

Virtual Collaborative Behavioral Health Model in a Community Pediatric Network: Two-Year Outcomes

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Abstract

Due to the pervasive shortage of behavioral health (BH) specialists, collaborative partnerships between pediatric primary care practitioners (PPCPs) and BH specialists can enhance provision of BH services by PPCPs. We aimed to create a new model of collaborative care that was mostly virtual, affordable, and scalable. The pilot program was implemented in 18 practices (48 PPCPs serving approximately 150 000 patients) in 2 consecutive cohorts. Outcomes were assessed by administering pre-program and post-program surveys. Across the 18 practices, PPCPs reported significantly increased confidence in their BH knowledge and skills, and significantly increased their provision of target BH services. Barriers to BH service provision (resources, time, and staff) were unchanged. This compact, mostly virtual model of BH collaboration appears to be beneficial to PPCPs while also offering convenience to patients and affordability and scalability to the practice network.

Keywords

pediatric primary care practitioners, behavioral health, child psychiatry access programs, American Academy of Pediatrics, American Academy of Child and Adolescent Psychiatry, quality improvement, BH learning community, child and adolescent psychiatrist, child adolescent psychiatry primary care, behavioral health education, pediatric primary care, electronic health record

Introduction

Of the one fifth of youth in the United States who need mental health care,¹ most are managed by their pediatric primary care practitioners (PPCPs).² Yet, despite provision of extensive professional organization supports,^{3–10} PPCPs continue to express discomfort with managing psychiatric disorders¹¹ due to limited training and significant challenges with time constraints, poor payment, and lack of access to mental health expertise.¹²

Collaborative partnerships between PPCPs and behavioral health (BH) specialists can enhance PPCPs' ability to provide safe and effective care for mild to moderate presentations of common psychiatric disorders in the familiar, trusted setting of their patients' medical home (“the primary care advantage”).¹³ In doing so, scarce specialty BH resources can be conserved for the most severe and complex psychiatric presentations.

Collaborative BH partnerships can take several forms, from (1) minimal or basic collaboration with

partners working at a distance in separate systems and locations (“coordinated care,” as in established BH specialist referral patterns or specialist education/consultation services); to (2) basic on-site collaboration with partners working in the same location but in separate systems (“co-located care,” as in BH specialists practicing independently but in proximity to primary care); to

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(3) highly collaborative multidisciplinary care with partners working in the same location and system (“integrated care,” as in BH specialists and primary care practitioners delivering seamless team-based care).¹⁴ Although at least some empirical support exists for all 3 of these models,^{15,16} integrated care has the strongest evidence base, both in adult¹⁷⁻²⁰ and pediatric settings.^{21,22} However, the benefits of integrated models in pediatric settings have not clearly outweighed their significant cost, reimbursement, resource, and operational challenges.²³

Accordingly, interest has grown in less resource-intensive models of collaborative BH care that can be flexibly adapted to local circumstances, are feasible and useful in “real world” settings, and have the potential for sustainability and broad dissemination.²⁴ Among these less intensive models are statewide child psychiatry access programs (CPAPs), a form of coordinated care, which provide on-demand psychiatric consultation to PPCPs and facilitated patient referral to specialty BH care.²⁵ Some CPAPs provide some formal education to PPCPs (eg, periodic webinars); however, education tends to be subordinate to the consultative/referral components. Although now operational in 46 states, evidence of the effectiveness of CPAPs in achieving PPCP BH confidence and practice change or improved patient outcomes remains sparse.^{16,26,27}

The American Academy of Pediatrics (AAP) recently has articulated core pediatric mental health competencies for PPCPs deemed essential for PPCPs to confidently extend their scope of practice to BH.²⁸ These competencies include communication, health promotion, BH assessment, brief psychosocial intervention, psychopharmacological management, team-based care, collaborative/consultative relationships, and systems to support mental health services. Yet both in training²⁹ and practice, PPCPs have limited opportunities to acquire these competencies.

In this context, we aimed to create a new model of collaborative BH care designed to diminish the cost and some of the challenges of integrated models and the educational limitations of CPAP models. This new coordinated care model, targeted at the needs and resources of a large community pediatric practice network in southern California, was designed in accordance with the collaboration components designated by the American Academy of Child and Adolescent Psychiatry (AACAP) as key in supporting primary care BH service provision: BH education, child and adolescent psychiatrist (CAP) consultation, and care coordination/facilitated referral.³⁰ The education component conveys the foundational knowledge and skills essential for the safe and effective management of BH disorders in the

pediatric setting. The consultation component provides additional individualized guidance regarding the management of specific cases. The care coordination/facilitated referral component provides assistance in accessing specialty care resources as indicated.

Our education component diminished the costs of new curriculum development by adapting a previously tested, AAP competency-focused curriculum that was delivered with favorable outcomes to a large pediatric practice network in Massachusetts.³¹⁻³³ Our consultation component reduced the costs of on-demand CPAP-like consultation by utilizing local psychiatry resources that offered a limited schedule of consultation availability. Our care coordination component streamlined specialty BH referral by standardizing referral pathways to local psychotherapy and psychopharmacology resources, and by creating a resource directory for other BH services. Almost all program activities were designed to be delivered virtually, through telephone or televideo platforms, to enhance convenience for PPCPs, patients, and families, with limited in-person consultation appointments available at a psychiatry group.

The primary aims of this quality improvement (QI) initiative were to assess whether this compact, mostly virtual model of coordinated collaborative care would prove feasible and useful for PPCP participants and effective in enhancing PPCPs’ BH confidence, facilitating their provision of BH services, and reducing service provision barriers.

Methods

Participants

The eligible population comprises approximately 200 PPCPs in 65 practices in a pediatric network affiliated with an academic medical center in Southern California. The network encompasses 5 large demographically diverse counties (Los Angeles, Orange, Kern, Ventura, and Santa Barbara) and serves a total population of approximately 300,000 patients. The communities in which the practices are located are middle class and the patient payer mix across the network is 90% commercial and 10% government. All practices are in areas designated by AACAP as severe shortage areas for CAPs.³⁴

Practices participate in the QI initiative on a first-come, first-serve basis, based on practices’ interest in providing BH services and the capacity of the quality team to support the practices’ involvement in program components. Approximately, 10 to 15 practices are targeted for enrollment each year. This report presents the findings from the first 2 groups of practices to enroll (cohorts 1 [7 practices, 23 PPCPs] and 2 [11 practices, 25 PPCPs]).

The observation period for both cohorts spanned the period from program launch on July 1, 2018, to the conclusion of the observation period on December 31, 2020, with cohort 1 followed for 30 months and cohort 2 followed for 18 months. Both cohorts were exposed to the same complete educational component during the first year of their enrollment; consultation and referral components were ongoing throughout the observation period from the start of enrollment.

BH Program Description

BH education. The goal of the BH learning community (BHLC) (*Making Behavioral Health Visits Matter*) is to enhance the ability of PPCPs to screen for, assess, and treat mild to moderate anxiety, depression, and attention-deficit hyperactivity disorder (ADHD) (target disorders). The BHLC³¹⁻³³ was presented by the curriculum originators via televideo and comprised eight 1.25-hour sessions delivered over the first 7 months of each cohort's enrollment. Sessions were scheduled during lunch breaks to facilitate attendance.

The BHLC addressed: (1) the purposes of collaborative care; (2) the stepped model of BH care in the primary care setting; (3) universal screening for the target disorders³⁵; (4) focused assessment, including focused symptom severity rating scales³⁶⁻⁴⁰ and focused clinical interview addressing symptom history, severity (functional impairment), complexity (medical and psychosocial) and safety (risk of self-harm); (5) guided self-(patient/family) management for early, sub-clinical symptoms (worries/fears, sad mood, executive function difficulties); (6) etiology, assessment, and management of mild/moderate presentations of the target disorders; (7) guideline-congruent^{7,41,42} medications for the target disorders; and (8) indications for referral to specialty BH care (eg, severe, complex, unsafe, and/or refractory presentations). For each of the 3 target disorders, a didactic session was paired with a follow-up case-based discussion. Interactive teaching techniques (eg, instant polling, reflective thinking, question/answer) were utilized as much as possible in this virtual format, based upon adult learning principles.⁴³ The BHLC was funded by the affiliated academic medical center.

CAP consultation. The goal of CAP consultation was intended to reinforce and extend the knowledge acquired in the BHLC to the management of individual patients by providing PPCPs' with access to diagnostic, triage, and treatment suggestions and medication management support. The consultation component initially utilized a community child and adolescent psychiatry group but in mid-cohort 2, transitioned to outpatient child and

adolescent psychiatry in the affiliated medical center. This transition expanded CAP availability as well as facilitated closer alignment between the education and consultation program components.

To decrease resource allocation and with anticipation that the call volume would be low initially, the telephone consultation line was not set up as on-demand; rather, calls were received by a triage administrator Monday through Friday from 9:00 a.m. to 5:00 p.m. Telephone consultations were then scheduled Monday, Wednesday, and Friday during 1 hour of protected CAP time. After the transition to outpatient psychiatry, the scheduled consultation hour expanded to 5 days a week. The CAP consultation line had limited funding through a larger philanthropic donation to support various BH initiatives across the institution.

Facilitated referral. The goal of the facilitated referral component was to provide ready access to specialty BH care for patients in participating practices. Families could directly request virtual psychotherapy upon the recommendation of their PPCP. Therapists were social work faculty and trainees from the affiliated university's school of social work. Appointments were scheduled Monday-Friday from 9:00 a.m. to 7:00 p.m. Since this program component was funded by a grant to the school of social work, therapy visits were not billed and were not limited in number or frequency.

For more severe/complex presentations that could not be resolved in a telephone CAP consultation, virtual or in-person appointments were offered through the community psychiatry group. This service was transitioned to outpatient psychiatry at the affiliated medical center mid-cohort 2 to align with the transition of telephone CAP consultations.

QI support. The 3-member QI team supported practice staff and PPCPs during 4 to 5 visits per practice in a combination of in-person and virtual visits over a 12-month period of enrollment. Practices completed at least 2 Plan-Do-Study-Act (PDSA) cycles. The purpose was to develop and implement processes for integration of BH screening and service provision in the practices through a QI model (Clinical Microsystems)⁴⁴ which can improve mental health screening processes and ensure sustainability.⁴⁵

Data source and measures. Sociodemographic information for the practice communities was obtained from the US Census Bureau.⁴⁶ Education attendance data were abstracted from the program's online continuing medical education (CME) and maintenance of certification (MOC) tracking system for health care professionals.

De-identified consultation utilization data were reported from the community psychiatry group and then from outpatient psychiatry in the affiliated medical center. De-identified psychotherapy referral data were reported from the affiliated school of social work.

At program launch (before the first educational session), a survey adapted from that used in the Massachusetts program³¹ was administered to PPCP participants via Survey Monkey software to compile practice characteristics and to assess target outcomes (Table 1). Post-program, all pre-program survey items were re-administered, along with post-program only items assessing the perceived usefulness of the education and consultation program components. The post-program consultation items were completed only by those PPCPs who utilized the consultation line. The Institutional Review Board (IRB) office was consulted during the development of this initiative and advised that the initiative was QI and as such no relevant materials needed to be submitted.

Statistical Methods

Pre-program survey results and sociodemographic characteristics were compared between cohorts to determine whether they were significantly different and if not, could be combined and analyzed as 1 cohort. Cohorts were compared using the Mann-Whitney *U* test for independent samples.

Due to the inability to match pre-survey/post-survey participants in cohort 1, the pre-program/post-program analysis for the combined cohorts was at the practice level using aggregated statistics (means) to represent each practice. Only practices participating in both the pre-program and post-program surveys were included in the pre-analysis/post-analysis ($n = 18$ practices). Pre-program only and post-program only analyses were at the PPCP level and included all survey participants ($n = 48$ PPCPs).

Practice-level primary outcomes included pre/post-program change in mean BH confidence scores; pre-program/post-program change in mean BH service provision; and pre-program/post-program change in mean barriers to BH service provision. Outcomes were presented with mean and standard deviation, as well as median and interquartile range; both statistics were presented because of the small sample size. The Wilcoxon signed-rank test was used to determine whether the paired pre-practice/post-practice-level change was significantly different from 0 at the 0.05 significance level. When a composite survey domain (eg, BH confidence, BH service provision) was significant, the Bonferroni multiple comparisons adjustment was used to determine which individual survey items drove the overall difference.

Practice-level secondary analyses included investigation of Spearman correlations between primary outcomes and sociodemographic variables. Statistical analyses were performed in SAS version 9.4 (Copyright © 2016 SAS Institute Inc, Cary, NC, USA).

Results

Survey Participants

Across both cohorts, 73% of practices had ≤ 6 PCPs, 2% had 7 to 12, 7% had 13 to 20, and 18% had ≥ 20 . Six percent of PCPs had 0 to 5 years of experience, 17% had 6 to 10 years, 10% had 11 to 15 years, and 67% had ≥ 16 years.

The pre-program survey revealed no differences between cohorts 1 and 2 with respect to demographic variables or study outcomes (Table 2); accordingly for all analyses, data from cohorts 1 and 2 were combined ($n = 18$ practices with 48 PPCPs).

Program Outcomes

Access to BH services. At pre-program, while the great majority (96%) of PPCPs ($n = 48$) reported believing that PPCPs should provide BH care, only 24% reported that they had adequate access to the resources needed. Only 11% of PPCPs reported adequate access to CAPs and only 15% reported adequate access to psychotherapists.

Program feasibility. The average practice participation across all provider educational sessions was 89% (97% before COVID-19). Although potentially affected by COVID-19, didactic sessions addressing anxiety and depression had better attendance (both 100%) than the didactic session addressing ADHD (76%), and didactic sessions had better attendance (92%) than sessions delivered in a case-based format (82%). Across the 2 cohorts, 1081 category 1 continuing medical education (CME), 1081 Part 2 Maintenance of Certification (MOC), and 1200 Part 4 MOC credits were awarded to PPCP participants through the affiliated academic institution.

Over 30 months, PPCPs requested 35 CAP telephone consultations (1.2/month) and referred 22 patients for CAP evaluations (0.7/month). During this same period, PPCPs made 6 psychotherapy referrals to the affiliated school of social work (0.2/month).

Program usefulness. Nearly, all (98%) PPCPs participating in the education component ($n = 45$) reported that this component improved the quality of their BH care (Figure 1). One half (50%) of PPCPs who utilized the

Table 1. Outcome Survey Item Domains.

Outcome domain	Items	Response format	Administration schedule
Confidence	3 items I am able to manage the medications needed to treat patients with behavioral health issues I have adequate knowledge and skills to treat patients with mild to moderate depression I have adequate knowledge and skills to treat patients with mild to moderate anxiety	5-point Likert-type scale ^a	Pre-test/post-test
Barriers to service provision	3 items I encountered time barriers to implementing changes in my behavioral health practice I encountered staff barriers to implementing changes in my behavioral health practice I encountered resource barriers to implementing changes in my behavioral health practice	Yes/no	Pre-test/post-test
Service provision	5 items In the past year . . . I prescribed medication to treat anxiety I prescribed medication to treat depression I used a behavioral health screening instrument (Pediatric Symptom Checklist-17 or Patient Health Questionnaire-9) I used a depression rating scale (Patient Health Questionnaire-9) I used an anxiety rating scale (Screen for Anxiety Related Emotional Disorders or Generalized Anxiety Disorder-7)	Yes/no	Pre-test/post-test
Need	4 items Pediatricians should address children's social, emotional, and behavioral development I have the resources necessary to treat children and adolescents with behavioral health needs There is adequate access to psychotherapists in my area There is adequate access to child and adolescent psychiatrists for my patients	5-point Likert-type scale ^a	Pre-test
Usefulness	Education component: 6 items I acquired new knowledge about psychotherapy for the treatment of child and adolescent psychiatric disorders I acquired new knowledge about guided self-management for sub-clinical child and adolescent behavioral health concerns I acquired new knowledge about screening for child and adolescent psychiatric disorders I acquired new knowledge about the use of psychotropic medications to treat child and adolescent psychiatric disorders I acquired new knowledge about distinguishing between mild, moderate, and severe child and adolescent psychiatric disorders The educational sessions were helpful in improving the overall quality of care for my patients with behavioral health problems Consultation component: 7 items The telephone consultation reinforced knowledge I acquired in the educational sessions The telephone consultation helped me to distinguish patients with behavioral health problems who need specialty care from patients who could be cared for in my practice The telephone consultation was timely The telephone consultation helped me to initiate or continue psychotropic medication management of my patient I can use the knowledge I acquired in the telephone consultation to care for other patients in the future The telephone consultation was convenient for my schedule The telephone consultation was helpful in improving the overall quality of care for my patient with behavioral health problems	5-point Likert-type scale ^a	Post-test

^aThe 5-point Likert-type scale—(1) strongly disagree, (2) disagree, (3) neither agree nor disagree, (4) agree, and (5) strongly agree.

Table 2. Participating Pediatric Practice Characteristics by Cohort.

	Cohort 1 (n = 7)	Cohort 2 (n = 11)	P value ^a	Combined cohorts (n = 18)
Census tract demographic characteristics ^b				
Population, mean (range)	42 780 (223-11 455)	38 476 (1093-10 849)	.28	40 149 (223-11 455)
Population, total	299 458	423 231	—	722 689
Household income, median \$USD (range)	\$98 948 (\$56 212-\$205 964)	\$94 375 (\$35 601-\$180 500)	.53	\$96 661 (\$35 601-\$205 964)
Bachelor's degree or more, mean % (range)	50% (19%-69%)	49% (10%-80%)	.65	49% (10%-80%)
White, mean % (range)	74% (29%-91%)	66% (27%-94%)	.15	69% (27%-94%)
Hispanic, mean % (range)	19% (1%-45%)	26% (2%-87%)	.86	23% (1%-87%)
Limited English proficiency, mean % (range)	6% (0%-24%)	7% (0%-28%)	.39	7% (0%-28%)
Practice-level outcomes				
Pre-program BH confidence, median Likert score (Q1, Q3)	2.00 (1.75, 2.42)	2.17 (2.00, 2.56)	.41	2.11 (2.00, 2.42)
Pre-program BH service provision, median % (Q1, Q3)	50% (40%, 55%)	50% (30%, 75%)	.86	50% (40%, 60%)
Pre-program BH service barriers, median # (Q1, Q3)	1.50 (1.00, 2.00)	2.00 (1.67, 2.00)	.25	2.00 (1.33, 2.00)

Abbreviation: BH, behavioral health.

^aP values based on the Mann-Whitney *U* test.

^bMultiple practices may reside within 1 census tract.

consultation component (n = 10) believed the same about the consultation component (Figure 2). Ratings of individual education outcomes overall were very high (Figure 1) and exceeded the ratings of individual consultation outcomes (Figure 2).

BH confidence and BH service provision. Overall mean practice-level pre-post BH confidence Likert scores (Table 3, Figure 3) increased from 2.15 ± 0.46 to 3.73 ± 0.65 ($P < .001$), corresponding to an overall increase in confidence of 73%. After correction for multiple comparisons, mean pre-post confidence scores for managing anxiety, depression, and psychotropic medication (Table 3, Figure 4), all reached statistical significance ($P < .001$) and increased by 80%, 78%, and 62%, respectively.

Overall mean practice-level pre-post BH service provision percentages (Table 3, Figure 5) increased from 49.35 ± 28.4 to 78.89 ± 19.8 ($P = .001$), corresponding to an overall increase in BH service provision of 60%. After correction for multiple comparisons, mean pre-post prescribing of anxiety medications significantly increased ($P = .020$) as did mean use of the BH screener ($P = .039$), corresponding to increases of 59% and 60%, respectively. Although not statistically significant, mean pre-post use of the anxiety and depression severity rating scales and mean pre-post prescribing of depression medications increased 99%, 50%, and 44%, respectively (Table 3). At post-test, all 18 practices reported use of the depression rating scale (Table 3).

No significant correlations were found between practice sociodemographic variables and BH confidence and BH service provision outcomes. However, variations across practices in pre-to-post program changes in confidence and service provision were observed, with mean

confidence score changes ranging from 0.7 to 3.0 and mean service provision percentage changes ranging from -20% to 90%.

Barriers to BH service provision. Overall, the mean practice-level number of service barriers to BH service provision decreased 16% (Table 3), from 1.74 ± 0.67 to 1.46 ± 0.56 ($P = .24$) (non-significant). A decrease in the resources barrier was the largest change; the staff barrier decreased slightly, and the time barrier increased slightly (all non-significant).

Discussion

This QI initiative in collaborative BH care was shown to address an acknowledged BH need; to be feasible to implement in a large pediatric practice network and perceived as useful by PPCPs; and to be effective in increasing PPCPs' confidence in their BH skills and their provision of services for common child and adolescent psychiatric disorders. As such, this initiative adds to the body of evidence supporting the benefits of primary/specialty collaboration in increasing convenient access to BH services for children and adolescents.

Although coordinated collaborative BH programs (particularly CPAPs) are well positioned to provide some degree of educational programming for PPCPs, in contrast to their consultation component few have published the outcomes of any educational efforts. The 2 notable exceptions are the New York Child and Adolescent Psychiatry Primary Care (CAPPC) program⁴⁷⁻⁴⁹ and the Massachusetts Behavioral Health Education in Pediatric Primary Care (BHE-PPC) program.³¹⁻³³ Both of these large-scale educational programs for PPCPs, when coupled with their statewide consultation component, demonstrated high

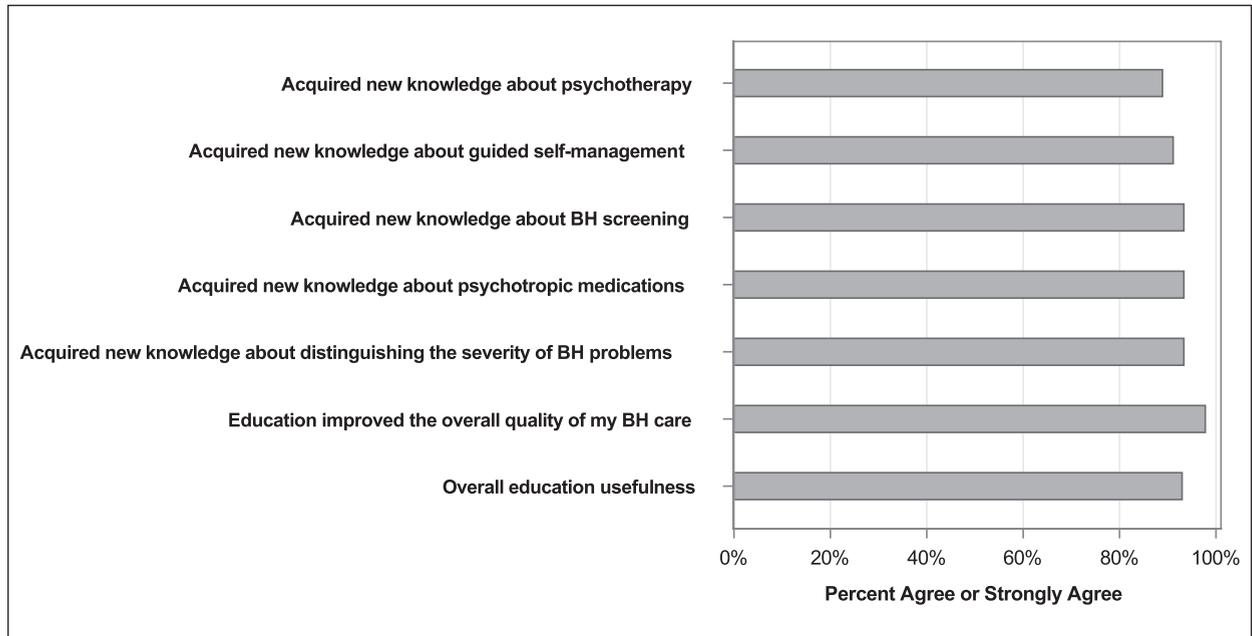


Figure 1. Post-program usefulness of education component, n = 45 PPCPs. Abbreviations: BH, behavioral health; PPCPs, pediatric primary care practitioners.

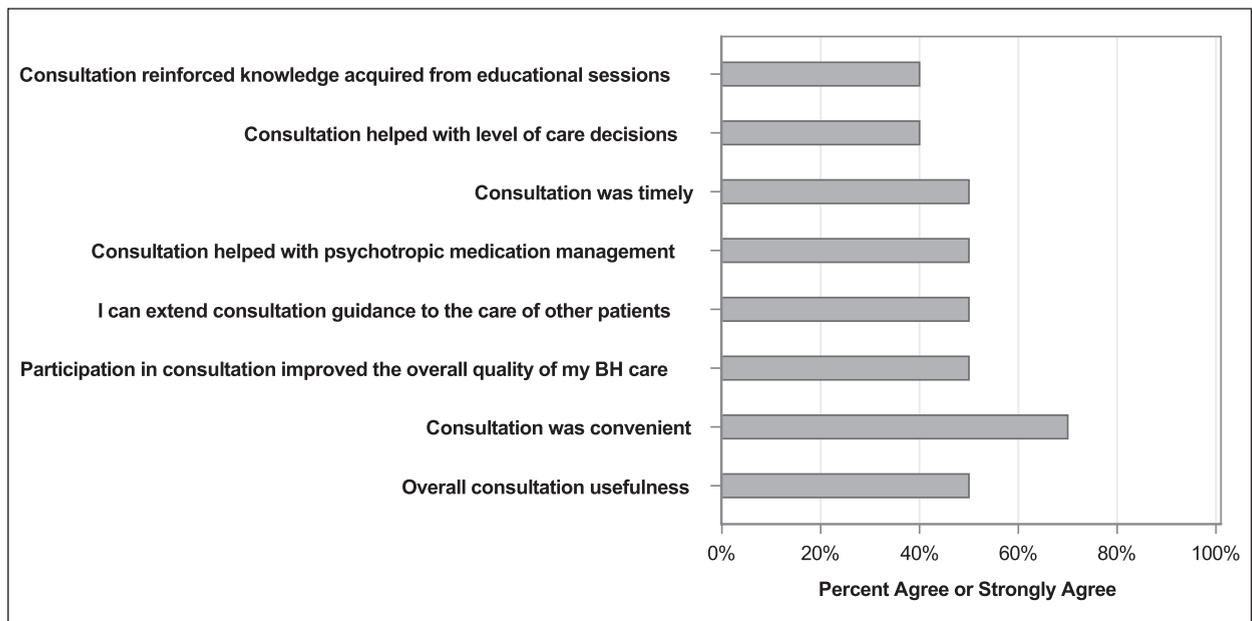


Figure 2. Post-program usefulness of consultation component, n = 10 PPCPs. Abbreviations: BH, behavioral health; PPCPs, pediatric primary care practitioners.

participant satisfaction and favorable changes in BH knowledge, confidence, and service provision.

Our initiative conveyed several strengths in comparison with these earlier programs. Until COVID-19 accelerated the development of virtual platforms, the CAP PC

and BHE-PPC educational components were delivered in-person, placing substantial time and transportation burdens on participants. In addition, both programs have large infrastructures necessitating substantial state-level funding.^{33,48} In contrast, the compact, less costly, and

Table 3. Practice-Level Outcomes Summary, Combined Cohorts.

		Phase		Change (post-pre)	P value ^a
		Pre (n = 18)	Post (n = 18)		
BH confidence	Mean (SD)	2.15 (0.46)	3.73 (0.65)	1.58 (0.59)	<.001
	Median (Q1, Q3)	2.11 (2.00, 2.42)	3.85 (3.56, 4.00)	1.58 (1.11, 2.0)	
Manage medications	Mean (SD)	2.16 (0.54)	3.50 (0.82)	1.34 (0.75)	<.001 ^b
	Median (Q1, Q3)	2 (1.67, 2.50)	3.5 (3, 4)	1.63 (0.83, 1.75)	
Knowledge/skills depression	Mean (SD)	2.16 (0.49)	3.85 (0.54)	1.69 (0.59)	<.001 ^b
	Median (Q1, Q3)	2 (2, 2.33)	4 (3.67, 4)	1.88 (1.33, 2)	
Knowledge/skills anxiety	Mean (SD)	2.13 (0.51)	3.83 (0.62)	1.69 (0.65)	<.001 ^b
	Median (Q1, Q3)	2 (2, 2.5)	4 (3.67, 4)	2 (1, 2)	
Number of barriers	Mean (SD)	1.74 (0.67)	1.46 (0.56)	-0.28 (0.71)	.24
	Median (Q1, Q3)	2.00 (1.33, 2.00)	1.50 (1.00, 1.67)	-0.50 (-1.0, 0.33)	
Time barrier, %	Mean (SD)	84.72 (26.9)	90.28 (17.7)	5.56 (30.1)	
	Median (Q1, Q3)	100 (66.7, 100)	100 (83.3, 100)	0 (0, 8.3)	
Staff barrier, %	Mean (SD)	14.81 (24.0)	11.57 (26.4)	-3.24 (26.8)	
	Median (Q1, Q3)	0 (0, 25)	0 (0, 0)	0 (0, 0)	
Resource barrier, %	Mean (SD)	74.54 (37.1)	44.44 (38.7)	-30.09 (54.1)	
	Median (Q1, Q3)	100 (33.3, 100)	50 (0, 75)	-29.2 (-83.3, 0)	
BH service provision	Mean (SD)	49.35 (28.40)	78.89 (19.84)	29.54 (32.49)	.0010
	Median (Q1, Q3)	50.0 (40.0, 60.0)	83.3 (60.0, 100.0)	15.0 (1.67, 60.0)	
Prescribed anxiety meds, %	Mean (SD)	37.04 (38.4)	58.80 (38.4)	21.76 (29.2)	.0195 ^b
	Median (Q1, Q3)	25 (0, 50)	50 (33.3, 100)	4.17 (0, 33.3)	
Prescribed depression meds, %	Mean (SD)	44.44 (41.1)	63.89 (41.7)	19.44 (36.6)	.195 ^b
	Median (Q1, Q3)	41.7 (0, 100)	83.3 (33.3, 100)	0 (0, 33.3)	
Used BH screener, %	Mean (SD)	62.50 (47.2)	100 (0)	37.5 (47.2)	.039 ^b
	Median (Q1, Q3)	100 (0, 100)	100 (100, 100)	0 (0, 100)	
Used Depression Rating Scale, %	Mean (SD)	66.67 (45.4)	100 (0)	33.33 (45.4)	.08 ^b
	Median (Q1, Q3)	100 (0, 100)	100 (100, 100)	0 (0, 100)	
Used Anxiety Rating Scale, %	Mean (SD)	36.11 (43.9)	71.76 (43.6)	35.7 (58)	.325 ^b
	Median (Q1, Q3)	12.5 (0, 100)	100 (25, 100)	25 (0, 100)	

If the global test was not significant for the overall score, then the individual scores were not compared with 0.

Abbreviations: BH, behavioral health; SD, standard deviation.

^aP values based on the Wilcoxon signed-rank test (null hypothesis is that the difference is equal to 0).

^bAdjusted for multiple comparisons with the Bonferroni correction.

Note. If the global test was not significant for the overall score, then the individual scores were not compared to zero.

largely virtual design of our program may appeal to a broader range of pediatric networks with fewer available resources.

Our program is being delivered in middle-class (for the Los Angeles area) communities that include a larger proportion of culturally diverse white residents, some with limited English language proficiency. The favorable outcomes of the initiative suggest that PPCPs found the program to be relevant to this population. It will be important to test this and other similar collaborative models in less sociodemographically advantaged populations to assess their broad generalizability.

The observed variability of program outcomes across practices provides an opportunity to seek explanatory factors for this variability. Thus far, the outcomes of the

program were not associated with any measured sociodemographic factors, suggesting the need for alternative strategies (eg, qualitative study) to identify and address these observed practice differences.

The underutilization of both the consultation and psychotherapy components of the program is notable and will be the focus of additional qualitative study. Although only 50% of PPCPs who accessed the consultation line reported that the consultation was useful, the meaning of this finding is unclear given the low number (n = 10) of PPCP consultees. Consultation programs, such as the Massachusetts CPAP report increased call volume over time⁵⁰; we anticipate a similar evolution. We hypothesize that psychotherapy referrals were underestimated because of inconsistent referral reporting, and we anticipate higher utilization

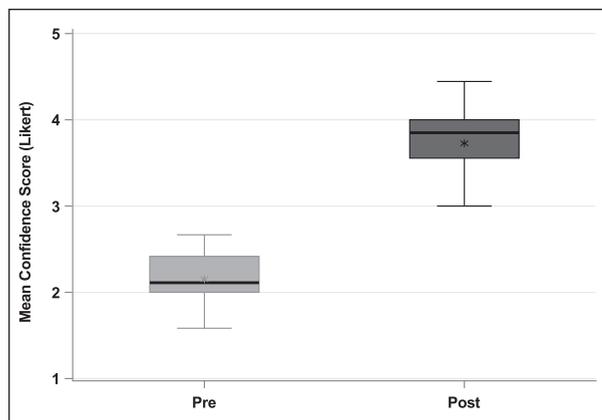


Figure 3. Pre-practice vs post-practice-level overall confidence scores, $n = 18$ practices. The bottom of the box represents the 25th percentile while the top of the box represents the 75th percentile. The thick, horizontal line within the box represents the median value while the asterisk represents the mean value. The top and bottom whiskers represent the maximum and minimum.

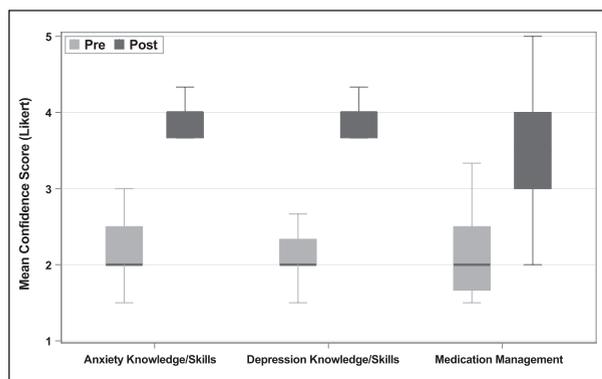


Figure 4. Pre-practice vs post-practice-level individual confidence scores, $n = 18$ practices. The bottom of the box represents the 25th percentile while the top of the box represents the 75th percentile. The thick, horizontal line within the box represents the median value while the asterisk represents the mean value. The top and bottom whiskers represent the maximum and minimum. Abbreviation: BH, behavioral health.

with transition to our affiliated outpatient psychiatric clinic due to enhanced care coordination and data collection.

Although not statistically significant, the increase in the time barrier reported by PPCPs with implementation of universal BH screening is notable. Screening models utilizing ancillary staff to distribute and score screening instruments during rooming for a well visit, or using patient portals to distribute and score screening

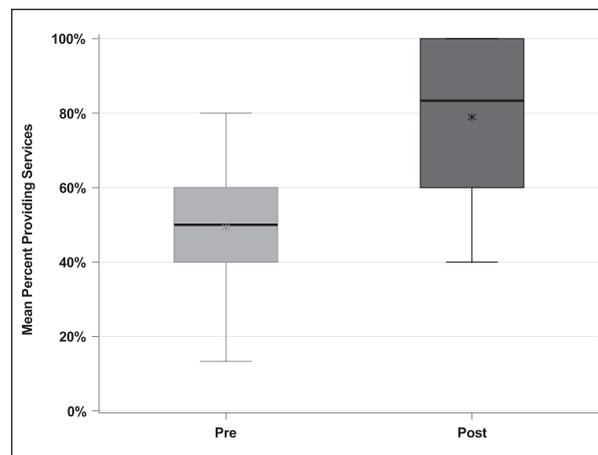


Figure 5. Pre-practice vs post-practice-level BH service provision percentages, $n = 18$ practices. The bottom of the box represents the 25th percentile while the top of the box represents the 75th percentile. The thick, horizontal line within the box represents the median value while the asterisk represents the mean value. The top and bottom whiskers represent the maximum and minimum. Abbreviations: BH, behavioral health; PPCPs, pediatric primary care practitioners.

instruments electronically in advance of the well visit, can greatly enhance the efficiency of BH screening.⁵¹

Limitations

This study was designed as a pilot with a small number of practices and was limited by self-report outcomes, analysis on a practice level rather than individual practitioner level with resultant loss of power, lack of data on the durability of the confidence and service provision improvements observed, lack of data on the quality of BH care provided, lack of data on patient and family outcomes, and limited generalizability of the findings due to the characteristics of the PPCP and patient populations. Our program analysis will be enhanced as we increase the number of enrolled practices beyond the pilot phase with data analysis on a PPCP level and aggregate data from the Electronic Health Record (EHR) on prescribing appropriateness and patient outcomes. The post-program survey will be repeated for earlier cohorts to assess durability of outcomes and will be coupled with qualitative interviews to understand practice variability in program utilization and outcomes.

Conclusion

To meet an urgent BH need among today's youth, our virtual collaborative BH model was designed to be rapidly deployable, affordable, facile, and scalable. The

initial findings suggest that the model was feasible and useful, and increased PPCP's BH confidence and service provision. Further program expansion to additional PPCPs with continued quantitative and new qualitative research will provide additional important data on scalability, sustainability, and inter-practice variability, with resultant additional opportunities to enhance effectiveness of the model from QI, PPCP, and patient/family perspectives.

This model of virtual coordinated BH care, along with other models of coordinated, co-located and integrated BH care,⁵² increasingly are demonstrating the importance of specialist collaboration in improving access to BH care in the primary care setting. Health professionals who are educated in the collaborative care approach can play a key role in alleviating the gap between the millions of youth needing BH services, and those receiving them.

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Author Contributions

Drs. Arora and Walter conceptualized and designed the study, designed the data collection instruments, drafted the initial manuscript, and reviewed and revised the manuscript. Ms. Klein carried out the statistical analyses and reviewed and revised the manuscript. Ms. Yousif and Ms. Khacheryan helped design the data collection instruments, collected data, carried out the initial analyses, and reviewed and revised the manuscript. All authors approved the final manuscript as submitted and agree to be accountable for all aspects of the work.

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Ethical/Consent

The IRB office was consulted during the development of this initiative and advised that the initiative was quality improvement and as such no relevant materials needed to be submitted.

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