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## Implementation Outcomes from a Pilot of “Access to Tailored Autism Integrated Care” for Children with Autism and Mental Health Needs

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### Abstract

**Objective:** To report the feasibility, acceptability and adoption of the “Access to Tailored Autism Integrated Care (ATTAIN),” a model to identify mental health needs and link to mental health care for autistic children.

**Method:** The Exploration, Preparation, Implementation, Sustainment framework informed implementation outcome measurement and analysis. Thirty-six providers from seven pediatric primary care clinics within three healthcare systems enrolled and received an initial ATTAIN training and ongoing online support over four months with autistic patients ages 4–16 years old. Survey and interview assessments measured perceptions of feasibility, acceptability and intentions to sustain ATTAIN use. Electronic health record data assessed child characteristics and ATTAIN adoption. Descriptive statistics and one-way ANOVAs characterized implementation outcomes and differences between healthcare systems. Rapid qualitative methods were used to analyze interview data that were integrated with survey data for convergence and expansion.

**Results:** Providers reported that ATTAIN was feasible, acceptable, and that the initial training was helpful. Reports were mixed about providers’ intentions to continue using ATTAIN. Providers

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offered recommendations for more specific and tailored implementation support. There were significant differences in provider-reported adoption rates between healthcare systems.

**Conclusion:** This is one of the first implementation studies examining integrated mental health care for autistic children and highlighted specific areas for refinement to facilitate scale-up.

**Trial registration:** [NCT04293627](#)

## Lay Abstract

Children with autism frequently experience co-occurring mental health needs. The “Access to Tailored Autism Integrated Care (ATTAIN)” model was co-created with caregivers, pediatric providers, and healthcare leaders to identify mental health needs and link to mental health care for autistic children. This paper describes outcomes from a pilot study of ATTAIN with 36 pediatric primary care providers from 7 clinics within 3 healthcare systems. Providers participated in an initial ATTAIN training and received ongoing online support over four months with autistic patients ages 4–16 years old. Survey and interview assessments measured provider perceptions of feasibility, acceptability and intentions to continue using ATTAIN after the pilot. Providers reported that ATTAIN was feasible, acceptable, that the initial training was helpful in their implementation but that more specific and tailored implementation support was needed. Results show that ATTAIN is a promising model to support mental health screening and linkage for children with autism in primary care. Findings provide information on specific areas of the ATTAIN model that could benefit from additional refinement to support more widespread use in primary care settings.

## Keywords

pediatrics; autism; mental health; integrated care; implementation

## INTRODUCTION

Mental health integrated models have emerged as a transformative and pragmatic approach to improve overall health management and access to specialty care (Wright et al., 2020). Integrated care definitions abound; we define it as collaboration between primary care and specialty mental health care to identify mental health concerns and facilitate mental health services access (Peek & The National Integration Academy Council, 2013). Further support for mental health integration in pediatric care settings is exemplified through a recent call to consider mental health screening as the “eighth vital sign” in pediatric well-child visits (Jellinek & Murphy, 2021). Empirical support for pediatric mental health integration is sparse but growing (Asarnow et al., 2015; Germán et al., 2017; Grimes et al., 2018), including successful examples in real-world health systems (Walter et al., 2019) and for children with developmental concerns (Martin-Herz et al., 2020).

Despite growing attention to and investment in integrated care, there has been limited focus on implementation of pediatric integration for specific populations, such as children with autism spectrum disorder (ASD). These children experience high rates of co-occurring psychiatric conditions (Brookman-Frazee et al., 2018; Joshi et al., 2010; Tye et al., 2019) that are often unrecognized and untreated. Children with ASD often have complex mental

health and medical needs that necessitate care from multiple service providers (Brookman-Frazee et al., 2009). Coordinating care across multiple providers could be supported by integrated care approaches led within pediatric primary care. No studies have developed models of integrated care for children with ASD. A paradigm shift is critical to understand and craft feasible solutions for pediatricians to efficiently identify the co-occurring mental health needs of children with ASD and subsequently improve their service access and quality of care (Wallis & Guthrie, 2020). The purpose of this study was to examine the feasibility and acceptability of a tailored mental health integrated care model, “Access To Tailored Autism Integrated Care” (ATTAIN) for school-age children with ASD in pediatric primary care settings.

### **ATTAIN Co-Design: Intervention and Implementation Strategies**

In partnership with ATTAIN Advisory Board members that included pediatricians, mental health providers, system leaders, caregivers, and implementation scientists, we co-designed ATTAIN to promote timely identification of mental health needs and subsequent linkage to mental health care tailored for children with ASD and to fit the organizations’ infrastructures and workflows (Stadnick et al., 2019). The co-design of ATTAIN was also informed by our formative mixed methods contextual assessment that reinforced the need for a tailored approach to link children with ASD to mental health services and intentionally incorporating organizational capacity considerations to support implementation efforts (Stadnick et al., 2020). Although integrated care models exist, none were designed for the specific and unique needs of children with ASD and co-occurring psychiatric conditions.

ATTAIN was tailored to each participating organization following iterative refinements with organizational leaders and providers. ATTAIN includes eight general steps that were yoked to an in-person well-child visit and customized to each organization for implementation. Local customizations were primarily related to the identified lead responsible for specific steps. The eight steps included the following:

1. Confirmed patient eligibility (ASD diagnosis and 4–16 years old) in medical record/chart.
2. Accompanying caregiver completed the Pediatric Symptom Checklist-17 (PSC-17) (Murphy et al., 2016) about the patient to determine the presence of clinically concerning mental health symptoms. The PSC-17 was selected based on the preference of the project’s Advisory Board and formative mixed methods data collection from PCPs (see Stadnick, Martinez, Aarons, et al., 2020). ATTAIN stakeholders recommended use of a brief, validated mental health screening tool that was available in multiple languages, spanned age ranges when co-occurring mental health needs are often present, and assess for common co-occurring mental health needs experienced by children with ASD.
3. The PSC-17 was scored and documented in the child’s EMR.
4. For patients with an elevated PSC-17 Total Score ≥ 15, the PCP discussed the elevated score guided by a 1-page psychoeducational communication aid “ATTAIN (ASD+MH) Information Sheet.”

5. The PCP offered the family a referral to mental health services.
6. The PCP documented the referral and family's acceptance or declination of the referral in the encounter note within the EMR using automated language or on a paper referral form.
7. An identified staff member (e.g., Call Center Representative, Psychiatry Developmental Case Manager) received the mental health referral and contacted the family on a set frequency to support scheduling the child's mental health appointment.
8. The staff member supporting the referral connection (from #7) sent a confirmation back to the referring PCP when the mental health appointment was scheduled or attended.

To support implementation of the ATTAIN protocol, three primary implementation strategies were employed: (1) provider/clinic champions, (2) periodic reflections and (3) technical assistance. First, prior to the pilot launch, a physician and/or clinical staff member was identified as the primary point of contact within the participating clinic and agreed to be contacted every two weeks by the research team to share about barriers, facilitators and adaptations. Second, adapted from the ethnographic approach described by Finley and colleagues (Finley et al., 2018), a member of the research team contacted the provider/clinical champion to assess the implementation process and identify ongoing and emergent technical assistance needs every two weeks. The champion was asked, from their observations or discussion with participating providers, about what was going well, what was challenging, what modifications or changes were providers making and what the clinic needed to support implementation. These reflections were completed by phone (approximately 5–10 minutes) or shared in an e-mail based on the champion's preference. Third, technical assistance was provided in the form of e-mails sent every two weeks with provider fidelity tips, answers to commonly asked questions based on site champions' periodic reflections and reminders about ATTAIN use.

### Implementation Science Framework

This study applied the Exploration, Preparation, Implementation, Sustainment (EPIS) (Moullin et al., 2019) framework to ground the study design, measurement and analysis plans. The EPIS framework is a widely used implementation science framework that has been applied in diverse health care contexts, countries, and implementation efforts for child and adult populations. It facilitates evaluation of efforts to implement and sustain an evidence-based practice or new innovation within a specific care setting. EPIS can be and has been used to guide implementation research questions, study design, quantitative, qualitative, and mixed methods data collection and analysis, and implementation junctures that may necessitate adaptation or refinement. Two defining characteristics of the EPIS framework include delineation of the phases of implementation and primary contextual and procedural domains (e.g., outer system context, inner organizational/clinic context, innovation factors) involved in the implementation lifespan. The EPIS framework was selected for its emphasis on assessing the multi-level contextual influences—that is,

how primary care providers deliver care within distinct healthcare systems—that impact implementation process and outcomes.

### Current Study

In this study, we examined perspectives from inner context users (primary care providers) about how ATTAIn characteristics and implementation determinants (e.g., organizational capacity to accommodate workflow changes) influenced early implementation and sustainment outcomes following a feasibility pilot trial in primary care. Our primary objective was to report the implementation outcomes (feasibility, acceptability, adoption) following a community pilot trial of ATTAIn in pediatric primary care clinics within three large healthcare systems. Since this was an exploratory feasibility pilot study, we did not have specific hypotheses. Rather, we sought to understand provider perspectives on early phase implementation outcomes and identify specific refinements or adaptations needed for future scaling.

## METHODS

This study used a mixed method concurrent exploratory quantitative + qualitative design (Palinkas, 2014) to understand primary care providers' (PCP) perceptions of feasibility, acceptability, adoption and barriers and facilitators to ATTAIn use in pediatric primary care settings.

### Participants and Setting

ATTAIn was piloted in pediatric primary care clinics representing three healthcare organizations that were involved in the development of ATTAIn: 1) a federally qualified health center serving ethnically and linguistically diverse communities along the U.S./ Mexico border; 2) the largest network of pediatric primary care practices serving families in two Southern California counties; 3) a large integrated healthcare system providing primary and specialty care in seven counties in California. Based on clinical, administrative and executive leadership recommendations and consideration of geographic variation, seven pediatric primary care clinics were selected and invited to participate. No participating clinic had an existing integrated mental health care model for pediatric patients, generally, or for special clinical populations including children with ASD. All seven clinics agreed to participate. Providers were then recruited within those seven clinics.

A total of 36 PCPs from these seven clinics enrolled and completed a baseline survey. Of these 36 PCPs, 22 completed a post-pilot survey and 16 completed a post-pilot interview. Four PCPs were ineligible to complete post-pilot data collection (reasons included retirement, on family leave during the pilot period) resulting in a retention rate of 69%. Of the 22 who completed a post-pilot survey, 3 PCPs were from Organization 1 and completed an abbreviated survey because their organization was unable to complete pilot participation (described below). Additional details about the PCP sample are included in Table 1.

## Procedures

The procedures for clinic and PCP recruitment and training are described in Stadnick, Penalosa, Martinez, et al., 2021. In brief, all clinics that were invited to participate agreed to enroll in the ATTAIN pilot study. The research team led a one-hour training in ATTAIN at each participating clinic during a regularly scheduled staff meeting. Participants received copies of training and study materials and completed a brief survey at the end of the ATTAIN training. The trainings took place between November and December 2019.

Following the baseline training, providers were asked to use ATTAIN with up to 5 eligible patients (ages 4–16 years old with an ASD diagnosis) over four months starting in January 2020. The participating clinic at Organization 1 had a delayed start due to additional review needed by their local Institutional Review Board. Shortly after the launch at that clinic, the California COVID-19 stay-at-home order was issued on March 19<sup>th</sup>, 2020 abruptly changing their clinic workflows and limiting their organizational capacity to complete ATTAIN implementation. However, these providers were recontacted at the end of the pilot period and completed an abbreviated survey to understand challenges to ATTAIN and interest in participating in an abbreviated pilot at a later time.

For the other six clinics (in Organizations 2 and 3), the pilot study was postponed for 10 weeks following the March 2020 California COVID-19 stay-at-home order. The decision to pause was made in collaboration with each clinic because of significant clinical and administrative changes including a low patient volume for well-child visits and modified staff and provider schedules to comply with state public health safety policies. The pilot for these six clinics was resumed for one final month in June 2020 resulting in a cumulative total of approximately four months. At the end of the implementation period, all PCPs who had enrolled and completed a baseline survey were invited to complete an online evaluation survey. Providers from Organization 1 who were unable to complete participation were invited to complete an abbreviated survey. Table 2 reports the specific measures that PCPs from each organization completed.

PCPs from Organizations 2 and 3 were additionally invited to participate in a 30-minute virtual individual or group semi-structured interview to share their perspectives on ATTAIN implementation. The interview guide was developed to expand upon the survey with respect to implementation determinants and recommendations for refinement based on relevant domains within the Implementation and Sustainment phases of the EPIS framework. Twenty providers participated in interviews. Seven group interviews were conducted ( $n = 17$ ) and three individual interviews were conducted ( $n = 3$ ). Each group interview consisted, on average, of three participants (range = 2–4). The interviews lasted approximately 27 minutes on average (range = 12–41 minutes) with group interviews lasting slightly longer ( $M = 30$  minutes, range = 12–41 minutes) than individual interviews ( $M = 24$  minutes, range = 12–26 minutes). The interviews were facilitated by a doctoral research assistant and a staff research assistant using the Zoom platform without video. Interviews were audio recorded and transcribed using a professional service. The interview guide is available upon request.

To minimize participant response bias, the PI who directly led the ATTAIN training activities, was not part of the outcome assessment (post-pilot data collection activities). All

procedures were approved by the Institutional Review Board at the University of California San Diego and partnering organizations.

## Measures

The specific measures completed by each organization are reported in Table 1.

**Baseline Survey.**—PCPs (n=36) completed a brief 10–15-minute survey about their demographic and professional characteristics along with the Evidence-Based Practice Attitude Scale (Aarons, 2004), the Organizational Readiness for Implementing Change (Shea et al., 2014), the Implementation Climate Scale (Ehrhart, 2014), and the ASD + Mental Health Comfort and Knowledge Questionnaire to assess readiness and capacity of an organization to change programs, policies or practices. Results from the baseline survey are reported in Stadnick, Penalosa, Martinez, et al., 2021. Baseline data from the ASD + Mental Health Comfort and Knowledge Questionnaire were used in this study to assess changes during the ATTAIN pilot.

**COVID-19 Impact.**—Locally developed items were used to assess changes in clinical services due to the COVID-19 pandemic. Select items from the NIH-developed CoRonavIruS Health Impact Survey V0.3 Adult Self-Report Baseline Form (Adult Self-Report Baseline Current Form VO.3., n.d.) were used to ask about exposure status and impacts on personal and family resulting from the COVID-19 pandemic.

**ATTAIN Training Evaluation.**—Five items were included about PCP’s perception of the training they received during the ATTAIN pilot. These included: (1) the method by which they received training (i.e., in-person initial training, virtual initial training, review of bi-weekly e-mails post initial training); (2) the extent to which ATTAIN training helped to tailor their communication about mental health with patients with ASD; the extent to which ATTAIN training was sufficient to use ATTAIN; (3) the extent to which reviewing the bi-weekly ATTAIN training tips helped to remember to use ATTAIN; (4) the extent to which reviewing the bi-weekly ATTAIN training tips improved their use of ATTAIN and (5) the number of patients with whom they used ATTAIN during the pilot.

**Feasibility of Intervention Measure (FIM) and Acceptability of Intervention Measure (AIM) (Weiner et al., 2017).**—This collection of measures each includes 4-items to measure the extent to which PCPs perceived ATTAIN to be acceptable, appropriate, and feasible in their care setting. Respondents rate their agreement with each item on a Likert scale ranging from “completely disagree” (0), “disagree” (1), “neither agree or disagree” (2), “agree” (3), and “completely agree” (4). Example items adapted for this study included, “ATTAIN is appealing to me.” (AIM); “ATTAIN seems easy to use.” (FIM). A score for each measure was produced by averaging responses within each measure. Scale values ranged from 0–4. In this sample, internal consistency was excellent for the AIM (4 items;  $\alpha=0.96$ ) and the FIM (4 items;  $\alpha=0.98$ ). Only

**Perceived Characteristics of Intervention Scale (PCIS) (Cook et al., 2015).**—The PCIS is an 18-item scale that assesses attitudes towards a specific intervention including



relative advantage, compatibility, and complexity. Participants were asked to rate the extent to which they agree with each item on a 5-point Likert scale ranging from “not at all” (0), “to a slight extent” (1), “to a moderate extent” (2), “to a great extent” (3), and “to a very great extent” (4). Example items included, “The ATTAIn model is clear and understandable.” “Using the ATTAIn model fits well with the way I like to work.” A total score was calculated by averaging responses across all items. Internal consistency was excellent in this sample (18 items,  $\alpha=0.94$ ). Only PCPs from Organizations 2 and 3 were asked to complete this measure.

**Adoption.**—ATTAIn uptake was defined as the proportion of ATTAIn-eligible patients with whom PCPs used ATTAIn. De-identified EHR data were used to determine this outcome.

**Measure of Innovation-Specific Implementation Intentions (Moullin et al., 2018).**—This is a three-item measure to assess provider intentions about continued implementation of a specific practice. Items were modified to be specific to continued use of ATTAIn (e.g., “I plan to use ATTAIn with my patients.”). Participants were asked to rate the extent to which they agree with each item on a 5-point Likert scale ranging from “not at all” (0), “to a slight extent” (1), “to a moderate extent” (2), “to a great extent” (3), and “to a very great extent” (4). A total score is calculated by averaging responses across all four items. Internal consistency was excellent in this sample (3 items,  $\alpha=0.95$ ).

**ASD Knowledge and Confidence.**—This measure asked PCPs to rate their knowledge and confidence delivering care to children with ASD, including talking about mental health with patients and caregivers and answering questions about ASD and mental health needs. These topics were covered in the initial PCP training and reinforced through ongoing communication with PCPs. This measure was completed at the baseline training and post-pilot period. Participants rated their level of knowledge (5 items) and confidence (2 items) regarding each topic on a 5-point Likert scale from “not at all knowledgeable/confident” (0) to “extremely knowledgeable/confident” (4). Subscale scores were computed from the average across the items within each of the two subscales. Internal consistency was very good in the post-pilot sample ( $\alpha=0.89$ , Knowledge;  $\alpha=0.88$ , Confidence).

**Mental Health Screening, Referral, and Linkage Comfort.**—This measure assessed level of comfort regarding mental health screening and referral/linkage practices for pediatric patients with ASD. Response options were on a Likert scale from “not at all comfortable” (1) to “very comfortable” (10). Items in this measure were created during our formative needs assessment described in an earlier publication (Stadnick, Martinez, Aarons, et al., 2020). This measure was completed at the baseline training and post-pilot period. Each item is reported separately, and no total score is produced.

## Data Analysis Plan

**Quantitative Data Analysis.**—Differences in demographic and professional characteristics between PCPs who completed a baseline and post-pilot survey were examined using chi-square analyses. Descriptive statistics, effect sizes, and 95% confidence

intervals were used to characterize study constructs and patterns of feasibility, acceptability, and uptake of ATTAIn and to examine differences in baseline and post-pilot ratings of PCP knowledge, confidence and comfort caring for children with ASD in PCPs. We emphasized interpretation of descriptive statistics and estimation using confidence intervals and effect sizes in accordance with recommendations for meaningful analyses of pilot trials (Lee, Whitehead, Jacques & Julious, 2014). Quantitative data analysis was conducted using SPSS Statistics version 26.

**Qualitative Data Analysis.**—Rapid qualitative assessment methods were used to analyze the qualitative interview data collected from PCPs from Organizations 2 and 3 (Hamilton, 2020). Specifically, a templated matrix was developed that included summary responses from each interview divided by the question posed from the interview guide. Two members of the research team iteratively reviewed the summaries across interviews and by interview question to develop themes that are organized by EPIS phase and inner context domain. Qualitative analyses were aided by use of Microsoft Excel version 16.53.

**Integration.**—The qualitative themes were integrated with the quantitative findings to examine convergence (i.e., do the 2 methods confirm or find similar results) and expansion (i.e., do the 2 methods provide insights beyond either method alone) (Palinkas et al., 2019). Integrated findings informed preliminary recommendations for refinement that are described in the Discussion and summarized in a joint display in Table 3.

### Community Involvement

Community pediatric providers and organizational leaders and caregivers of children with autism were involved in the development of ATTAIn and its implementation.

## RESULTS

A total of 22 PCPs completed both a baseline and post-pilot survey (full or abbreviated). For this subset of PCPs ( $n=22$ ) 73% self-reported as female and 23% as Hispanic/Latino. PCP tenure at their current organization was less than one year (14%), 1–3 years (9%), 3–10 years (27%), and greater than 10 years (50%). A significantly greater proportion of the post-pilot sample identified as female as compared to the baseline sample ( $\chi^2(1)=4.00$ ,  $p < .05$ ). No other demographic or professional characteristics differed. Table 2 provides additional details about PCP participants.

### Impact of COVID-19 on Care Delivery

Because the pilot study occurred during the early phases of the COVID-19 pandemic, it was important to understand the impact of COVID-19 on clinic services and PCP's own experiences. Most PCPs ( $n=16$ , 73%) reported that their clinic suspended in-person services during the COVID-19 pandemic and that services in their clinics were provided via telehealth ( $n=21$ , 96%). Most PCPs ( $n=19$ , 84%) reported that they felt well prepared or confident to deliver care via telehealth (moderate to very great extent).

## Perceptions of ATTAIN Training

Regarding ATTAIN training, all who completed a post-pilot survey (n=22) reported that they had attended an in-person training at their clinic (n=20, 95%) or a virtual training (n=1, 5%). In addition to the initial training, 24% (n=5) reported that they reviewed the bi-weekly e-mails with training tips from the research team. In terms of the utility of the ATTAIN training, 67% (n=14) agreed that that ATTAIN training helped to tailor their communication about mental health with patients with ASD; 71% (n=15) agreed that ATTAIN training was sufficient for them to use ATTAIN; 48% (n=10) agreed that reviewing the bi-weekly ATTAIN training tips helped them to remember to use ATTAIN or improved their use of ATTAIN. Differences in the number of patients with whom PCPs reported using ATTAIN during the pilot were compared between organizations. PCPs in Organization 3 reported having used ATTAIN with more patients ( $M=8$  patients across PCPs in Organization 3) than PCPs in Organization 2 ( $M=3$  patients across PCPs in Organization 2) during the pilot period.

## Changes in Knowledge, Confidence and Comfort

There was a medium effect size (Cohen's  $d = .5$ ; 95% CI:  $-0.7, -0.01$ ) on increases in confidence delivering care to children with ASD from baseline ( $M=2.5$ ,  $SD=.6$ ) to post ( $M=2.8$ ,  $SD=.6$ ). There were small effect sizes in knowledge (Cohen's  $d = .3$ ; 95% CI:  $-0.5, 0.1$ ); comfort interpreting mental health screening results (Cohen's  $d = .3$ ; 95% CI:  $-0.5, 1.6$ ); or coordinating care for children with ASD (Cohen's  $d = .1$ ; 95% CI:  $-1.2, 0.7$ ) from baseline to post. There was no effect in changes to PCPs' comfort identifying mental health needs (Cohen's  $d = 0.0$ ; 95% CI:  $-0.8, 0.8$ );

## Implementation Outcomes

On average, PCPs agreed ATTAIN was acceptable ( $M=2.7$ , Median=2.5,  $SD=.8$ ) and feasible ( $M=3.0$ , Median=3.0,  $SD=.6$ ) as indicated by their average ratings aligned with a report of "agree" on the AIM and FIM. Regarding their perceptions of the characteristics of ATTAIN, PCPs reported an average PCIS Total Score of 2.1 (Median=3.0,  $SD=.8$ ) indicating agreement to a "moderate extent" towards the specific components of ATTAIN (e.g., compatibility, knowledge needed to use ATTAIN, technical support available to use ATTAIN). Regarding intentions to continue implementation of ATTAIN, PCPs reported an average of 1.5 (Median=1.5,  $SD=1.3$ ) on the MISII indicating overall agreement to a "slight to moderate extent" regarding intentions to continue ATTAIN implementation.

Adoption rates were similar across organizations that completed pilot participation. ATTAIN adoption was 53% for Organization 2 (43 eligible patients screened / 81 patients eligible) and 55% for Organization 3 (47 eligible patients screened / 85 patients eligible).

## Qualitative Results

Qualitative themes related to perceptions of feasibility and acceptability, the fit of ATTAIN within care settings, determinants that explain adoption and sustainment intentions, and specific components of ATTAIN that were described as useful or require further refinement. Overall, qualitative findings confirm quantitative findings that ATTAIN was feasible and

acceptable for use by PCPs in their primary care clinics. In addition, PCPs were uniformly most enthusiastic about the mental health need identification components of the model.

Qualitative data expanded survey data in several areas. For example, differences in perceptions of feasibility and acceptability were noted between participating organizations. A key feature for Organization 3 that heightened positive perceptions of feasibility and acceptability was the new integration of a referral order that allowed PCPs to directly refer pediatric patients to the Psychiatry Developmental Case Manager workflow rather than only allowing patients to self-refer to Psychiatry. Organization 2 reported mixed perceptions regarding the feasibility and acceptability of ATTAIN components. Specifically, Organization 2 PCPs reported that the mostly automated PSC-17 screening components increased its feasibility and acceptability. However, PCPs from this organization conveyed challenges about the post-referral steps. Specifically, PCPs from Organization 2 reported beliefs that staff contacting referred families on a set frequency to encourage the family to schedule the child's mental health appointment was not sufficient to successfully schedule an appointment. This was the case because the family still needed to call mental health providers on their own, even with a curated list of providers with ASD+ training. Additionally, PCPs from Organization 2 reported that the utility of ATTAIN post-referral steps differed by the child's mental health funder (e.g., more MH providers specializing in ASD available for certain insurance plans).

Across both organizations that completed pilot participation, providers reported that eligible patient volume was low, particularly once COVID-19 impacts on clinical service delivery limited in-person well-child visits and focused clinical care efforts on telehealth and sick visits. ATTAIN was designed to be implemented within the context of well-child visits to afford PCPs time (albeit limited, even within well-child visits) to review PSC-17 scores and explain the rationale for a referral to mental health services, if needed. Across organizations, many PCPs reported enthusiasm for dedicated attention to mental health needs for children with ASD, particularly through concrete tools including having access to the PSC-17 and psychoeducational communication aids to explain the interpretation of PSC-17 scores and the rationale for a mental health referral.

Based on extrapolation from the mixed methods findings and direct feedback from PCPs, several recommendations emerged to increase feasibility and acceptability including automating the patient eligibility identification, PSC-17 administration and scoring for all clinics. These recommendations are described in the Discussion.

## DISCUSSION

This mixed methods pilot study reports findings from PCPs regarding use of ATTAIN, a newly developed tailored integrated mental health care model for children with ASD. Overall, PCP perspectives from quantitative and qualitative sources indicated that ATTAIN was a feasible and acceptable method for mental health needs identification and referral for children with ASD in primary care. PCPs reported mixed attitudes regarding their intentions to continue using ATTAIN. Qualitative findings richly expanded upon quantitative

findings to illuminate determinants of implementation outcomes and to inform specific recommendations for refinement and facilitate continued ATTAIN implementation.

Current study findings corroborate a growing body of literature demonstrating the utility of integrated care models for screening, referral, and treatment of mental health concerns (Walter et al., 2019). Findings also support enhanced understanding that integrated care implementation is not a “one-size-fits-all” approach but can and likely will vary based on organizational and patient-level characteristics (Njoroge et al., 2016). Additionally, ATTAIN pilot findings are consistent with a recent systematic review of pediatric integrated care models that documented increased provider comfort treating mental health concerns within the context of integrated/collaborative care models (Burkhart et al., 2020).

Although the focus of ATTAIN is on a specific clinical population (i.e., children with autism, at risk for or experiencing co-occurring mental health concerns), the pilot findings and corresponding recommendations may easily generalize to other pediatric integrated care models. Perhaps the most generalizable finding is the demonstrated feasibility and acceptability of using the PSC-17 as a screener for mental health concerns in primary care. Though several screeners have been recommended for use in integrated care models, such as the Screen for Child Anxiety Related Disorders (SCARED) or the Patient Health Questionnaire (PHQ-9) (Burkhart et al., 2020), these screeners are limited in their narrow assessment. The PSC-17 is a general mental health screening tool designed to screen for internalizing, externalizing, *and* attention disorders, all of which are common co-occurring forms of psychopathology in children with autism (Brookman-Frazer et al., 2018). Additionally, the PSC-17 is validated for children as young as four years old, facilitating earlier opportunity for identification of mental health needs.

We detail several specific inner organizational context refinements to optimize scaling and sustainment efforts. Our refinements are guided by both the integrated findings from our pilot and inspired by the call to action detailed in Smith et al. (2020) for rapid implementation. Rapid implementation is defined as providing “the best possible evidence-based practice of a program or intervention to those who need it, with speed and efficiency, by redefining rigour, and adapting both methods and trial design, to fit research aims and objectives.” To this end, below are initial proposed refinements.

First, a core attribute of rapid implementation (Smith et al., 2020) is provision of actionable results balanced with scientific rigour. In line with this attribute and based on findings that review of bi-weekly technical assistance tips was low and to facilitate requested closed communication, it is recommended that regular (e.g., weekly/bi-weekly) data feedback loops to PCPs, clinic managers and the implementation research team be implemented. These regular data feedback loops could facilitate nimble responses to potential implementation adaptations and for behavioral reinforcement of implementation. The form of these data feedback loops could also include technical support through brief interactive implementation support or consultation during regularly scheduled PCP gatherings (e.g., team huddles, staff meetings).

Another core attribute of rapid implementation (Smith et al., 2020) is redefining rigor to encourage methods to be adapted for the real-world and quickly changing needs of implementation contexts. In line with this attribute, several related recommendations are offered in response to PCP's calls for more personalized and action-oriented support to families to maximize mental health linkage. This may include identifying a dedicated staff lead (e.g., family navigator, nurse care manager, care coordinator) and corresponding funding for these leads who can work with families to clarify logistical questions and the rationale for accessing mental health services for their child (e.g., differentiating between autism-specific and mental health-specific care). Additional forms could include preparing families for a follow-up call or outreach following the PCP's mental health referral; offering information in the child's after visit summary about who will be contacting the family and the approximate timeline to receive the communication about the referral follow up.

Second, consistent with calls for closed loop communication from PCPs, it is recommended that the outcome of the referral outreach to the family be shared back to the referring PCP regardless of the outcome (e.g., scheduled or attended first mental health appointment, unable to reach family).

Third, to increase ATTAIN feasibility and acceptability it is recommended that automated decision support for PCPs be further embedded within EHR system operations.

The study design and the context within which the study was conducted convey both limitations and strengths. As a feasibility pilot study conducted in community pediatric clinics, the study offers real-world evidence of feasibility and concrete opportunities for adaptation and refinement. The study design intentionally included a relatively small number of PCPs, but they were recruited from three diverse healthcare systems and organizations. The diversity of organizations and clinics was both a strength and challenge. This diversity offered piloting in multiple settings, which reinforced that there is no one size-fits-all healthcare model, but also challenged the limited resources of the research team to provide intensive technical assistance and implementation support. We sought and obtained real world evidence; we were challenged by real world issues including the global COVID-19 pandemic. The timing of the pilot study spanned the early phase of the pandemic, which resulted in downstream effects on ATTAIN implementation due to changes in clinic operations, service delivery and organizational priorities (i.e., responding to public health directives to prevent and respond to COVID-19). Although we cannot be certain, the pandemic might also have affected PCP participants' ability or availability to complete post-pilot data collection, resulting in a small amount of missing data. Also, despite efforts to maximize full participation and constructive feedback from PCPs implementing ATTAIN, this was not fully realized due to potential logistical, procedural, or unknown reasons, including the possibility of a less positive implementation experience. Despite these dialects, there is evidence of ATTAIN adoption and specific contextual knowledge from PCPs to directly guide needed refinements for ATTAIN.

Consistent with the recursive and iterative nature of implementation as operationalized by the EPIS framework, our next steps are to return to the Preparation phase and convene a series of iterative debrief meetings with each participating organization to plan for

micro-piloting of the reported refinements. In addition, the infrastructure developed for ATTAIN will be leveraged to support adaptation and implementation of a family navigation intervention to optimize personalized mental health care linkage in a newly funded stepped-wedge implementation trial (NIMH R34 MH120190; PI: Stadnick).

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**Table 1**

Measures Completed by Organization

	Organization 1	Organization 2	Organization 3
<b>Baseline Survey</b>			
Evidence-Based Practice Attitude Scale	✓	✓	✓
Organizational Readiness for Implementing Change	✓	✓	✓
Implementation Climate Scale	✓	✓	✓
ASD Knowledge and Confidence	✓	✓	✓
<b>Post Survey</b>			
COVID-19 Impact	✓	✓	✓
ATTAIN Training Evaluation	✓	✓	✓
Feasibility of Intervention Measure (FIM)		✓	✓
Acceptability of Intervention Measure (AIM)		✓	✓
Perceived Characteristics of Intervention Scale (PCIS)		✓	✓
Adoption		✓	✓
Measure of Innovation-Specific Implementation Intentions (MISII)		✓	✓
ASD Knowledge and Confidence		✓	✓
Mental Health Screening, Referral, and Linkage Comfort		✓	✓

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**Table 2**

Demographic and Professional Characteristics of Participating Primary Care Providers

Demographic or professional characteristic				
	Baseline Survey		Post-Survey	
	n	%	n	%
Gender				
Female	21	58	16	73
Male	15	42	6	27
Hispanic/Latino (Yes)	10	28	5	23
Highest educational level				
Master's degree	4	11	2	9
Doctoral/medical degree	32	89	20	90
Primary organization				
Organization 1	7	19	3	14
Organization 2	14	39	9	41
Organization 3	15	42	10	46
Years at organization				
<1 year	5	14	3	14
1–3 years	5	14	2	9
3–10 years	11	31	6	27
>10 years	15	42	11	50
ASD caseload				
<10%	25	69	17	77
10–25%	10	28	5	23

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**Table 3**

Joint Display of PCP Perspectives on ATTAIN Implementation

Implementation Outcome (QUANT)		Themes Organized by EPIS Outer and Inner Context Determinants	Illustrative Quotes of Themes by Outcome Domain (QUAL)	
<b>Feasibility, Acceptability</b> FIM <i>M</i> (SD) 3.0 (0.6); max response=4 AIM <i>M</i> (SD) 2.7 (0.8); max response=4 PCIS <i>M</i> (SD) 2.1 (0.8); max response=4		-Organizational capacity for workflow modifications -Resilience to changes in service delivery due to COVID-19 pandemic preferences -Fit with care delivery values and preferences -Fit with routine workflow -Filled a gap in mental health screening -Mismatch between expectations and implementation reality -Persistent systemic difficulties identifying and accessing external mental health sources for children with ASD+ -Eligible patient volume -Impacts from COVID-19 pandemic -Perceptions of well-designed and innovative aspects of workflows	<p>“I think it’s helpful for both [parents and providers]. . . .we may not be completely aware that, oh, these are symptoms that are more than what their normal ASD manifestations are like. And parents. . . .may not bring it up because they just think, “Oh, well, they’re getting ABA. They’re getting OT and speech. . . .these behaviors might improve in time with those therapies.” But those aren’t exactly the type of interventions that help them.”</p> <p>“ . . .the PSC-17 was a great screening tool. It was helpful for me as a provider because I don’t always know what questions to fully ask. . . .So it’s a great tool to give to the parents and. . . .then I can quickly glance at it without having to spend a length of time talking about it. And then the scripting was nice. That helped to explain to the parents what the purpose of it was, and that if there was anything of concern that we would refer them over. And I think even if they didn’t have any concerns, they were still appreciative of answering the questionnaire and that we were looking out for their needs.”</p> <p>“ . . .putting in place the tool that would then help trigger the need for the family, something that we didn’t have in place consistently. At least for me, that was what I saw as the big benefit. The secondary part, which is having in place a conduit for referral to have support within the psych department, was also something I looked forward to having that as a benefit for the families.”</p> <p>For me, I think I was hoping that it was going to help to give us a little bit more access to resources. It didn’t actually do that. . . .I expected it to be helpful, but it just kind of reinforced what I already knew, which is that getting mental health benefits for children with autism is difficult.”</p> <p>“But for kids who are autistic, who have a diagnosis of autistic and they need psychological services, there is no roadmap for them. So that’s a concern.”</p> <p>“Yeah, I was happy to have a closed loop. Let’s just say a closed loop on those referrals, because it’s a self-refer department, typically I wasn’t always aware of the outcome or if families ever got really connected unless I made the effort to check back to their chart. And I was looking forward to having that closed loop process where we could place a referral, and the case manager would let us know the outcome. So that was a good workflow that was designed for the study.”</p>	
<b>Adoption</b> ATTAIN Uptake (%) 54%				