

# Evaluating the *Keystones of Development* - An Online Curriculum for Residents to Promote Positive Parenting in Primary Care

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Conflict of Interest: All authors have indicated they have no potential conflicts of interest to disclose.

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Received for publication August 19, 2020; accepted June 7, 2021.

## ABSTRACT

**OBJECTIVE:** This pilot outcome evaluation assesses the effectiveness of an online curriculum, the *Keystones of Development*, aimed at improving residents' knowledge, attitudes, and reported behaviors around promoting positive parenting and childhood development in well-child visits.

**METHODS:** We used an explanatory mixed-methods approach, including a single-arm pre-posttest of intervention effects on self-reported behavioral outcomes (discussing, modeling, and praising) and secondary outcomes (knowledge, perceived barriers, attitudes, and self-efficacy). Following this, a subset of residents participated in in-depth interviews to describe participant responses to the intervention.

**RESULTS:** The study was conducted at 8 pediatric residency programs across the United States with 67 pediatric residents (mean age = 29; 79% female; 57% PGY1). Within one month postintervention, there was a statistically significant increase in the behaviors that promote positive parenting: discussing ( $P < .01$ ;  $d = 0.73$ ) and modeling ( $P < .01$ ;  $d = 0.61$ ) but not praising ( $P = .05$ ;  $d = 0.3$ ). Significant changes in the secondary outcomes: knowledge ( $P < .01$ ), perceived barriers,

( $P < .01$ ), and retrospective self-efficacy ( $P < .01$ ) were seen. Interviews revealed that integration of curriculum content into clinical practice was due to the relevance of the material to primary care and the modeling of how to apply in the clinical setting. Curriculum format, content, and clinical application helped participants weave recommendations into the well-child visit.

**CONCLUSIONS:** In this study, we demonstrated that the online curriculum, *Keystones of Development*, increased resident behaviors, knowledge, and self-efficacy, and decreased perceived barriers to promote parenting behaviors associated with improved child development outcomes in well-child visits. These findings were observed across participants demonstrating equal success regardless of demographic characteristics or study site.

**KEYWORDS:** early child development; *keystones of development*; pediatric resident education; positive parenting; online curriculum

ACADEMIC PEDIATRICS 2021;XXX:1–9

## WHAT'S NEW

The *Keystones of Development* curriculum trained residents to promote positive parenting and childhood development within well-child visits. This online curriculum meets a need for self-directed, socially-distant learning and is scalable to educate pediatric residents nationally in promoting early child development.

PARENT-CHILD INTERACTIONS IN the early years are critical in shaping children's developmental trajectory and lifecourse.<sup>1</sup> Specific parenting behaviors are associated with improved executive function skills,<sup>2</sup> social-emotional adjustment,<sup>3</sup> early language,<sup>4</sup> literacy,<sup>5</sup> and numeracy.<sup>6</sup> Studies have shown these behaviors can even impact future educational attainment<sup>7</sup> and physical

health.<sup>8</sup> Moreover, children who experience limited positive parent-child interactions and less stimulating environments are at increased risk for language, cognitive, and social-emotional deficits which can be seen as early as 18 months of age and can increase over time.<sup>9,10</sup>

Evidence-based programs, such as the Nurse-Family Partnership, have demonstrated success in improving parenting skills.<sup>11</sup> However, many programs are implemented in early education centers or through home visits,<sup>12</sup> and consequently reach a limited number of families, with financial, logistical, and staffing challenges preventing widespread dissemination.<sup>13</sup> In contrast, the primary care setting offers 14 recommended preventive visits in the first 5 years, providing an already-existing opportunity to reach families. Programs such as Video Interaction Project (VIP),<sup>14</sup> Triple P,<sup>15</sup> and Healthy

Steps<sup>16</sup> have successfully used the primary care setting to strengthen parenting behaviors and improve child development. However, they are limited to selected families and require additional cost, coordination and resources for adoption and widespread use.<sup>13,17,18</sup>

Research shows primary care physicians are viewed by parents as a credible source of parenting advice, and that families expect to receive this information during well-child visits.<sup>19</sup> Yet, many parents report not receiving guidance on parenting from their pediatrician.<sup>20,21</sup> Although the American Academy of Pediatrics (AAP) recommends that anticipatory guidance include support for early social, emotional, and cognitive development in preventive visits,<sup>22</sup> only 10% of residency program leaders report they train their residents “very well” about parenting behaviors that promote development.<sup>23</sup> A needs assessment of pediatric residency leadership showed that the absence of curricula is the most frequently cited barrier, with lack of faculty expertise, cost, and resident time being other significant obstacles.<sup>23</sup> Without adequate training in residency, pediatricians may be less likely to incorporate promoting positive parenting behaviors into their clinical practice. A free, online, asynchronous curriculum to support early childhood development may provide a solution to address existing barriers.

The *Keystones of Development* online curriculum was thus created by the Mount Sinai Parenting Center and Bezos Family Foundation to give pediatric residents the knowledge and skills necessary to promote early child development and strong parent-child relationships. This mixed methods pilot study sought to evaluate the impact of the curriculum on residents’ self-reported behaviors as well as their knowledge, attitudes, perceived barriers, and self-confidence. Data from this study will be used to inform curriculum improvement and national dissemination.

## METHODS

### CURRICULUM OVERVIEW

The *Keystones of Development* curriculum uses 6 “keystone concepts” (attachment, autonomy, self-regulation, perspective taking, problem solving, and academic knowledge) that are predictive of social-emotional-cognitive well-being in children. These ‘keystone concepts’ provide a foundation to teach pediatric residents ways to promote early childhood development and support the strengthening of parent-child relationships within the context of well-child visits. The self-directed curriculum design draws from Malcolm Knowles’ Theory on Andragogy for adult learners and emphasizes the relevance and application of a topic that is of immediate practical value to their clinical work.<sup>24</sup> The curriculum aligns with Bandura’s Social Cognitive Theory, which posits that behavior change can be facilitated by observation of desired behaviors and positive reinforcement,<sup>25,26</sup> by encouraging providers to promote positive parenting practices by modeling behaviors and praising caregivers when the behaviors are demonstrated.

The curriculum consists of 2 courses made up of a total of 13 modules, each 10 to 20 minutes in length. Residents were advised to watch 1 to 2 modules a day over a two week period, although they were free to engage with the curriculum as desired and could watch alone or in groups. Course 1, the “Exam Room,” demonstrates how residents can integrate the science of early childhood development into well visits through discussing, modeling, and praising positive parenting behaviors with patients and caregivers. Course 2, the “Classroom,” provides an introduction to the science behind the ‘keystone concepts’ through interviews with leading researchers in the field of developmental psychology and neuroscience and discussion of seminal studies in early childhood development.

### STUDY DESIGN

This pilot outcomes evaluation used a mixed methods approach. Pre-posttest quantitative survey data were collected to assess changes in resident self-reported behaviors, knowledge, attitudes, barriers, and self-confidence. This was followed by semistructured interviews with a subset of participants to gain deeper insight into measured changes.

### PARTICIPATION

Residents from 8 pediatric programs across the country were assigned the *Keystones of Development* curriculum as part of their required training. The residency programs included the Icahn School of Medicine at Mount Sinai, where the curriculum was developed, and 7 additional sites across the country who had learned about the curriculum through outreach at national conferences and expressed interest in being part of the pilot study. Residency programs were eligible to participate if they could identify a suitable time during training for residents to complete the curriculum and if they had a faculty site champion willing to oversee curriculum logistics. Site champions participated in several check-ins by phone and video conference with the Mount Sinai Parenting Center. All residents enrolled in the curriculum were invited to participate in the quantitative study; those consenting to participate were asked if they could be contacted for follow up interviews. Residents consenting to be interviewed were contacted by a research assistant after completing the curriculum and were interviewed 1 to 3 months after curriculum completion; care was taken to ensure representation across sites and residency years. This study was conducted from August 2018 through June 2019. The study was deemed exempt by the Icahn School of Medicine at Mount Sinai Institutional Review Board.

## INSTRUMENTS, DATA COLLECTION, AND ANALYSIS

### QUANTITATIVE STUDY

#### PRETEST-POSTTEST SURVEY

The research team developed a survey that measured the self-reported frequency of three behavioral outcomes

related to promoting positive parenting behaviors: 1) Discuss—discussing positive parenting strategies, 2) Model—modeling positive interactions with the child for caregivers to observe, and 3) Praise—praising caregivers when they positively engage with their children and acknowledge children's positive behavior. Other outcomes assessed were change in resident knowledge, perceived barriers, attitudes, and retrospective self-efficacy. Demographic variables included: age, gender, race/ethnicity, having children, residency year, residency track, specialty planning to pursue, and relevant rotations completed in advance of residents' current rotation. The survey instrument was developed using a modified Delphi approach and was reviewed by a 10-person expert panel which included pediatricians, a developmental psychologist, and medical education specialists for content validity. There were two cognitive testing sessions with pediatric residents for face validity to ensure residents' understanding of survey questions as intended.

The instrument assessed whether residents discussed (10 items), modeled (4 items), and praised (3 items) age-specific behaviors in their well-child visits using the stem "Which of the following (if any) did you do during your last well-child visit with the caregiver and/or child?" providing dichotomous (yes/no) choice options. They were asked to select their last well child visit that did not focus on a serious medical or psychosocial issue. Perceived barriers, attitudes, and retrospective self-efficacy were assessed on a 5-point Likert scale (1 = strongly disagree, 5 = strongly agree) and knowledge was assessed using 10 multiple choice questions related to specific content highlighted in the curriculum. Prior to starting the curriculum, consenting participants received the 41-item pretest. In order to give participants time to integrate the curricular content into well-child visits, the 46-item posttest was distributed 2 weeks after completion of the curriculum.

#### DATA ANALYSIS

Pretest and posttest data were analyzed using the statistical software R. We characterized our study population using descriptive statistics and used paired *t* tests to evaluate baseline to postintervention outcome changes. We used Cohen's *d* to calculate effect size. To compare mean differences in change score for study outcomes by demographic variables, we used *t* tests and one-way ANOVAs with a posthoc analysis when significant differences were seen.

#### QUALITATIVE STUDY

##### INTERVIEW PROTOCOL

The lead researcher and an experienced qualitative researcher created the interview script including five open-ended questions, probes, follow-up questions, and member checks. Questions sought to understand how residents applied what they learned from the curriculum, how residents engaged with the curriculum, and residents' overall impression of the curriculum. The interview guide was pilot-tested and adapted iteratively. Interviews were

led by an experienced qualitative researcher or a trained research assistant using open-ended probes and techniques to minimize social desirability. Participants were interviewed until data saturation was achieved.

#### DATA ANALYSIS

All interviews were transcribed verbatim by an outside source and reviewed for accuracy with the interviewer. The research team reviewed transcripts beginning with an open-coding process using line-by-line coding to identify themes, patterns of words, perceptions, and ideas which were then classified into categories to create an initial codebook of themes including a priori themes based on the target outcomes and emergent themes. Three independent coders met to review the coding scheme after reviewing three transcripts together and thereafter two members of the research team met to come to consensus on their codes after coding the remaining 12 transcripts. Discrepancies between coding pairs were resolved through discussion. Each interview transcript was imported into the qualitative software Dedoose and themes were extracted from the imported text files and coded in Dedoose.

## RESULTS

#### QUANTITATIVE STUDY

A total of 150 residents were invited to take the curriculum. One hundred and thirty-five consented to participate in the study and completed the pretest, and 67 participants (50% response rate) completed their posttest surveys. There were no statistically significant differences in demographic variables between study completers and noncompleters (Supplemental Table 1). Demographic characteristics of study participants are presented in Table 1.

#### PRE-POST SURVEYS

The mean age of participants was 29 years  $\pm$  2.2, 79% (*n* = 53) were female, and 57% (*n* = 38) were PGY1. Pre-post findings are presented in Table 2. There was a significant increase in the quantity of "Discussing" and "Modeling" from pre to posttest with the proportion of items discussed increasing from 0.37 to 0.56 ( $P < .01$ ; *d* = 0.73) and the proportion of items modeled increasing from 0.50 to 0.68 ( $P < .01$ ; *d* = 0.61). Marginally significant changes, 0.67 to 0.75 ( $P = .05$ ; *d* = 0.30) were seen for change in quantity of praising.

A statistically significant improvement in knowledge (premean = 61%; postmean = 75%;  $P < .01$ ; *d* = 0.68) and self-efficacy (premean = 3.15, postmean = 4.19;  $P < .01$ ; *d* = 1.55), as well as a decrease in perceived barriers (premean = 2.65 postmean = 2.12;  $P < .01$ ; *d* = 1.01) occurred from pre- to posttest. No statistically significant change was observed for attitudes (premean = 4.35, postmean = 4.43;  $P = .35$ ; *d* = 0.12). Cronbach alpha coefficient values were calculated for self-efficacy (0.96) and perceived barrier scales (0.69) to measure internal consistency; *n*'s for behavior scales were not high enough to calculate

**Table 1.** Descriptive Characteristics of Study Participants

Variable	Pre/Post Survey n = 67	Interviews n = 15
Age in year, mean (±SD)	28.8 ± 2.2	30 ± 2.7
Gender n(%)		
Female	53(79%)	11(73%)
Race/Ethnicity n(%)		
White	44(65%)	9(60%)
Asian	12(18%)	2(13%)
Black	3(4%)	1(7%)
Mixed	2(3%)	2(13%)
Hispanic	2(3%)	—
Decline to answer	4(6%)	1(7%)
Has children n(%)		
No	58(86%)	12(80%)
Site (State) n(%)		
Mount Sinai (NY)	18(27%)	5(33%)
Elmhurst Hospital (NY)	6(9%)	2(13%)
Mass General (MA)	9(13%)	1(7%)
Children's Hospital LA (CA)	4(6%)	2(13%)
Tulane Medical Center (LA)	11(16%)	2 (13%)
UTSW (TX)	8(12%)	—
University of Utah (UT)	9(13%)	3(20%)
University of Mississippi (MS)	2(3%)	—
Residency year n (%)		
PGY1	38(57%)	6(40%)
PGY2	17(26%)	4(27%)
PGY3	10(15%)	5(33%)
Other†	1(2%)	—
Residency track n (%)		
General pediatrics	50(75%)	14(93%)
Medicine pediatrics	5(7%)	—
Other‡	12(18%)	1(7%)
Plan to pursue by group n (%)		
Primary care	25(38%)	7(47%)
Subspecialty	30(45%)	7(47%)
Other§	9(15%)	1(6%)

†“Other” category comprised of: PGY5 and Fellows.

‡“Other” category comprised of: Triple Boards – Peds/Psych/Child, Psych, Research Track, Pediatrics Genetics, Prelim Year Track, Pediatrics-Neurology, Primary Care Track.

§“Other” category comprised of: Developmental Pediatrics, Nonclinical.

internal consistency or not appropriate for other measures (attitudes = 1 item; knowledge).

Item-by-item analysis revealed statistically significant changes in three of the five perceived barriers within the

scale (Table 3). The perception that participants did not have enough knowledge to counsel on positive parenting practices was the greatest baseline barrier with the largest change from pre-to-posttest (premean = 3.33, postmean = 2.09;  $P < .01$ ;  $d = 1.20$ ). Subgroup analysis revealed statistically significant differences in this perceived barrier by residency year, such that PGY1 residents perceived knowledge as a greater barrier than PGY2 or PGY3 respectively ( $f = 3.22, 3, 61, P < .05$ ) at pretest. The concern for sounding judgmental when giving parenting advice ( $P < .01, d = 60$ ) and the perception that the evidence is not strong enough to include counseling on positive parenting in clinical practice ( $P < .01, d = 0.40$ ) also changed significantly with moderate effect sizes. The perception that there is not enough time to counsel on positive parenting behaviors and that caregivers will not respect parenting advice coming from a pediatric resident did not change significantly.

There were no differences in overall knowledge, attitudes, perceived barriers, self-efficacy, or behavioral outcomes by demographic variables. Statistically significant differences between participants planning to pursue primary care versus a subspecialty were seen in the change in frequency of praising ( $f_{2,42} = 4.1, P < .05$ ) (Table 4).

**QUALITATIVE STUDY**

*IN-DEPTH INTERVIEWS*

Fifteen participants (3–6 from each residency year, representing 6 of 8 pilot sites that started at the same time) were interviewed (73% female; mean age  $30 \pm 2.7$ ; 40% PGY1; 27% PGY2; 33% PGY3). See Table 5 for themes and illustrative quotes from the semistructured interviews. Participants were asked 3 main questions: What is your overall impression of the curriculum? In which ways, if any, did you apply what you learned from the curriculum? What are some reasons you have not applied what you learned?

Four major themes emerged: Relevance of curriculum content to clinical practice, change in clinical interactions as a result of the curriculum, and facilitators and barriers to incorporating the curriculum content into daily practice.

**Table 2.** Outcomes for Participants from Pre- to Posttest

Measure	Mean (SD)		Effect Size Cohen's d	Statistic t (df)	P value	Internal Consistency Cronbach $\alpha$
	Pre	Post				
Behavioral outcomes						
Discuss (10 items)	0.37(±0.23)	0.56(±0.23)	0.73	4.92(45)	$P < .01$	—
Model (4 items)	0.50 (±0.27)	0.68 (±0.28)	0.61	4.12(45)	$P < .01$	—
Praise (3 items)	0.67(±0.32)	0.75 (± 0.33)	0.3	2.04(45)	$P = .05$	—
Secondary outcomes						
Attitudes (1 item)	4.35(±0.59)	4.43(±0.68)	0.12	0.95(64)	$P = .35$	—
Perceived barriers (5 items)	2.65(±0.53)	2.12(±0.55)	1.01	-8.14(64)	$P < .01$	0.69
Knowledge (10 items)	0.61(±.18)	0.76(±.19)	0.68	5.49(64)	$P < .01$	—
Retrospective self-efficacy (13 items)	3.15(±0.65)	4.19(±0.36)	1.55	12.30(62)	$P < .01$	0.96

Note: Behavioral outcomes were assessed as a proportion of items that were discussed, modeled, or praised using dichotomous choice options (yes/no). Attitudes, perceived barriers, and retrospective self-efficacy were measured using a 5-point Likert scale (1 = strongly disagree, 5 = strongly agree) and knowledge was assessed as the proportion of correct answers.



**Table 3.** Change in Perceived Barrier by Item

ITEM	Mean (SD)		Effect Size Cohen's d	Statistic t (df)	P value
	Pre	Post			
Not enough time during visit	2.76(±0.95)	2.52(±0.87)	0.25	-2.04(63)	<i>P</i> = .05
Caregivers won't respect parenting advice coming from me	2.18 (±0.88)	2.05 (±0.78)	0.12	-0.98(63)	<i>P</i> = .33
I worry I will sound judgmental	2.85(±1.06)	2.23 (±0.81)	0.60	-4.82(63)	<i>P</i> < .01
I am not convinced that the evidence is strong	2.11 (±0.81)	1.71 (±0.84)	0.45	-3.66(63)	<i>P</i> < .01
I do not have enough knowledge	3.33(±1.00)	2.09(±0.70)	1.20	-9.69(63)	<i>P</i> < .01

Note: Perceived barriers were measured using a 5-point Likert scale (1 = strongly disagree, 5 = strongly agree).

Theme 1: Clinical Relevance of Curriculum. Participants felt the curricular content was highly relevant to clinical practice and addressed many parental concerns that arise in well-child visits such as discipline, potty

training, and picky eating. Residents reported that the curriculum gave them both knowledge and specific strategies to assist caregivers in managing these issues.

**Table 4.** Differences in Mean Change Score for Behavioral Outcomes by Demographic Groups

Variable	Discuss t-statistic (df)	Model t-statistic (df)	Praise t-statistic (df)
Gender			
Female	-1.49(11.2)	0.75(27.64)	-0.7(10.76)
Male			
Children			
No children			
Children	-1.22(15.79)	0.38(6.84)	-1.11(7.33)
Rotation during study			
Behavior and development	0.34(22.34)	-0.38(7.92)	.14(7.95)
Other <sup>†</sup>			
	f-statistic (df)	f-statistic (df)	f-statistic (df)
Site			
Mount Sinai (NY)	0.81(7, 38)	1.22 (7, 38)	0.53(7, 38)
Elmhurst Hospital (NY)			
Mass General (MA)			
Children's Hospital LA (CA)			
Tulane Medical Center (LA)			
UTSW (TX)			
University of Utah (UT)			
University of Mississippi (MS)			
Race/Ethnicity			
White	0.36(4, 37)	0.27(4, 37)	1.24(4, 37)
Asian			
Black			
Mixed			
Hispanic			
Residency year			
PGY1	0.92(2, 41)	0.34(2, 41)	2.52(2, 41)
PGY2			
PGY3			
Other <sup>‡</sup>			
Residency Track n(%)			
General pediatrics	1.13(2, 43)	1.81(2, 43)	0.66(2, 43)
Medicine pediatrics			
Other <sup>§</sup>			
Plan to pursue by group			
Primary care(*)	0.5(2, 42)	0.16(2, 42)	4.1(2, 42)
Subspecialty(*)			
Other <sup>¶</sup>			

\**P* < .05 for statistically significant differences between groups.

<sup>†</sup>“Other” category comprised of: Child & Adolescent Psychology and Ambulatory.

<sup>‡</sup>“Other” category comprised of: PGY5 and Fellows.

<sup>§</sup>“Other” category comprised of: Triple Boards – Peds/Psych/Child, Psych, Research Track, Pediatrics Genetics, Prelim Year Track, Pediatrics-Neurology, Primary Care Track.

<sup>¶</sup>“Other” category comprised of: Developmental Pediatrics, Nonclinical.

**Table 5.** Main Themes and Illustrative Quotes

Theme	Illustrative Text
Clinical Relevance of Curriculum	<p>"I've found over and over again that parents are looking for strategies for behavioral modification and that's when I really utilize the curriculum to talk them through strategies."</p> <p>"I had one mom who came in who was concerned about their kid having difficulty with potty training. I was able to use that whole part of the lesson in terms of talking to the parents about what's the best way to potty train their kids, which I thought was great."</p>
Changes in Practice as a Result of the Curriculum	
Use of Discussion to Promote Positive Parenting	<p>"Sportscasting was something I really was able to share with parents [to do] during diaper changes, especially given how frequently diapers are changed to really optimize that time instead of just doing it really fast and then moving on."</p> <p>"I definitely do a lot of work with my newborn visits, in terms of talking to the parents about ways you can do you like sportscasting and parentese, and definitely applying a lot of the curriculum that I hadn't known before in terms of like modeling, "Yes, even when you're changing your baby's diaper, this is a great time to be talking to your baby about what you're doing, and being able to fill their head with words."</p>
Use of Modeling to Promote Positive Parenting	<p>"I've been modeling how I can give choice to my patients [...]asking them do you want me to listen to your heart first or your lungs? [...]giving them the autonomy and power and then point out to the parents you know, "This is an example of allowing your kids to have choice."</p> <p>"I talk to the kids while I do the physical exam in a normal voice not just like, goo goo gaga."</p> <p>"Rather than sitting at the computer and then doing my exam separate, I do my exam and interact with the kids more from the beginning and I'm able to demonstrate some of the things that [I then] talk about with families."</p>
Use of Praise to Promote Positive Parenting	<p>"In clinic visits [I've been more likely] to tell parents that they're doing a really good job, and that a lot of the developmental milestones their children have achieved is because of things they're doing with them."</p>
Facilitators to Incorporation of Curricular Content into Clinical Practice	<p>"I compliment parent[s] when they [are] doing something right and provide reassurance."</p> <p>"Watching those examples gave me better vocabulary to explain it to parents."</p> <p>"There were names to things that weren't being taught, like sportscasting. For me to actually have a name to call it to tell parents [helped], here are things you can say to promote the behaviors you want."</p> <p>"I think one thing that I really appreciate with the curriculum was showing you how you can actually incorporate the content with the parents."</p> <p>"Being able to learn about the science was helpful for me to at least ground some of these strategies, where they actually came from... made me feel a little bit more comfortable when I was recommending these strategies to parents to know that there is some evidence to back it up and things like that."</p> <p>"I enjoyed especially the evidence-based stuff as someone who is not a parent and giving parenting advice. I feel a little bit like a hypocrite at times, and so that sort of evidence that you're talking about was really nice to hear and helpful to learn from."</p>
Barriers to Incorporation of Curricular Content into Practice	
Not Enough Time	<p>"Often with the clinic visits, the number one limitation is time, so I always try to get in as much as I can."</p>
Medically Complex Patients	<p>"...there are time issues especially if they [patients] have like multiple health issues, then it becomes difficult to apply all of those [positive parenting practices] in one health visit."</p>
Non-receptive Caregivers	<p>"Sometimes parents are just set in what they choose to do and as much as you try to preach it, you know it's not going to be received well. So that sometimes is a hindering factor... a hesitation for me."</p>

Theme 2: Change in Practice as a Result of the Curriculum. Participants reported changes in their interaction with parents as a result of the curriculum, particularly using discussion, modeling, and praise to promote positive parenting behaviors. This discuss, model, praise framework was felt to be an effective scaffold for structuring the visit. The use of sportscasting (talking about what you are doing moment by moment), parentese (a high pitched, singsong voice with real words and exaggerated expression), talking directly to young children, giving choices in older children, and praising observed positive behaviors in the visits were some examples reported. Participants noted that modeling back and forth interactions with

patients reduced the need for didactic explanation and facilitated patient and family rapport.

Theme 3: Facilitators of Incorporation of the Curriculum Content into Clinical Practice. Participants reported that the curriculum gave them foundational knowledge about positive parenting practices and early child development that enabled them to communicate more effectively and confidently with parents. They specifically noted that understanding the science and evidence behind parenting strategies was important for their counseling. The animated demonstrations of provider-family interactions gave residents a template they could use to facilitate conversations with parents.

Theme 4: Barriers to Incorporating into Clinical Practice. Participants cited not having enough time in the context of a busy clinic schedule as a barrier. This was particularly noted by residents when dealing with patients who were medically complex and required prioritizing medical issues over behavior and development. Language and cultural issues were also cited as barriers to implementing the curriculum. Even with the use of an interpreter, participants felt it could be difficult to discuss content in a sensitive manner. Some also reported worrying about sounding judgmental or condescending especially in regard to the topic of discipline. Another barrier noted was dealing with more experienced parents who may be less receptive to parenting support from residents. Subgroup analysis demonstrated that nonparent residents also struggled with feelings that they lack authenticity in giving parenting support. However, many nonparent participants reported that the knowledge they acquired from the curriculum mitigated this barrier and helped root their advice in science.

## DISCUSSION

This pilot study demonstrated that the *Keystones of Development* online curriculum increased residents' behavior, knowledge, and self-efficacy and decreased barriers to promoting positive parenting in well-child visits.

### BEHAVIORAL OUTCOMES

Residents increased the quantity of discussing and modeling behaviors in well-child visits after this curriculum. The effect size, as measured by Cohen's *d*, was large for discussing and moderate for modeling, suggesting these changes were likely educationally significant. While a statistically significant change in praising was not seen, there was a small effect size in the desired direction. Findings from in-depth interviews triangulated these quantitative behavioral changes and gave insight into how behavioral change may have been mediated. Participants reported that the content was highly relevant to their clinical practice and the curriculum provided strategies to incorporate this information into visits. These findings are supported by other research and align with Knowles' Theory of Andragogy which recognizes that provider adoption of new practices is related to perceptions of clinical relevance.<sup>27,28</sup> Additionally, caregivers' common concerns related to content discussed in the curriculum, such as potty training, temper tantrums, picky eating etc., may have increased the relevance of curricular material and provided increased opportunities to easily integrate positive parenting into practice.

The curriculum facilitated the application of knowledge by providing specific words and actions that residents could use in clinical encounters. This type of training was especially helpful in outpatient primary care when participants have few opportunities to shadow other providers. Furthermore, participants valued the opportunity to model behaviors that promote development, rather than being limited to simply discussing information. Overall,

residents reported that modeling positive parenting practices in tandem with conversations with caregivers made their advice seem less judgmental and saved time. Other research similarly demonstrates a support for modeling parenting practices when working with families<sup>29,30</sup> and finds that these demonstrations were also more engaging for caregivers.<sup>29</sup>

### PERCEIVED BARRIERS

Prior to taking the curriculum, pediatric residents reported the greatest barrier to promoting positive parenting behaviors was a lack of knowledge, which is consistent with other research demonstrating that residents do not feel well-trained on this topic.<sup>31</sup> At posttest, this barrier improved the most irrespective of residency year, implying that the knowledge incorporated from this curriculum may not otherwise be gained from traditional three-year residency training. Knowledge about positive parenting practices also objectively improved after taking the curriculum, as measured by improved participant scores on content-related questions. Residents noted in interviews that a greater understanding of the evidence and broader knowledge behind positive parenting behaviors facilitated the promotion of the behaviors and provided techniques for integration into clinical practice.

While time was cited as a barrier to discussing parenting in visits, marginally significant improvements were seen at posttest. Interviews revealed that time was primarily an issue when caring for medically complex patients, which may indicate that strategies suggested in the curriculum, such as weaving anticipatory guidance throughout the visit, helped to alleviate general concerns with time except when medical care was complicated.

Another barrier to counseling on positive parenting practices that persisted at posttest was the perception that caregivers would not respect parenting support from a pediatric resident. Interview subgroup analysis showed that this perception was especially apparent for nonparent participants.

### SELF-EFFICACY

Bandura's social cognitive theory posits that self-efficacy is a strong predictor of behavior change. In this study, qualitative findings supported the significant quantitative changes seen in self-efficacy and behavior. In interviews, residents reported that the curriculum's highly relevant information and demonstration of specific strategies improved their perceived capabilities to deliver this content to families. However, this study was underpowered to conduct mediation analysis to verify this association quantitatively. Other research demonstrates that self-efficacy is an important driver of behavior change especially for residents<sup>32</sup> with limited clinical experience in promoting positive parenting behaviors.<sup>18</sup>

Strengths and Limitations. Strengths of this study include participation from eight geographically-diverse residency programs. In addition, the study sample was representative (in age, gender, race/ethnicity) of pediatric

residents nationally.<sup>33,34</sup> Outcomes did not vary based on demographic characteristics of the participants or residency site, implying that the curriculum may be generalizable to a larger population and suitable for widespread dissemination. With the recent COVID-19 pandemic and the need to modify medical education to accommodate remote, asynchronous learning, an online curriculum is a particularly effective means of educating learners.<sup>35</sup>

A limitation of this study was the fact that behavioral change was measured by resident self-report, which may have introduced social desirability and recall bias. However, in-depth interviews triangulated the quantitative findings. Posttest surveys were also administered within 14 days of curriculum completion to minimize recall bias. Given that behavioral questions were specific to the age of the patient, it is possible that residents' ability to counsel would vary based on age of the patients they saw during this period of time. In addition, information about length of visit, use of translator, and data about parent and child ethnic and cultural background and their familiarity with the provider were not collected, all of which may impact the type of counseling provided. Furthermore, assessing residents only 14 days after taking the curriculum precludes us from making conclusions about the longer-term effects of this curriculum on resident behavior. Future studies will include a larger sample size, a longer study period, and direct observation of behavior. These changes will allow for better subgroup analysis of data, will enable us to detect persistence of behavioral changes over time, and will correlate reported behaviors with observed behaviors. While obtaining parents' perspectives and child outcomes were beyond the scope of this study, future research will survey parents to obtain their perspectives on counseling delivered and child outcomes.

## CONCLUSIONS

The results from this pilot study suggest the *Keystones of Development* online curriculum can be an effective tool to train residents on integrating the promotion of positive parenting behaviors within well-child visits. This resource is particularly valuable because of the apparent gap in resident education on this subject and the increasing need for asynchronous, remote-learning opportunities due to the COVID-19 pandemic. This free, online curriculum has the potential to train the next generation of pediatricians and provides an opportunity to incorporate positive parenting behaviors as standard practice in well-child visits.

## ACKNOWLEDGMENTS

We appreciate the notable contributions of Layla Fattah, MEd; Ellen Galinsky, MS; Robert Fallar, PhD; Anne Martin, DrPH; Joel Forman, MD; and Lianna Lipton, MD for their research and editorial assistance.

The authors gratefully acknowledge the contributions of site champions and participating residents from each study site. Pilot site and site champions are as follows: Children's Hospital of Los Angeles - Jeffrey Yang, MD; Elmhurst Hospital - Gwen Raphan, MD; Massachusetts General Hospital - Daniel Hall, MD; Tulane Medical Center - Mary Margaret Gleason, MD & Myo Thwin T Myint, MD; University of Mississippi Medical Center - Susan Buttross, MD & Lauren Elliott,

PNP; University of Utah School of Medicine - Quang-Tuyen Nguyen, MD; UT Southwestern Medical School - Sari Bar, DO.

**Funding source:** This work was funded in part by the Einhorn Family Charitable Trust, the Bezos Family Foundation, the Aronson Family Foundation, and the Board of the Mount Sinai Parenting Center. The views expressed are those of the authors and not necessarily those of our funders. Funders were not involved in the design of the study, analysis, interpretation, writing the manuscript, or in the decision to submit this article for publication.

**Financial disclosure:** Dr. Hiershenee B. Luesse at 8RES, LLC was hired as the external evaluation consultant to support this evaluation. All other authors have indicated they have no financial relationships relevant to this article to disclose.

## SUPPLEMENTARY DATA

Supplementary data related to this article can be found online at <https://doi.org/10.1016/j.acap.2021.06.005>.

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