller, W., Schindler, A. C., & Lambert, M. J. (2011). Defining response and remission in psychotherapy research: A comparison of the RCI and the method of percent improvement. *Psychotherapy Research: Journal of the Society for Psychotherapy Research*, *22*(1), 1–11. https://doi.org/10.1080/10503307.2011.616237

Hunter, C. L., Goodie, J. L., Oordt, M. S., & Dobmeyer, A. C. (2009). *Integrated behavioral health in primary care: Step-by-step guidance for assessment and intervention*. American Psychological Association.

Jaso-Yim, B., Eyllon, M., Sah, P., Pennine, M., Welch, G., Schuler, K., Orth, L., O'Dea, H., Rogers, E., Murillo, L., Barnes, J. B., Hoyler, G., Peloquin, G., Jarama, K., Nordberg, S. S., & Youn, S. (2024). Evaluation of the impact of a digital care navigator on increasing patient registration with digital mental health interventions in routine care. *Internet Interventions, 38*, 100777 https://doi.org/10.1016/j.invent.2024.100777

Kroenke, K., & Unutzer, J. (2017). Closing the false divide: Sustainable approaches to Integrating Mental Health Services into Primary Care. *Journal of General Internal Medicine*, *32*(4), 404–410. https://doi.org/10.1007/s11606-016-3967-9

Kroenke, K., Spitzer, R. L., & Williams, J. B. (2001). The PHQ-9: Validity of a brief depression severity measure. *Journal of General Internal Medicine*, *16*(9), 606–613.

Loeb, D. F., Bayliss, E. A., Binswanger, I. A., Candrian, C., & deGruy, F. V. (2012). Primary care physician perceptions on caring for complex patients with medical and mental illness. *Journal of General Internal Medicine*, *27*(8), 945–952. https://doi.org/10.1007/s11606-012-2005-9

Lyon, A. R., & Koerner, K. (2016). User-centered design for Psychosocial Intervention Development and implementation. *Clin Psychol (New York)*, *23*(2), 180–200. https://doi.org/10.1111/cpsp.12154

McAleavey, A. A., Nordberg, S. S., & Moltu, C. (2021). Initial quantitative development of the norse feedback system: A novel clinical feedback system for routine mental healthcare. *Quality of Life Research*, *30*(11), 3097–3115. https://doi.org/10.1007/s11136-021-02825-1

Naderifar, M., Goli, H., & Ghaljaie, F. (2017). Snowball sampling: A purposeful method of sampling in qualitative research. *Strides in Development of Medical Education*, *14*(3).

Nordberg, S. S., Jaso-Yim, B., Sah, P., Schuler, K., Eyllon, M., Pennine, M., Hoyler, G., Barnes, J. B., Murillo, L., O'Dea, H., Orth, L., Rogers, E., Welch, G., Peloquin, G., & Youn, S. (2024). Evaluating the Implementation and Clinical Effectiveness of an Innovative Digital First Care Model for Behavioral Health Using the RE-AIM Framework: Quantitative Evaluation. *Journal of Medical Internet Research, 26*, e54528. https://doi.org/10.2196/54528

Olfson, M., Blanco, C., Wang, S., Laje, G., & Correll, C. U. (2014). National trends in the mental health care of children, adolescents, and adults by office-based physicians. *JAMA Psychiatry*, *71*(1), 81–90.

Palinkas, L. A., Aarons, G. A., Horwitz, S., Chamberlain, P., Hurlburt, M., & Landsverk, J. (2011). Mixed method designs in implementation research. *Administration and Policy in Mental Health and Mental Health Services Research*, *38*, 44–53.

Patton, M. Q. (2014). *Qualitative research & evaluation methods: Integrating theory and practice*. Sage.

Poghosyan, L., Norful, A. A., Ghaffari, A., George, M., Chhabra, S., & Olfson, M. (2019). Mental health delivery in primary care: The perspectives of primary care providers. *Archives of Psychiatric Nursing*, *33*(5), 63–67. https://doi.org/10.1016/j.apnu.2019.08.001

Powell, B. J., Waltz, T. J., Chinman, M. J., Damschroder, L. J., Smith, J. L., Matthieu, M. M., Proctor, E. K., & Kirchner, J. E. (2015). A refined compilation of implementation strategies: Results from the Expert recommendations for Implementing Change (ERIC) project. *Implementation Science*, *10*, 1–14.

Rodríguez-Rivas, M. E., Cangas, A. J., Cariola, L. A., Varela, J. J., & Valdebenito, S. (2022). Innovative technology–based interventions to reduce stigma toward people with mental illness: Systematic review and meta-analysis. *JMIR Serious Games*, *10*(2), e35099.

Saunders, B., Sim, J., Kingstone, T., Baker, S., Waterfield, J., Bartlam, B., Burroughs, H., & Jinks, C. (2018). Saturation in qualitative research: Exploring its conceptualization and operationalization. *Quality & Quantity*, *52*, 1893–1907.

Shanafelt, T. D., West, C. P., Dyrbye, L. N., Trockel, M., Tutty, M., Wang, H., Carlasare, L. E., & Sinsky, C. (2022). Changes in burnout and satisfaction with work-life integration in Physicians during the First 2 years of the COVID-19 pandemic. *Mayo Clinic Proceedings*, *97*(12), 2248–2258. https://doi.org/10.1016/j.mayocp.2022.09.002

Spitzer, R. L., Kroenke, K., Williams, J. B., & Löwe, B. (2006). A brief measure for assessing generalized anxiety disorder: The GAD-7. *Archives of Internal Medicine*, *166*(10), 1092–1097.

Staras, S., Tauscher, J. S., Rich, N., Samarah, E., Thompson, L. A., Vinson, M. M., Muszynski, M. J., & Shenkman, E. A. (2021). Using a clinical Workflow Analysis to enhance eHealth implementation planning: Tutorial and Case Study. *JMIR Mhealth Uhealth*, *9*(3), e18534. https://doi.org/10.2196/18534

Sutton, R. T., Pincock, D., Baumgart, D. C., Sadowski, D. C., Fedorak, R. N., & Kroeker, K. I. (2020). An overview of clinical decision support systems: Benefits, risks, and strategies for success. *NPJ Digital Medicine*, *3*(1), 17.

Triplett, N. S., Woodard, G. S., Johnson, C., Nguyen, J. K., AlRasheed, R., Song, F., Stoddard, S., Mugisha, J. C., Sievert, K., & Dorsey, S. (2022). Stakeholder engagement to inform evidence-based treatment implementation for children's mental health: A scoping review. *Implementation Science Communications*, *3*(1), 82.

Van de Velde, S., Heselmans, A., Delvaux, N., Brandt, L., Marco-Ruiz, L., Spitaels, D., Cloetens, H., Kortteisto, T., Roshanov, P., & Kunnamo, I. (2018). A systematic review of trials evaluating success

factors of interventions with computerised clinical decision support. *Implementation Science*, *13*, 1–11.

What is Re-AIM? (n.d.). https://re-aim.org/learn/what-is-re-aim/

World Health Organization (2020). *Mental Health atlas 2020*. https://www.who.int/publications/i/item/9789240036703/

Youn, S., Boswell, J. F., Douglas, S., Harris, B. A., Aajmain, S., Arnold, K. T., Creed, T. A., Gutner, C. A., Orengo-Aguayo, R., & Oswald, J. M. (2023a). Implementation science and practice-oriented research: Convergence and complementarity. *Administration and Policy in Mental Health and Mental Health Services Research*, *51*(3), 336–347. https://doi.org/10.1007/s10488-023-01296-5

Youn, S., Jaso, B., Eyllon, M., Sah, P., Hoyler, G., Barnes, J. B., Jarama, K., Murillo, L., O'Dea, H., Orth, L., Pennine, M., Rogers, E., Welch, G., & Nordberg, S. S. (2023b). Leveraging implementation science to Integrate Digital Mental Health Interventions as part of Routine Care in a Practice Research Network. *Administration and Policy in Mental Health*. https://doi.org/10.1007/s10488-023-01292-9

Zhang, X., Han, X., Dang, Y., Meng, F., Guo, X., & Lin, J. (2017). User acceptance of mobile health services from users' perspectives: The role of self-efficacy and response-efficacy in technology acceptance. *Informatics for Health and Social Care*, *42*(2), 194–206.