Pediatric Residency Training and Behavioral Health: Preliminary Outcomes from an Interprofessional Education Curriculum

Kris Rooney MD
Lehigh Valley Health Network, kris.rooney@lvhn.org

Paul W. Kettlewell PhD

Kathryn A. DeHart MD

Mohammed Palejwala

Laura Diaz

See next page for additional authors

Published In/Presented At

Shahidullah J, Kettlewell P, DeHart K, Palejwala M, Rooney K, Diaz L, Amato I, Carlson J. (2018, Fall/ Winter). Pediatric Residency Training and Behavioral Health: Preliminary Outcomes from an Interprofessional Education Curriculum. *New Jersey Pediatrics*, 1, 32-40.

Authors

Kris Rooney MD, Paul W. Kettlewell PhD, Kathryn A. DeHart MD, Mohammed Palejwala, Laura Diaz, Indira Amato, Joann Carlson, and Jeffrey D. Shahidullah PhD

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Jeffrey D. Shahidullaha, PhD, Rutgers University, New Brunswick, NJ
Paul W. Kettlewell, PhD, Geisinger Health System, Danville, PA
Kathryn A. DeHart, MD, Geisinger Health System, Danville, PA
Mohammed H. Palejwala, MA, Michigan State University, East Lansing, MI
Kris Rooney, MD, Lehigh Valley Health Network, Allentown, PA
Laura Diaz, MD, Rutgers Robert Wood Johnson Medical School, New Brunswick, NJ
Indira Amato, MD, Rutgers Robert Wood Johnson Medical School, New Brunswick, NJ
Joann Carlson, MD, Rutgers Robert Wood Johnson Medical School, New Brunswick, NJ

Abstract

Primary care is an increasingly common venue in which children and adolescents present with behavioral health concerns. Unfortunately, pediatricians report that they do not feel prepared to address many of the behavioral health conditions that their patients present with such as ADHD, anxiety, depression, and suicidality. The American Academy of Pediatrics in a 2009 policy statement endorsed the need for innovations in behavioral health training within pediatric residency programs. This study describes and empirically evaluates comparative outcomes from three models of behavioral health training in pediatric residency programs: (1) training as usual (TAU; mandated 4-week developmental-behavioral pediatrics rotation), (2) enhanced didactic exposure (DE), and (3) enhanced didactic exposure plus integrated primary care (DE-IPC). P-values suggested that change in knowledge or skills after receiving training did not significantly depend on the model of training. However, effect sizes suggested that the changes over time in knowledge for the TAU group and skills for the DE-IPC group were large.

Keywords: interprofessional education; pediatrics, behavioral health, primary care, integrated care

1. Introduction

Pediatric residents and residency program directors report that training in the areas of mental and behavioral health within their programs is inadequate.[1-3] Recognizing this state of training, the American Academy of Pediatrics (AAP) in a 2009 Policy Statement[4] endorsed aspirational behavioral health competencies for all future pediatricians and cited the need for innovations in how pediatric residents are trained. Further, the policy statement identified key clinical areas—ADHD, anxiety, depression, and suicidality, as well as learner variables—knowledge and skills, in which these training innovations should focus. In a recent report,[5] the pace of improvement in developing innovative training curricula in this area appears to be slow.

The importance of training pediatricians to effectively manage common behavioral health concerns is clear as these providers are typically more accessible than specialty behavioral health providers (BHPs) such as child and adolescent psychiatrists and psychologists.[6] Additionally, specialty behavioral health services are typically covered through "carve-outs" within managed care. These carve-outs often allocate a lower reimbursement rate for non-medical services and contract with a specific panel of local providers (who may or may not treat children or adolescents). When specialty behavioral health referral options are available, there remain access issues related to transportation and location barriers as well as stigma with seeking out these specialty services. Thus, there are low follow-though rates by patients to these externally-referred services.[7,8]

Initiatives focused on integrating behavioral health services into the primary care medical home have proliferated recently.[9,10] These initiatives address behavioral healthcare access issues while improving the quality of care through service coordination and minimizing fragmentation in care. Evaluation efforts have assessed the potential for these integrated approaches to improve care[9] and show financial savings or costs offset.[11] However, little has been done to show how to maximize the capacity of physicians to provide these behavioral health services.

The placement of BHPs (e.g., psychologists, social workers) in the medical home provides one approach to this problem and further increases the need for the medical providers to be competent in identifying behavioral health concerns and understanding which evidence-based treatments exist—whether they be medical or behavioral. The ability for pediatricians to incorporate routine screening around social, emotional, and behavioral development into their well-child visits and understand the need for on-going care that can be coordinated amongst a team of physical and behavioral health providers is essential for providing care within a biopsychosocial framework.

The purpose of this paper is to describe the development of innovations in behavioral health training within pediatric residency programs. This description includes three different training curricula: (1) training as usual (TAU), (2) enhanced didactic exposure (DE), and (3) enhanced didactic exposure plus integrated primary care (DE-IPC; "exposure and practice"). Training as usual consists of the Accreditation Council for Graduate Medical Education (ACGME) mandated 4-week block rotation in developmental-behavioral pediatrics (DBP). Preliminary outcomes from the first year (out of three years) of implementation are discussed in the context of AAP's learner variables—knowledge and skills in primary care behavioral health.

2. Method

This study was approved by the local institutional review boards at each training site.

2.1 Participants

Fifty-six residents across three pediatric residency programs participated in the study. Residency program sites were located in the northeastern United States. Residents, including chief residents, in combined programs with pediatrics (e.g., Internal Medicine/Pediatrics, Pediatrics/Emergency Medicine, Pediatrics/Child and Adolescent Psychiatry) were excluded from the study. Twelve residents (out of 18) participated at site 1, 20 residents (out of 32) participated at site 2, and 24 residents (out of 32) participated at site 3. No residents declined study participation; non-participants at sites 1, 2, and 3 were missing by chance (e.g., prescheduled vacations, clinical schedules).

Table 1 on the following page reports descriptive statistics for demographic and training variables for each group at pre-training. Most residents were female (site 1- 91.7%, site 2- 90%, site 3- 75%). The percentage of residents with an MD degree (compared to DO degree) was significantly higher in the DE and DE-IPC groups relative to the TAU group. The percentage of residents who completed one or more rotations in primary care with an embedded BHP was significantly higher in the TAU and DE groups relative to the DE-IPC group. Residents in the DE-IPC group were significantly less likely to have completed a clinical rotation or clerkship in medical school that had embedded BHPs on site compared to the TAU and DE-IPC groups. Differences between groups on other demographic and training variables were not significant including whether residents had completed their ACGME mandated DBP rotation prior to completion of the training year.

Residents at all sites rotate through a primary care continuity clinic during all three years of residency. Minimum behavioral health training at each site consists of an ACGME-mandated 1-month block rotation in developmental-behavioral pediatrics (DPB) in which residents shadow and observe hospital-based BHPs in psychiatry, psychology, and social work.

2.1. Training Curricula

See Table 2 on Page XX for overview of the training model delivered at each site.

2.1.1. Site 1: Training as Usual (TAU)

Residents completed their ACGME-mandated 4-week block rotation in developmental and behavioral pediatrics (DBP), with no additional didactics in behavioral health. The DBP rotation consists of varying degrees of shadowing/targeted observations and other immersion experiences in clinics providing care for typically-developing children and those who are at risk of developmental and behavioral problems by virtue of biomedical or psychosocial factors. At this site, residents took their DBP rotation in either their 1st or 3rd years. It is important to note that residents at sites 2 and 3 also are expected to complete a DBP rotation during their residency training. The other training modalities occur in addition to this rotation.

2.1.2. Site 2: Didactics exposure (DE)

This curriculum consists of 12-hours annually of behavioral health lectures delivered by pediatric psychologists during residents' didactics time slot. The lectures emphasize evidence-based practice parameters and cover the following topics: ADHD, anxiety, depression, suicide, toileting, feeding, sleep, medically unexplained physical symptoms, behavior management,

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Table 1 Demographic and Training Information by Study Group

Variable	Training as Usual (TAU) (*n* = 12)	Didactic Exposure (DE) (*n* = 20)	Didactics + Integrated Primary Care (DE-IPC) (*n* = 24)	
Mean age, *y* (SD)	30.17 (2.29)	30.15 (2.41)	31.35 (2.29)	F=1.74, p=0.19
Males, *n* (%)	1 (8.33%)	2 (10%)	6 (25%)	χ^2=2.50, p=0.33
Hard science major, *n* (%)	10 (83.33%)	12 (60%)	21 (87.5%)	χ^2=5, p=0.11
MD degree (vs DO), *n* (%)	1 (8.33%)	12 (63.16%)	12 (50%)	χ^2=9.27, p=0.01 DE-IPC > TAU DE > TAU
Weeks in medical school on mental health rotation, *w* (SD)	4.83 (2.33)	5.75 (1.74)	5.08 (1.95)	F=1, p=0.38
Completed mental health training (outside of medical school/ residency, *n* (%)	12 (100%)	19 (95%)	20 (83.33%)	F=3.32, p=0.21
Clinical rotations in primary care in medical school, *n* (%)	6 (100%)	20 (100%)	16 (100%)	
Did those primary care practice(s) have an embedded behavioral health provider (BHP) on site?	5 (83.33%)	10 (50%)	2 (12.5%)	χ^2=10.53, p=0.004 TAU > DIPC DE > DE-IPC
What type were they? Psychologists	2 (40%)	7 (70%)	2 (100%)	χ^2=2.55, p=0.48
What type were they? Social Workers	4 (80%)	9 (90%)	1 (50%)	χ^2=1.86, p=0.66
Current residency year, *n* (%) PGY-1 PGY-2 PGY-3	5 (41.67%) 2 (16.67%) 5 (41.67%)	9 (45%) 4 (20%) 7 (35%)	13 (54.17%) 5 (20.83%) 6 (25%)	χ^2=1.17, p=0.89
End of year - Completed DBP rotation, *n* (%)	2 (33.33%)	4 (36.36%)	4 (25%)	χ^2=0.43, p=0.88

motivational interviewing, bullying, and collaborating with schools. Lecture topics were selected based on resident feedback obtained through focus groups as well as consultation with residency program faculty regarding their most pertinent training needs. Residents complete a 5-item quiz prior to and following the lectures as a self-assessment, which is not shared with training or research staff. Examples of the types of quiz questions included are those that are found on the Pediatrics Board Exam Content Outline (www.abp.org/sites/abp/files/pdf/blueprint_gp_2016.pdf) within *Domain 28: Behavioral and Mental Health Issues.* Lectures also include case vignettes to facilitate discussion. Prior to each lecture residents receive evidence-based practice parameters and other relevant resources regarding evaluation and treatment (e.g., *Pedialink, Pediatrics in Review*) which they are encouraged to read before each lecture session.

2.1.3. Site 3: Didactic Exposure plus Integrated Primary Care (DE-IPC)

This curriculum consisted of the same 12-hours annually of BH lectures that were delivered at site 2. To increase consistency and fidelity between the lectures across sites, the same BHP who delivered the lectures at site 2 also delivered the same lectures at site 3. In addition to didactic lectures, residents at this site also shared patient care with integrated BHPs (i.e., a licensed psychologist and a postdoctoral fellow in pediatric psychology) within the context of a "fully integrated" model. This included shared patient care through warm hand-offs (i.e., brief, unscheduled encounters during which the primary care physician [PCP] introduces the patient to the BHP for brief assessment and intervention for BH concerns), curbside consults (i.e., brief consultations regarding a specific patient issue or broad BH topic from the BHP to the PCP without bringing the BHP to the exam room to meet a patient) and joint appointments. BHPs also provided joint precepting to residents in conjunction with the attending PCP. The BHPs schedules were split to ensure that one of the two was always available for unscheduled warm handoffs and consults while the other provider was with their scheduled follow-up visits. Resident PCPs would either send a page to the BHP or precept directly with the BHP in conjunction with the attending PCP after identifying a BH concern with their patient. The BHP and resident PCP would briefly meet to discuss the patient's history and reason for referral before the PCP would introduce the BHP to the patient in the exam room.

In addition to warm handoffs and curbside consults, the integrated service delivery component of this curricula included live observation and performance feedback. This consisted of BHPs observing/providing feedback to residents in their management of ADHD, anxiety, depression, and/or suicidality. Feedback was structured via the completion of a checklist of components of an evaluation based on AAP/AACAP practice parameters and discussion of strengths/improvement areas. When identified in advance, the BHP would plan to be available to go into the exam room with the resident from the start of the appointment, after receiving verbal approval from patient. This was typically facilitated in advance during the morning pre-charting in the electronic medical record. BHPs would review with residents their scheduled patients for the day and identify those patients that were coming in for specific concerns related to ADHD, anxiety, depression, or suicidality. Suicidality referral concerns would often be last minute (sent from school), so these were identified and a plan was put into place to ask the family for their verbal consent that the BHP join in the appointment. Feedback consisted of both content components (i.e., adherence to evidence-based practice parameters for evaluation or treatment for a particular concern) and process components (i.e., use of interpersonal and communication skills; i.e., "common factors"). The feedback session included an opportunity for resident self-reflection and to identify areas for improvement. The BHP summarized major "take-aways" and/or future action steps with a rationale for why those steps are important for improving clinical care.

2.3 Survey Instrument

The instrument was a 29-item survey developed by study investigators (see Appendix 1). While pre-existing surveys have been developed to measure attitudes and knowledge,[12] there has not been a published instrument which measures the construct of skills in pediatric residents' service delivery to children and adolescents. Steele and colleagues[13] assessed skills in the ability of practicing PCPs (pediatricians, family physicians) to accurately diagnose behavioral health conditions in response to case vignettes. However, a limitation of this study was its narrow focus on diagnostic accuracy compared to skills in carrying out evidence-based treatment.

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Table 2 Enhanced Training Curricula for Pediatric Residents

Didactic Exposure	
Lectures	• Consists of BHPs (psychologist and postdoctoral fellow) delivering lectures on common BH concerns in primary care • 12 total lecture hours throughout year; approximately one per month • Topics included: *The Art of the Behavioral Health Referral, Behavior Management I & II, ADHD I & II, Anxiety I & II, Depression I & II, Suicide/Crisis Response I & II, Sleep, Feeding, Toileting, Child Abuse, Medical Unexplained Physical Symptoms, Common Factors I & II, Collaborating with Schools*
Readings and Quizzes	• Consists of assigning readings for residents to read before each lecture • Readings consisted of relevant practice parameters or standards of care for each topic; if formal practice parameters or standards of care did not exist, then relevant journal articles were selected for each topic; resources from the AAP's Mental Health Toolkit[1] • Pre-lecture quizzes were administered to residents for some topics (e.g., ADHD, anxiety, depression, suicidality); feedback and discussion of answers were embedded into the lectures
Case Vignettes/ Discussions	• Consists of residents reading case vignettes corresponding to each lecture topic, then describing BH concerns and identifying appropriate evaluation steps, diagnosis, and treatment plans based on information presented in the lecture • Case discussions are built into lectures and discussed as a group • Time is allotted to discuss actual cases that residents see in continuity clinic
Integrated Primary Care Exposure	
Warm Hand-offs	• Consists of on-site BHPs (pediatric psychologist and postdoctoral fellow) collaborating with residents on BH concerns through direct patient care • PCP directly introduces patient to BHP at the time of patient's medical visit • To facilitate enhanced learning, accommodations were made to residents schedules to allow them to remain in the room to observe BHPs interactions with the patient
Curbside Consults	• Consists of on-site BHPs collaborating with residents through indirect (informal discussions in resident clinic workroom) patient care • The resident informally obtains information or advice from the BHP to assist in the management of a patient with BH concerns
In-vivo Observation/ Performance Feedback	• Consists of BHPs being in the room to observe residents in their conducting evaluations for ADHD, anxiety, depression, and/or suicidality, and to provide performance feedback to the resident after the clinical encounter • Feedback sessions were standardized to include the joint completion of a checklist • Checklist components consisted of degree to which the resident adhered to evidence-based practice parameters for a given condition as well as their use of "common factors" in the patient interaction (asking open-ended questions, reflective listening, allowing the patient ample time to talk) • This discussion included time for residents to self-reflect and assess their performance as well as to identify action steps to improve future performance
Joint Precepting	• Psychologist precepts residents and psychology fellows in shared space • Psychologist also precepts the resident in conjunction with medical preceptor

1 https://www.aap.org/en-us/advocacy-and-policy/aap-health-initiatives/Mental-Health/Pages/Addressing-Mental-Health-Concerns-in-Primary-Care-A-Clinicians-Toolkit.aspx

In the survey, *Items 1-8* inquired about demographic and training variables—year in residency program, type of medical school attended, exposure to prior mental health training, future practice setting preferences. *Items 9-21* consisted of resident's self-reporting their level of knowledge of evidence-based practice parameters for specific behavioral health conditions on a 1-10 scale (1 = not at all knowledgeable; 10 = extremely knowledgeable); Items *22-29* consisted of open-ended questions asking residents to demonstrate their skills to carry out these practice parameters in evaluation and treatment for ADHD, anxiety, depression, and suicidality using clinical vignettes. Participants were asked to list all steps/considerations they would employ, in an exhaustive format, in evaluating and treating a presenting condition based explicitly on evidence-based practice parameters in their field.

Responses to the skills items were scored based on completeness and accuracy when compared with evidence-based practice parameters of the AAP[14] and the American Academy of Child and Adolescent Psychiatry.[15-17] Possible scores ranged: ADHD evaluation, 0-20; ADHD treatment, 0-10; anxiety evaluation, 0-12; anxiety treatment 0-7; depression evaluation, 0-16; depression treatment, 0-9; suicide evaluation, 0-3; suicide safety plan, 0-3. A higher point total equates to a higher degree of alignment with practice parameters (i.e., for each step/consideration a clinician would perform that is explicitly listed in the practice parameters for a given clinical condition, they would earn 1 point). After participants completed the skills items, scores were independently assigned by two pediatric psychologists using a scoring guide (see Appendix 2). Regarding inter-rater reliability, Kappa coefficients for items 22-29 ranged from 0.65 (Moderate agreement) to 0.89 (Almost perfect agreement). Items in which different scores were assigned by each rater, went to a third rater (also a pediatric psychologist) who scored the item independently as a tie-breaker.

2.4. Procedure

2.4.1. Data collection

Surveys were administered to pediatric residents at the outset (July) and end (June) of the training year. A trained research assistant administered surveys during a normally occurring didactic timeslot. Consent procedures were explained as participation in the study being voluntary and that their decision to complete the survey served as their consent. Residents were provided 45 minutes to complete the survey, although no residents at any site used the full time allotment.

2.4.2. Data analysis

The validity of the instrument used in this study was investigated by inspecting correlations between and within knowledge and skills variables at pre-training. Weighted least squares estimation was used to compute the correlations because this method is designed to handle ordinal variables. Two multilevel models (MLMs) were used to answer whether the DE and/or DE-IPC trainings improved residents' knowledge and/or skills more than TAU. The dependent variables for the MLMs were unweighted sums of the knowledge and skills scores separately. Because the scales of the skills scores differed, the skills scores were converted to the same scale before they were summed. Composite scores were used because they are theoretically more reliable than item scores. The sums were unweighted because the instrument was new and the sample size was insufficient to perform factor analyses that would help determine weights. Composite variables were not computed for observations with missing data on one or more of the individual variables that formed the composite variable.

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The formula for the MLMs was:

$$Y_{ij} = \beta_0 + \beta_1 (Time_{ij}) + \beta_2 (DE_i) + \beta_3 (DE - IPC_i) + \beta_4 (DE_i)(Time_{ij}) + \beta_5 (DE - IPC_i)(Time_{ij}) + u_{0_i} + \varepsilon_{ij}$$

Y_{ij} represents the knowledge or skills composite scores at pre- or post-training. Time was a variable that was coded as 0 for pre-training scores and 1 for post-training scores. DE was a variable that was coded as 0 for residents in the DE-IPC and TAU groups and 1 for residents in the DE group. DE-IPC was a variable that was coded as 0 for residents in the DE and TAU groups and 1 for residents in the DE-IPC group. β_1 represents the difference in the scores from pre-training to post-training for the TAU group. β_2 represents the difference in the pre-training scores between the DE and TAU groups, and β_3 represents the difference the pre-training scores between the DE-IPC and TAU groups. β_4 and β_5 indicates whether the change in scores over time was significantly greater for the DE and DE-IPC groups, respectively, relative to the TAU group. Because the residents in the DE and DE-IPC groups were expected to improve overall knowledge and skills more than residents in the TAU group, it was hypothesized that β_4 and β_5 would be positive and significant. u_{0_i} accounts for the autocorrelation in the errors of the model. Satterthwaite's approximation was used to calculate degrees of freedom for the t-tests examining the statistical significance of the parameter estimates.

Effect sizes for the change in the composite variables from pre-training to post-training were computed using Cohen's d. When computing correlation coefficients between and within variables, pairwise deletion was used to handle missing data. When estimating the multilevel models, full information maximum likelihood estimation was used to include observations with missing data at pre-training or post-training. The percentage of observations with missing data at pre- and/or post-training was 50% for the knowledge composite and 46% for the skills composite. Demographic and training variables with a rate of missingness more than 5% were completion of DBP rotation (41%), completion of one or more primary care rotations (25%), and type of BHP in primary care rotation(s) (60%).

3. Results

Table 3 shows means and standard deviations for the individual and composite knowledge and skills variables. Knowledge and skills scores for all three groups generally improved over the training year. The only composite score that did not increase over the year was the knowledge composite score for the DE group. Cohen's d for the change in the knowledge composite scores over time was 1.12 for TAU, -0.24 for DE, and 0.44 for the DE-IPC group. Cohen's d for the change in the skills composite scores over the training year was 0.11 for TAU, 0.46 for DE, and 1.01 for the DE-IPC group. Based on rules of thumb for describing the size of standardized mean differences,[18] the increase in the knowledge composite score for the TAU group and the skills composite score for the DE-IPC group could be considered as large.

Table 4 on the following page shows the parameter estimates for the multilevel model testing whether the DE and/or DE-IPC training improved residents' knowledge more than TAU. The parameters indicated that the pre-training knowledge scores of the DE-IPC group were significantly lower than the pre-training knowledge scores of the TAU group. The parameters also indicated that the knowledge scores of the TAU group did not significantly improve over time, and that change in the knowledge scores for the DE and DE-IPC groups was not significantly different from the change in the knowledge scores for the TAU group. Table 5 shows the parameter estimates for the multilevel model for the skills composite. The parameters indicated that the skills scores of the TAU group did not significantly improve over time, and that the change in the skills scores for the DE and DE-IPC groups was not significantly different from the change in skill scores for the TAU group. Although the skills scores for the DE and DE-IPC groups were not significantly different from the TAU group, they did however "trend" positively towards significance even at this preliminary

Table 3 Descriptive Statistics for Knowledge and Skills Variables by Group and Time

Outcome	TAU		DE		DE-IPC	
	Pre M (SD)	Post M (SD)	Pre M (SD)	Post M (SD)	Pre M (SD)	Post M (SD)
Knowledge Composite	0.64 (0.17)	0.83 (0.19)	0.54 (0.16)	0.50 (0.12)	0.53 (0.15)	0.58 (0.10)
Knowledge Evaluation						
ADHD	7.27 (1.85)	8.20 (1.48)	6.42 (2.19)	6.91 (2.21)	6.09 (1.81)	7.47 (1.13)
Anxiety	7.27 (1.79)	8.40 (1.82)	6.16 (1.98)	6.18 (1.40)	6.26 (1.42)	7.00 (1.20)
Depression / Suicidality	7.73 (1.74)	9.40 (0.89)	7.16 (1.38)	6.45 (1.29)	7.17 (1.80)	7.33 (1.35)
Developmental Delays	7.36 (2.06)	8.00 (2.12)	6.89 (1.66)	6.18 (1.60)	6.52 (2.21)	6.93 (1.33)
Sleep	6.73 (1.68)	7.80 (2.28)	5.84 (1.64)	5.82 (1.47)	5.09 (1.83)	5.67 (1.29)
Substance Abuse	7.09 (1.64)	8.60 (1.14)	6.63 (1.42)	6.00 (1.67)	6.35 (2.12)	6.27 (1.39)
Knowledge Treatment						
ADHD	6.36 (1.80)	7.20 (2.28)	5.21 (2.35)	5.91 (1.92)	5.52 (1.90)	6.36 (1.65)
Anxiety	6.18 (1.78)	8.00 (2.00)	4.84 (2.03)	4.82 (1.72)	5.39 (1.88)	5.86 (1.29)
Depression / Suicidality	6.27 (1.68)	8.40 (1.82)	5.21 (2.12)	4.82 (1.66)	5.91 (1.78)	6.21 (1.58)
Developmental Delay	6.36 (2.42)	8.20 (2.17)	5.74 (2.56)	4.36 (2.11)	5.22 (2.63)	6.00 (1.57)
Sleep	6.18 (1.60)	7.40 (2.79)	4.79 (1.99)	4.82 (1.89)	4.43 (2.15)	5.07 (1.73)
Substance Abuse	6.00 (1.79)	7.25 (2.50)	5.21 (2.20)	3.91 (1.58)	4.87 (2.20)	5.00 (1.18)
Skills Composite	0.35 (0.04)	0.35 (0.08)	0.35 (0.09)	0.39 (0.09)	0.36 (0.07)	0.43 (0.07)
Skills Evaluation						
ADHD	3.08 (0.90)	2.83 (0.75)	3.15 (1.18)	3.73 (1.35)	3.87 (1.63)	4.07 (1.49)
Anxiety	2.55 (1.04)	2.67 (0.82)	2.55 (1.10)	2.82 (1.17)	2.83 (1.07)	3.80 (1.01)
Depression	2.92 (1.31)	2.17 (0.41)	2.85 (1.18)	3.64 (1.03)	3.65 (1.50)	3.53 (1.55)
Suicidality	1.17 (0.39)	1.40 (0.55)	1.60 (0.60)	1.64 (0.67)	1.52 (0.51)	1.47 (0.52)
Skills Treatment						
ADHD	2.67 (0.78)	2.67 (0.82)	2.65 (0.75)	2.55 (0.93)	2.26 (0.96)	3.20 (1.26)
Anxiety	2.42 (0.51)	2.33 (0.52)	2.05 (0.76)	2.18 (0.60)	2.09 (0.85)	2.47 (0.64)
Depression	2.25 (0.45)	2.67 (0.82)	2.15 (0.59)	2.91 (0.83)	2.04 (0.56)	3.07 (1.10)
Suicidality	1.10 (0.32)	1.20 (0.45)	1.20 (0.62)	1.45 (0.52)	1.22 (0.42)	1.60 (0.63)

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Table 4 Parameters for Knowledge Multilevel Model

Effect	Estimate	SE	df	t	p
Intercept (ß0)	0.65	0.04	64.21	14.61	<0.001
Time (ß1)	0.11	0.07	38.52	1.72	0.09
DE (ß2)	-0.11	0.06	62.83	-1.99	0.05
DE-IPC (ß3)	-0.12	0.05	62.99	-2.28	0.03
TimexDE (ß4)	-0.12	0.08	35.16	-1.60	0.12
TimexDE-IPC (ß5)	-0.06	0.07	35.59	-0.74	0.47

Table 5 Parameters for Skills Multilevel Model

Effect	Estimate	SE	df	t	p
Intercept (ß0)	0.35	0.03	74.86	13.51	<0.001
Time (ß1)	0.01	0.04	42.59	0.25	0.8
DE (ß2)	0.002	0.03	74.86	0.06	0.95
DE-IPC (ß3)	0.01	0.03	74.99	0.30	0.77
TimexDE (ß4)	0.03	0.05	42.65	0.73	0.47
TimexDE-IPC (ß5)	0.06	0.05	42.49	1.34	0.19

stage of evaluation (year one of three). With two more years of program implementation and evaluation on two additional cohorts of residents increasing the sample size, it will be more likely to be able to detect significant differences.

Table 6 shows a correlation matrix of the knowledge and skills variables. Regarding correlations within knowledge variables, they ranged from 0.15 to 0.8 and the average correlation was 0.51. For correlations within skills variables, the correlations ranged from -0.1 to 0.54 and the average correlation was 0.22. Based on rules of thumb for describing the size of correlation coefficients,[18] the average correlation between knowledge variables could be considered as small and the average correlation between skills variables could be considered as large.

For correlations between knowledge and skills variables, the correlations ranged from 0.24 to 0.37 and the average correlation was 0.07. Correlations between knowledge and skills variables that measured the same construct were 0.23 for ADHD evaluation, 0.12 for ADHD treatment, 0.04 for anxiety evaluation, and 0.26 for anxiety treatment. Therefore, even when correlations between knowledge and skills variables were restricted to those that measure the same construct, the size of the correlations could be described as negligible or small.

4. Discussion

The purpose of this paper was to describe and evaluate the delivery of three different behavioral health training approaches within pediatric residency programs: (1) training as usual (TAU), (2) enhanced didactic exposure (DE), and (3) enhanced didactic exposure plus integrated primary care (DE-IPC; "exposure and practice"). These preliminary outcomes report on the first year (out of three years) of training program implementation. Outcomes from pediatric residents' participation in these training models revealed key differences in their effect on the construct of knowledge (i.e., a set of understandings related to a particular topic considered to be necessary for demonstration of a clinical skill) compared to the construct of skills (i.e., ability to use one's knowledge effectively in execution or performance). For example, without any additional training than what was mandated by ACGME, residents in the TAU group showed larger improvements on the knowledge composite than did the DE and DE-IPC groups. However, the skills composite score for the TAU group score remained the same at the end of the year, while the DE and DE-IPC groups both demonstrated score improvements. These findings pose important items for discussion.

First, the findings from the knowledge and skills assessment appear to fit a pattern that has been demonstrated in the medical education training literature pertaining to a general over-confidence by novice physicians in areas in which they receive less exposure.[19] This phenomenon has been

Table 6 Correlation Matrix of Skills and Knowledge Variables

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
1																			
2	.49																		
3	.58	.64																	
4	.60	.30	.37																
5	.62	.52	.42	.59															
6	.70	.52	.74	.59	.49														
7	.66	.38	.46	.62	.49	.52													
8	.34	.58	.34	.15	.26	.28	.59												
9	.25	.43	.58	.29	.20	.39	.66	.74											
10	.50	.25	.25	.79	.54	.47	.63	.36	.40										
11	.54	.40	.39	.67	.80	.41	.67	.51	.47	.70									
12	.48	.44	.53	.60	.52	.71	.67	.57	.67	.71	.57								
13	.23	.13	.24	.27	.01	.15	.10	.07	.21	.08	.13	-.06							
14	-.04	.04	-.16	.01	.06	-.04	.08	.05	.03	-.05	.08	-.13	.54						
15	-.11	.09	-.17	-.15	-.09	-.04	.13	.37	.15	.09	.07	.12	.25	.43					
16	-.12	.02	-.10	.02	.02	.07	-.01	.19	.06	.06	.08	.13	.02	.13	.02				
17	-.05	-.06	-.01	.16	-.11	-.18	.12	.00	.14	.04	-.01	-.13	.38	.24	-.10	.16			
18	.03	.19	.14	.01	.09	.02	.07	.26	.28	.08	.04	.16	.38	.45	.44	.08	.42		
19	.06	-.02	-.04	.10	.06	-.03	.24	.13	.14	.22	.06	.03	-.10	.05	-.10	.05	.43	.33	
20	.19	.11	-.24	.33	.21	.11	.11	.18	.04	.30	.20	.14	.29	.31	.34	.40	.05	.10	.17

Note. N = 49. 1 = Knowledge Evaluation ADHD; 2 = Knowledge Evaluation Anxiety; 3 = Knowledge Evaluation Depression / Suicidality; 4 = Knowledge Evaluation Dev. Delay; 5 = Knowledge Evaluation Sleep; 6 = Knowledge Evaluation Substance Abuse; 7 = Knowledge Treatment ADHD; 8 = Knowledge Treatment Anxiety; 9 = Knowledge Treatment Depression / Suicidality; 10 = Knowledge Treatment Dev. Delay; 11 = Knowledge Treatment Sleep; 12 = Knowledge Treatment Substance Abuse; 13 = Skills Evaluation ADHD; 14 = Skills Treatment Anxiety; 15 = Skills Evaluation Depression; 16 = Skills Suicidality Evaluation; 17 = Skills Treatment ADHD; 18 = Skills Evaluation Anxiety; 19 = Skills Treatment Depression; 20 = Skills Suicidality Treatment.

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referred to as the Dunning-Kruger effect[20] and represents a finding in which people show difficulty in recognizing their own incompetence in key areas; the idea being that the lack of exposure to a given area prohibits self-awareness of where their competencies fall short (i.e., illusory superiority bias). In pediatric residency training, behavioral health has repeatedly been deemed as an area in which residents lack training and exposure[3] and may partially explain the general overconfidence that was found in TAU residents in terms of their perceived knowledge that was found to not be congruent with their demonstrated knowledge (i.e., skills). Conversely, the DE group actually had a decrease in the knowledge composite score (0.54 to 0.50) from pre to post, suggesting a potential dynamic whereby more exposure to a topic allows residents to realize how much more there was for them to know (i.e., "the more you learn, the less you realize you know" phenomenon?).

Second, the knowledge scores were a self-report of residents' perceived knowledge of evidence-based practice parameters for clinical care. On the other hand, the skills scores were objectively measured constructs of residents actually demonstrating their knowledge of the use of evidence-based practice parameters. This self-reported knowledge versus demonstrated knowledge (or "know how" versus "show how") distinction is important for training program faculty to recognize as it suggests the need to be aware of how assessments are structured and to ensure that evaluation of residents includes measurements for the construct of skills in addition to knowledge. Training programs may likely find that developing methods to evaluate skills (or demonstrated knowledge) may be more difficult as they often require some type of competency assessment in response to an observed clinical encounter or case vignette. However, data gathered from these types of authentic assessments will likely be more useful in the process of formative assessment in identifying and addressing key behavioral health competencies which are in need of further development and support. The clinical case vignette tool used in the study was a time and resource efficient approach that allowed for more meaningful assessment of competencies in behavioral health. This case vignette approach may offer a feasible option for training programs that do not have the time or resources to have faculty conduct multiple observations of clinical encounters with patients.

Finally, this study's findings pose implications for workforce development as there is a widely acknowledged shortage of faculty within pediatric residency programs who can provide sufficient behavioral health training to residents. Hampton and colleagues[3] found that residents reported a substantial difficulty in finding faculty mentors who were able to competently model how to deliver effective behavioral healthcare. Developmental-behavioral pediatricians are commonly the faculty who are positioned to train residents in developmental, social, and behavioral aspects of care with patients. However, there is a shortage of well-trained developmental-behavioral pediatricians; thus, pediatric residency programs report difficulty in hiring these providers because they are in such demand.[21] As a result, pediatric residency programs are increasingly relying on psychologists and social workers to provide this interprofessional training and education to their residents. In fact, over 90% of pediatric residency programs in the U.S. now have behavioral health providers on their training faculty; 81.3% of programs have psychologists on faculty and 58.2% of programs have social workers on faculty.[21]

4.1. Limitations

This study's findings should be interpreted in the context of several limitations. First, a convenience sample was used from the same area of the northeastern U.S. which reduces generalizability to pediatric residents nationwide. Future research should adapt and implement these models to determine their effects within their local circumstances. Second, the survey used in this study was developed by study investigators due to the lack of preexisting validated tools. Thus, future research should explore the psychometric properties of this tool. Third, as noted earlier, the knowledge component of the survey relied on self-report which poses numerous biases and limitations when interpreting how that self-reported knowledge translates to skills. However, a contribution of the present study pertains to the recognition of the incongruence between yielded knowledge and skills scores as that presents implications for future training and evaluation efforts. Finally, although the skills construct was objectively measured by multiple raters, the task required substantial exertion of participant effort in writing out all possible steps they would carry out in providing clinical care. Thus, given the exertion required on this voluntary task, it is unclear if the obtained results are representative of their true competencies or if they are an underrepresentation due to potential fatigue.

5. Conclusion

Although the small sample size from the first out of three years of training program implementation made it difficult to detect statistically significant differences in improvements of knowledge and skills, the skills scores for the DE ("exposure") and DE-IPC ("exposure and practice") groups did "trend" positively towards significance. Increased sample sizes that will come from years two and three of this study will likely make it easier to detect statistical significance. Nevertheless, this preliminary study suggests that interprofessional training experiences have the potential to remediate the currently inadequate standard of training in behavioral health for pediatric residents. These competencies are increasingly important given the prevalence of behavioral health concerns that present in primary care and the access barriers that these children and families face in seeking out services from specialty BHPs. Thus, PCPs such as pediatricians and pediatric residents are uniquely positioned to deliver this care contingent on their possessing the appropriate training and competencies. Enhanced didactic exposure as a training delivery model appears to be a time-efficient method of learning enhancement of evidence-based behavioral health practices for pediatric residents. For programs that have the internal capacity to facilitate integrated care within the continuity training clinic, pediatric residents appear to yield an additional benefit from interprofessional collaboration with BHPs around shared patient care.

References

1. Horwitz SM, Caspary G, Storfer-Isser A, et al. Is developmental and behavioral pediatrics training related to perceived responsibility for treating mental health problems? *Acad Pediatr.* 2010;10:252-259.

2. Leigh H, Stewart D, Mallios R. Mental health and psychiatry training in primary care residency programs. Part I. who teaches, where, when, and how satisfied? *Gen Hosp Psychiatry.* 2006;28:189-194.

3. Hampton E, Richardson JE, Bostwick S, et al. The current and ideal state of mental health training: pediatric resident perspectives. *Teach Learn Med.* 2015;27:147-154.

4. American Academy of Pediatrics. Policy statement—The future of pediatrics: mental health competencies for the care of children and adolescents in primary care settings. *Pediatrics.* 2009;124:410-421.

5. McMillan JA, Land ML Jr, Leslie LK. Pediatric residency education and the behavioral and mental health crisis: a call to action. *Pediatrics.* 2017;171:1031-1032.

6. National Institute for Health Care Management Foundation. *Strategies to support the integration of mental health into pediatric primary care.* 2009. Available at: https://www.nihcm.org/pdf/PediatricMH-FINAL.pdf. Accessed July 8, 2016.

7. Cummings NA, O'Donohue W. *Understanding the behavioral health-care crisis: The promise of integrated care and diagnostic reform.* New York: Routledge. 2011.

8. Kruse GR, Rohland BM, Wu X. Factors associated with missed first appointments at a psychiatric clinic. *Psychiatric Services.* 2002;53:1173-1176.

9. Azarnow JR, Rozenman, M, Wilbin J, et al. Integrated medical-behavioral care compared with usual primary care for child and adolescent behavioral health: a meta-analysis. *Pediatrics.* 2015;169:929-937.

10. Richardson LP, McCarthy CA, Radovic A, et al. Research in the integration of behavioral health for adolescents and young adults in primary care settings: a systematic review. *J Adolesc Health.* 2017;60:261-269.

11. Reiss-Brennan B, Brunisholz KD, Dredge C, et al. Association of integrated team-based care with health care quality, utilization, and cost. *JAMA.* 2016;316:826-834.

12. Garfunkel LC, Pisani, AR, leRoux P, et al. Educating residents in behavioral health care and collaboration: comparison of conventional and integrated training models. *Acad Med.* 2011;86:174-179.

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13. Steele MM, Lochrie AS, Roberts MC. Physician identification and management of psychosocial problems in primary care. *J Clin Psychol Med Settings.* 2010:17:103-115.

14. American Academy of Pediatrics, Subcommittee on Attention-Deficit/Hyperactivity Disorder, Steering Committee on Quality Improvement and Management. ADHD: clinical practice guideline for the diagnosis, evaluation, and treatment of attention-deficit/hyperactivity disorder in children and adolescents. *Pediatrics.* 2011;128:1007-1022.

15. American Academy of Child and Adolescent Psychiatry. Practice parameter for the assessment and treatment of children and adolescents with anxiety disorders. *J Am Acad Child Adolesc.* 2007; 46:267-283.

16. American Academy of Child and Adolescent Psychiatry. Practice parameter for the assessment and treatment of children and adolescents with depressive disorders. *J Am Acad Child Adolesc.* 2007;46:1503-1526.

17. American Academy of Child and Adolescent Psychiatry. Practice parameter for the assessment and treatment of children and adolescents with suicidal behavior. *J Am Acad Child Adolesc.* 2001;40:24-51.

18. Cohen J. *Statistical power analysis for the behavioral sciences* (2nd ed.). Hillsdale, NJ: Erlbaum. 1988.

19. Hodges B, Regehr, G, Martin D. Difficulties in recognizing one's own incompetence: novice physicians who are unskilled and unaware of it. *Acad Med.* 2001;76:87-89.

20. Kruger J, Dunning D. Unskilled and unaware of it: how difficulties in recognizing one's own incompetence lead to inflated self-assessments. *J Personal Social Psychol.* 1999;77:1121-1134.

21. Shahidullah JD, Kettlewell PW, Palejwala MH. et al. Behavioral health training in pediatric residency programs: a national survey of training directors. *J Dev Behav Pediatr.* 2018;39:292-302.

Appendix 1

Pediatric Residents' Knowledge and Skills in Behavioral Health Survey

1. Full name
2. What year were you born?
3. Current residency year?
4. Sex?
5. Undergraduate major?
6. Domestic or foreign medical school?
7. Year of medical school completion?
8. Type of medical school?

9-21. Rate your level of knowledge of evidence-based practice parameters in evaluation and treatment of the following conditions in children: ADHD, anxiety, depression/suicidality, developmental delays, sleep, substance abuse (1 = not at all knowledgeable, 10 = extremely knowledgeable)

22/23. *Pediatric patient screened positive for signs or symptoms suggesting* ***ADHD***

a. Please list steps for evaluation and treatment (as many as you can list)
b. Your response should address what the evaluation should look like and diagnostic features you would look for (although you do not need to list all 18 specific symptoms)
c. If a clinical diagnosis is made, how would you approach treatment (please take into account differences, if any, between a preschool- and school-age patient)?

24/25. *Pediatric patient screened positive for signs or symptoms suggesting* **Anxiety**

a. Please list steps for evaluation and treatment (as many as you can list)
b. Your response should address what the evaluation should look like and diagnostic features you would look for.
c. If a clinical diagnosis is made, how would you approach treatment (please take into account differences, if any, between a preschool- and school-age patient)?

26/27. *Pediatric patient screened positive for signs or symptoms suggesting* **Depression**

a. Please list steps for evaluation and treatment (as many as you can list)
b. Your response should address what the evaluation should look like and diagnostic features you would look for (8 common characteristics/symptoms)
c. If a clinical diagnosis is made, how would you approach treatment (please take into account differences, if any, between mild and moderate/severe depression)? Please note: There is a separate question addressing suicidality

28/29. *Pediatric patient identified with signs or symptoms suggesting* **Suicidality**

a. Please list key risk factors (28) and list the steps in developing a suicide safety plan (29). We are looking for the quantity of accurate responses you can provide.

Appendix 2

Skills Scoring Guide

Instructions: Award one point for each of the below bullets

ADHD Evaluation

- Evaluate symptoms (do not give points for each symptom they list)?
- Screen, assess for, rule out other coexisting conditions?
- Obtain data from more than 1 setting?
- Duration of core symptoms?
- Persistence/frequency of core symptoms?
- Severity of core symptoms?
- Degree of impairment?
- Patients developmental history?
- Medical history?
- Educational history?
- Social history?
- Family history (medical, psychological, etc.)?
- Physical exam?
- Screen for sensory impairments (vision/hearing)?
- Rating scales?
- Standardized/validated rating scales (Vanderbilt/Conners, etc.)?
- Diagnostic criteria met based on DSM-5/ICD-10 criteria?
  - Has 6/9 symptoms in each category?
  - Meets age of onset criteria?
  - Causes impairment in multiple settings?

ADHD Treatment

- Did they make an age distinction (preschool vs school age)?
- Behavioral therapy?
- Stimulant medication?
- First line either behavioral therapy or combined treatment; 2nd line stimulants?

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Appendix 2

Skills Scoring Guide *(continued)*

- School-based supports (DRC, consultation with teacher)?
- 504 plan if no academic impairment; IEP if academic impairment?
- Establish target behavioral goals?
- Follow-up evaluation/monitoring?
- Bi-weekly to monthly visits until optimal response is achieved?
- Subsequent visits occur every 3 to 6 months as deemed appropriate?

Anxiety Evaluation

- Evaluate symptoms?
- Screen, assess for, rule out other coexisting conditions?
- Rule out physical health conditions that may mimic anxiety symptoms (hyperthyroidism, caffeinism, migraine, asthma, seizure disorders, and lead intoxication)?
- Avoidance level?
- Distress level (SUDS, etc.)?
- Patients' developmental/psychological history?
- Patients medical history?
- Family medical/psychological history?
- Is anxiety/fears/worries developmentally appropriate?
- Diagnostic criteria met based on DSM-5/ICD-10 criteria?
  - Must have impairment present?
  - Determine which anxiety disorder is present?

Anxiety Treatment

- Provide education to the child/family of child about the anxiety disorder?
- Behavioral therapy?
- Behavioral therapy as first line?
- CBT, exposure based, or desensitization?
- Psychotropic medications?
- Psychotropic medication if moderate to severe severity?
- Consider school-based interventions (accommodations, teacher consultation, etc.)?
- Follow-up evaluation and monitoring?

Depression Evaluation

- Evaluate symptoms (if they simply write "SIGECAPS", they get 1 point; if they list them out, they can get extra points depending on how many they list)?
- SIGECAPS (1-3 = 1; 4-6 = 2; all = 3)
- Screen, assess for, rule out other coexisting conditions?
- Presence of ongoing or past exposure to negative event?
- Environment is which low moods occur?
- Social/family support?
- Developmental/psychiatric history?
- Social history?
- Educational history?
- Medical history
- Family/family psychiatric history?
- Diagnostic criteria met based on DSM-5/ICD-10 criteria?
  - Must have impairment present?
  - Impairment in at least 5 domains of SIGECAPS?
  - Occurs in same 2-week period?

Depression Treatment

- Treatment includes acute and continuation/maintenance phase?
- Active support and monitoring?
- Behavioral therapy?
- Do they list a specific type (IPT, CBT, DBT, psychoanalytic, ACT, etc.)?
- Psychotropic medication?
- Mild severity- active support monitoring and/or behavioral therapy; moderate to severe severity = medication?
- Psychiatric consult for medication or refer to child/adolescent psychiatric if deemed appropriate?
- Follow-up monitoring/evaluation should occur?
- To consolidate the response to the acute treatment and avoid relapse, treatment should be continued for 6-12 months?

Suicide Risk Factors

- 1-5 =1
- 6-10 = 2
- 11 + = 3

Suicide Safety Planning

- 1-3 = 1
- 4-6 = 2
- 7 + = 3